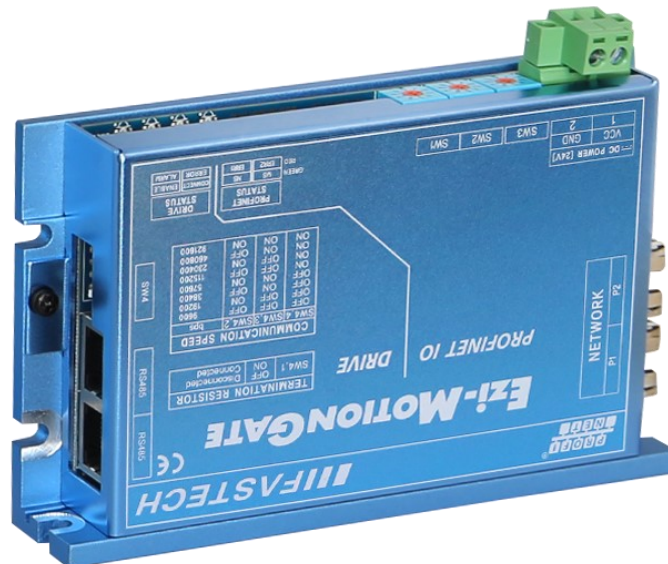


Ezi-MOTIONGATE ^{PROFINET}

PROFINET to RS-485 Motion Gateway

- User Manual -



2023-10-27

IO-Map 1.5.3

This manual is valid for over Ezi-MOTONGATE Ver.1.03.23.

※ Before Operation ※

- Thank you for purchasing our Ezi-MOTIONGATE product.
- Ezi-MOTIONATE PROFINET IO is a gateway product that allows Ezi-MOTIONNGATE products to be connected directly to PROFINET Network so that they can use motion, parameters, PT operation, teaching, etc. of the Ezi-MOTION Plus-R family.
- This manual describes the handling, safety caution, trouble shooting, specifications of Ezi-MOTIONGATE PROFINET IO.
- Before start operation of Ezi-MOTIONGATE PROFINET IO, thoroughly read this manual.
- After reading this manual, keep the manual near Ezi-MOTIONGATE PROFINET IO, so that any user can read this manual whenever needed.

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※ Before operation ※

- Thank you for purchasing our Ezi-MOTIONGATE product.
- Ezi-MOTIONGATE is Fieldbus to FASTECH protocol Gateway Unit with 32bit high performance ARM processor.
- This manual describe the handling, safety caution, trouble shooting, specifications of Ezi-MOTIONGATE PROFINET IO.
- Before start operation of Ezi-MOTIONGATE PROFINET IO, thoroughly read this manual.
- After reading this manual, keep the manual near Ezi-MOTIONGATE PROFINET IO, so that any user can read this manual whenever needed.

1. Safety Precautions

1.1 General Precautions

- ◆ Contents of this manual are subject to change without prior notice for functional improvements, change of specifications or user's better understanding.
- ◆ In case manual is damaged or lost, please contact with FASTECH's agent or our company.
- ◆ FASTECH is not responsible for a product breakdown due to user's dismantling for the product, and such a breakdown is not guaranteed by the warranty.

1.2 Safety Precautions

- ◆ Before installation, operation, inspection, repair, etc. be sure to read the User's Manual thoroughly. In addition, be aware of the safety precaution notices for the machine sufficiently before using the product.
- ◆ The User's Manual classifies the level of safety instructions into **Attention** or **Warning**.



How to view the notation on the manual, or additional explanation for function examples.

 Attention	If handled incorrectly, the user may seriously or slightly injured damages may occur in the machine.
 Warning	If handled incorrectly, dangerous situations such as electric shock may occur and there may be a risk of death or severe injury.

- ◆ Although contents are CAUTION among the written contents, a serious result could be caused depending on the situation. Follow safety precaution.

■ Product Status

 Attention	Check the product is damaged or parts are missing. If install or drive abnormal product, the machine may get damaged or the user may get injured.
--	---

■ Installation

 Attention	Pay sufficient attention during operation. If dropped, the product may get damaged or user's foot may get injured by dropping the product. Keep away from flammable materials when handling the product as there is a risk of fire. When installing several Ezi-MOTIONGATE in one closed space, be sure to install a cooling device, etc. so that the ambient temperature is less than 50°C. Overheating may cause fire and other accidents.
 Warning	The installation, connection, operation, inspection and diagnosis of malfunction shall be carried out by qualified personnel. Otherwise, a fire or other kinds of accidents may occur.

■ Wiring

 Attention	Keep the rated range of input Voltage for drive. Otherwise, a fire or other kinds of accidents may occur. Cable connection should be following the wiring diagram. Otherwise, a fire or malfunction of machine may occur.
--	---

 Warning

Before connecting cables, check if input power is off.
Otherwise, an electric shock or a fire may occur.

The case of this Ezi-MOTIONGATE is isolated from the ground of the internal GND by the condenser. Please ground the Ezi-MOTIONGATE.

Otherwise, an electric shock or a fire may occur and a cause of malfunction of machine.

■ Operation & Setting change

 Attention

If a protection function occurs, firstly remove its cause and then release the protection function.

If you operate continuously without removing its cause, the machine may get damaged or the user may get injured.

Make all input signals to OFF before supply input voltage to drive.

The machine may get damaged or the user may get injured by motor operation.

All values of this Ezi-MOTIONGATE were set correctly at the time of its release.

Before changing stings, read the User's Manual thoroughly.

Improper usage may break or damage the machine.

■ Maintenance & checking



Stop to supply power to the main circuit and wait sufficient time before checking or repairing this Ezi-MOTIONGATE.

Electricity remaining in the condenser may cause of electric shock.

Do not change cabling while power is being supplied.

Otherwise, the user may get injured or the product and machine may get damaged.

Do not reconstruct the product.

Otherwise, an electric shock may occur or the product and machine get damaged. And the reconstructed product cannot get after service.

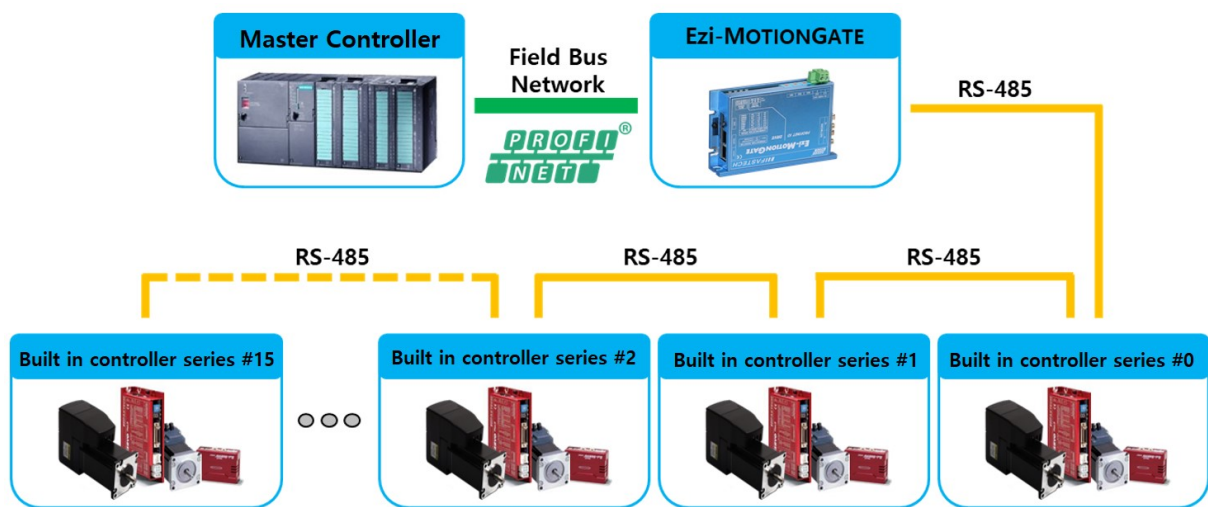
Notices for Installation.

- 1) The products should be used indoors and the ambient temperature must be 0°~55°C.
- 2) If the ambient temperature is over 50°C, the heat should be discharged outside.
- 3) Avoid direct light, magnetic objects, and radiative objects when installing.
- 4) When installing more than two drives side by side, leave a distance over than 20mm vertically and over than 50mm horizontally.

2. Product Composition

2.1 System composition of Ezi-MOTIONGATE

Ezi-MOTIONGATE is controlled by connecting with PROFINET network. Thus, Ethernet port of MOTIONGATE network terminal should be connected to PROFINET network line. Up to maximum 16 Ezi-MOTION PlusR drive systems can be connected to one Ezi-MOTIONGATE. Standard-Alone type "ST" drive, compact type "MINI" drive, and motor & drive integrated type "ALL" drive can be directly connected to Ezi-MOTIONGATE with RS-485 cable (UTP : FASTECH CGNR-R cable). For some other product, to connect with RS-485 network, you need to use a junction unit called "BD-CON"



<System Diagram>

2.2 Overview

- Ezi-MOTIONGATE(hereunder, MOTIONGATE) is the Motion gateway device controlling motion drive composed of FASTECH RS-485 with master by connecting with slave at the industrial network.
- The maximum volume available by connecting MOTIONGATE with slave is the volume supported at the applied industrial network.
- Motor drive(Axis) able to connect in MOTIONGATE can give up to 16 motor IDs every industrial network.(In case PROFINET IO, use ID0~ID15)

2.3 PROFINET

PROFINET is designated and announced as innovative open standards for industrial Ethernet by PI (PROFIBUS & PROFINET International) at automation technology. PROFINET provides a solution for system automation, factory automation, and motion control.

PROFINET makes possible to integrate the existing fieldbus system as like PROFIBUS, Interbus, DeviceNet at open Ethernet-based network. PROFINET is a protocol for communication, composition, diagnosis at the network and use Ethernet standard along with TCP, UDP, IP.

PROFINET IO is called surrounding equipment having characteristic industrial Ethernet application layer(OSI-7 most significant class). It provides lots of advantage in comparison with any other network application layer.

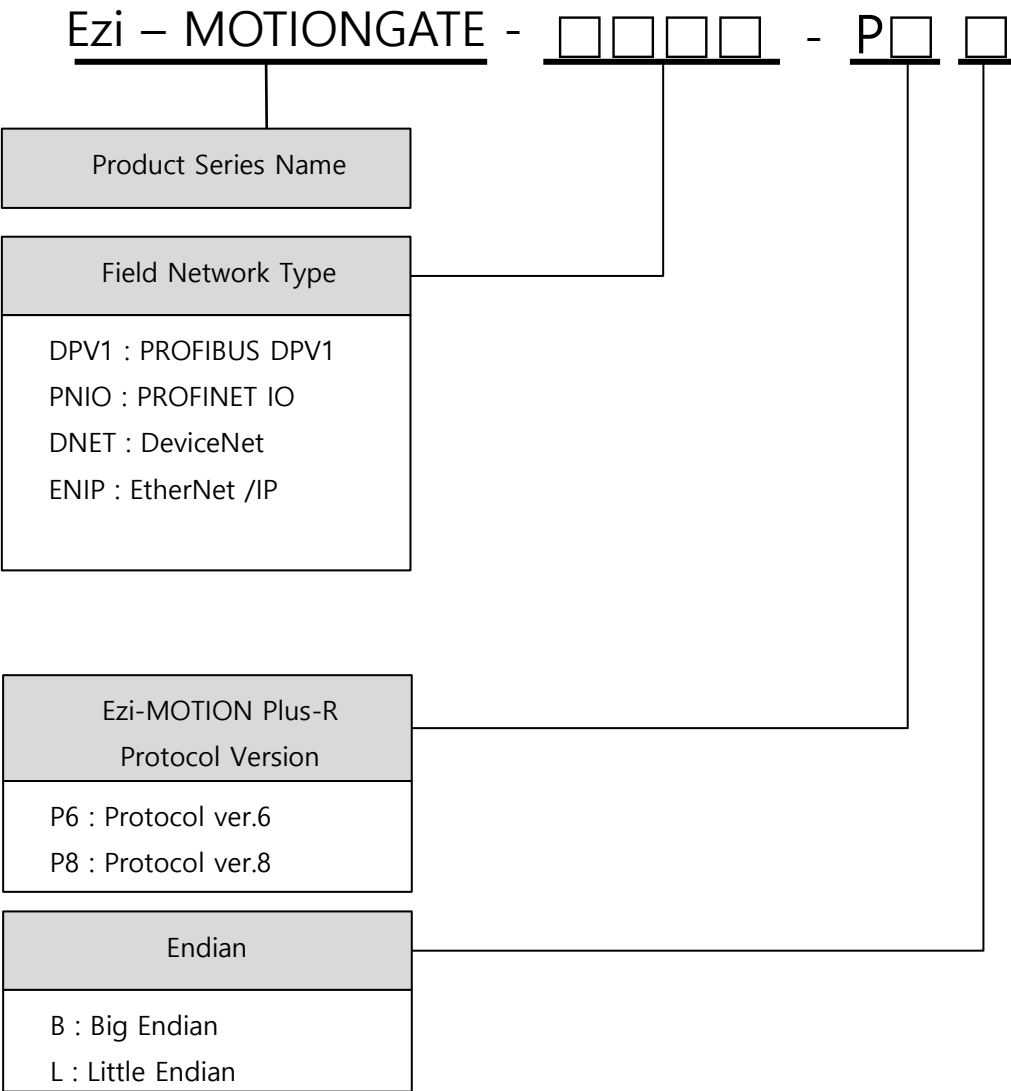
- ✓ High speed movement – Real-Time channels provide high-speed message exchanges by bypassing the time needed to process the TCP / IP stack
- ✓ Siemens S7 PLC can be integrated seamlessly and almost identically with PROFIBUS
- ✓ Sensitive at time Motion control application support (IRT [Isochronous Real Time]) *1)
- ✓ Diversified intelligence – Processing of four functions : For performance and reliability local I / O or hardware, information collection and temporary storage, information processing, remote I / O and communication
- ✓ Minimum support a test time and engineering support



NOTE

1*) Ezi-MOTIONGATE PROFINET is not supporting IRT.

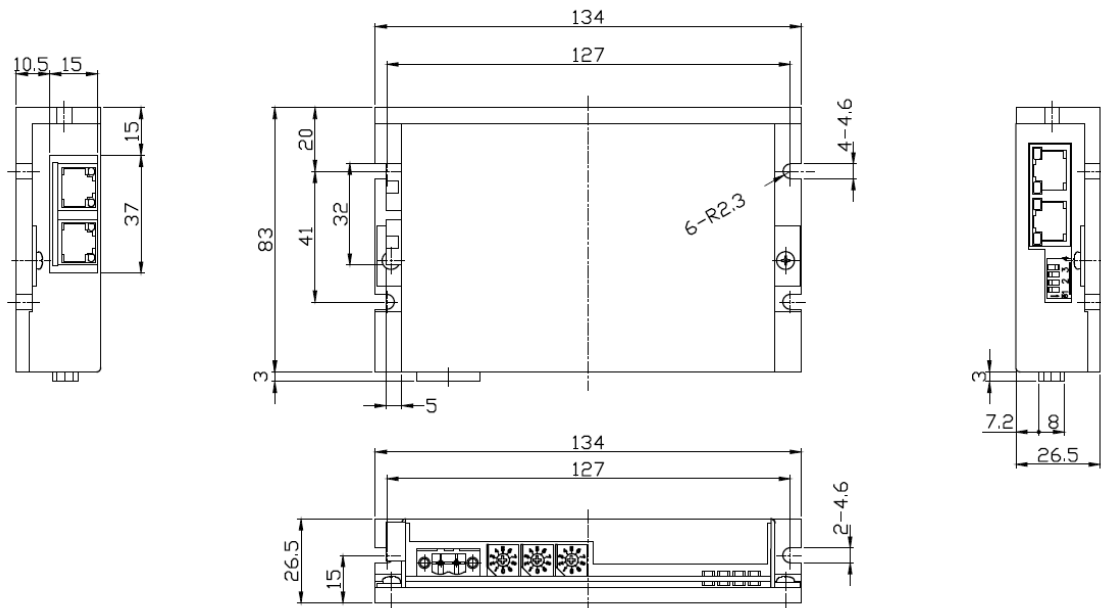
2.4 Part Numbering



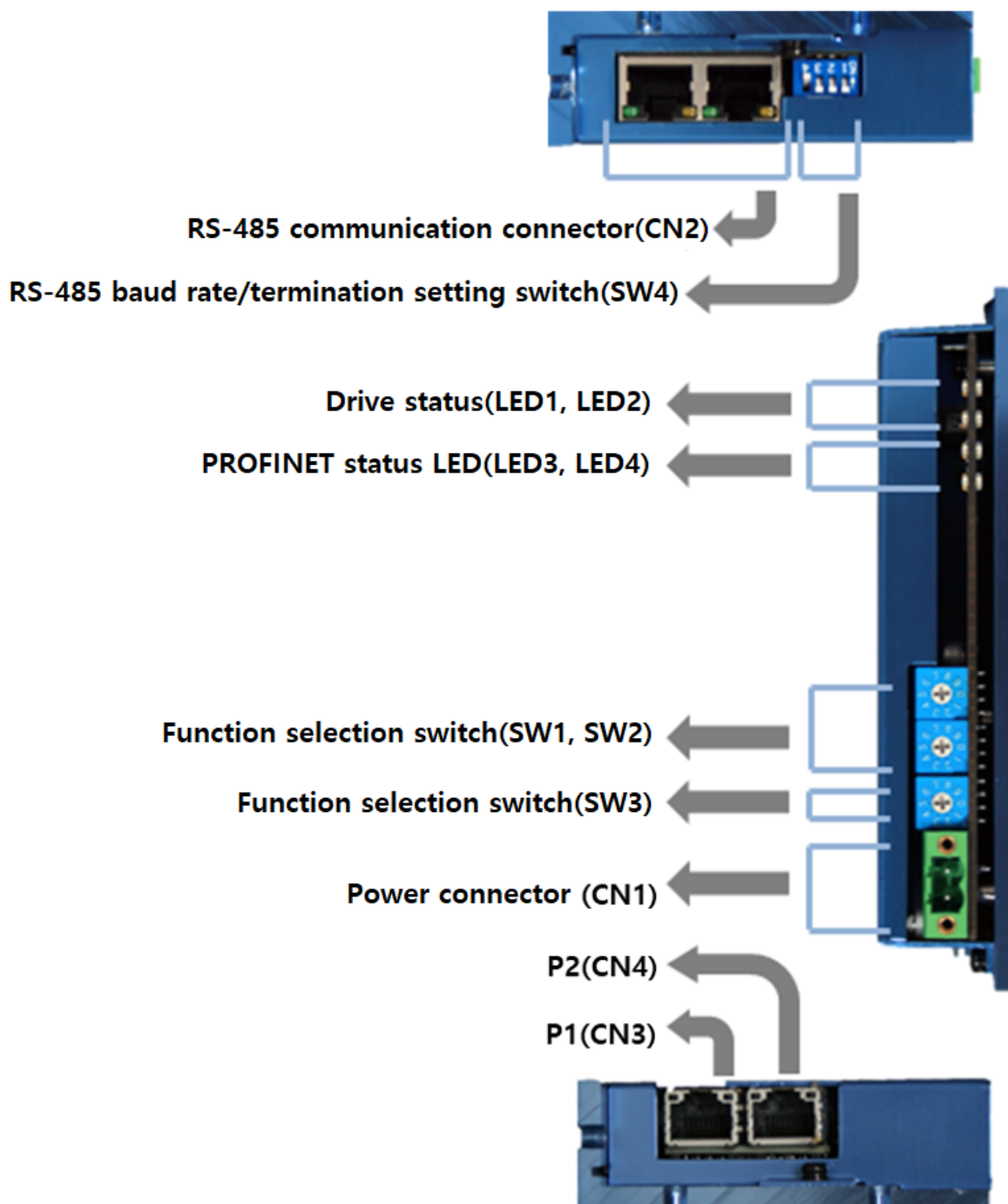
2.5 Ezi-MOTIONGATE specifications

Network		EtherNet / IP							
Input Voltage		24VDC $\pm 10\%$							
Control Method		Motion gateway able to control multi-axis by using I/O data of the industrial network							
Physical layer		Ethernet Based 100Mbps; RJ45 connector compatibility							
Data size		IN : 128 byte OUT : 128 byte							
Current consumption		Max 500mA							
Environment	Temperature	When in use : 0~55°C When stored : -27~70°C							
	Humidity	When in use : 35~85% (No Condensation) When stored : -10~90% (No Condensation)							
	Inner Vibration	0.5G							
Function	Rotary Switch	None function							
	LED Display	Network anomaly, master connection anomaly, drive Servo On status, drive alarm status							
Module Slot		64 (Q Address 32, I Address 32)							
FASTECH RS485		RJ-45 connector LED	YELLOW : RS485 transmission status (TX from MOTIONGATE) GREEN : RS485 reception (RX to MOTIONGATE)						
		Baud-Rate (bps)	9,600	19,200	38,400	57,600	11,5200	230,400	460,800
		Cable Length (m)	1,200	1,150	1,100	1,000	1,000	880	550
		RJ-45 connector LED	YELLOW : RS485 transmission status (TX from MOTIONGATE) GREEN : RS485 reception status (RX to MOTIONGATE)						

2.6 Ezi-MOTIONGATE exterior



2.7 Name of each part



2.7.1 Function selection switch (SW1, SW2, SW3)

There is no current implementation. This will be applied on systems that require custom behavior.

2.7.2 RS485 Baud-Rate Setting Switch(SW4)

SW4 is a switch for setting Baud-Rate of RS-485 communication network connected with motor drive. If MOTIONGATE connects to end of a network segment, it determines whether terminating resistor uses.

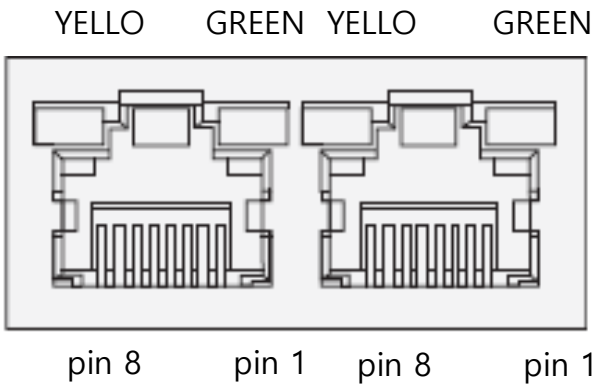
SW4.1 determines using of terminating resistor, SW4.2~SW4.4 is used to set Baud-Rate as follows.

SW4.1	SW4.2	SW4.3	SW4.4	Speed baud[bps]	 When SW4.1 is OFF : A terminating resistor is OFF. When SW4.1 is ON : A terminating resistor is ON.
X	OFF	OFF	OFF	9600	
X	ON	OFF	OFF	19200	
X	OFF	ON	OFF	38400	
X	ON	ON	OFF	57600	
X	OFF	OFF	ON	115200 ^{*1)}	
X	ON	OFF	ON	230400	
X	OFF	ON	ON	460800	
X	ON	ON	ON	921600	

^{*1)}: Default value

2.7.3 FASTECH RS-485 communication connector

RJ45 communication connector is used to connect to RS-485 network.



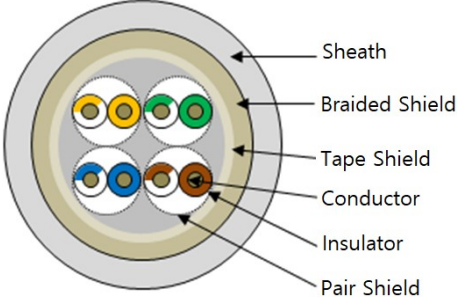
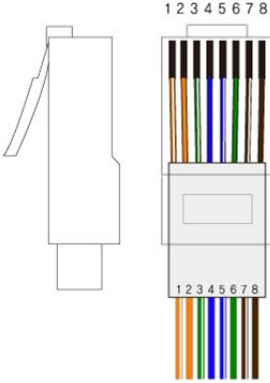
Pin map of communication connector (RS485)

Pin No.	Function
1, 2, 4, 5, 7, 8	GND
3	DATA +
6	DATA -
CASE	Frame GND

Communication connector LED

Display	Color	Blinking timing
RS485 TX	Green	Blinks on transmission of RS-485 data
RS485 RX	Yellow	Blinks on reception of RS-485 data

Structure of RJ45 cable using UTP/STP cables

UTP/STP Cable	Pin map of RJ-45
 * The picture above shows STP cable standard. UTP cable does not have shield.	 * The picture above shows T568B standard.

2.7.4 Status display LED (LED1...LED4)

Status display LED indicates status by simultaneous operation of LED1~LED4 or single operation situationally.

LED No.	Operation status	Explanation
LED1 LED2 LED3 LED4	Light-out	Power OFF, time-out state, network not connected
	Green and red light is on simultaneously	Booted by power supply to the MOTIONGATE. Re-booted by changing station number or baud rate with switch. *Since green LED and red LED are lit at the same time, the LED color appears to be orange.
	Green LEDs blink simultaneously	MOTIONGATE's self-diagnosis state Connector not connected Wrong baud rate setting Wrong network station number setting
LED3 LED4	Green and red light is on simultaneously	Network device of MOTIONGATE cannot be recognized * Contact the head office or retail shop for action.

■ Drive status display LED (DRIVE STATUS)(LED1, LED2)

LED No.	LED Status Information	LED Name	Operation Status	Explanation
LED1	MOTIONGATE activated	ENABLE (Green)	Blinking	MOTIONGATE is active
	Drive alarm	ALARM (Red)	Blinking	One or more drives are in alarm mode.
LED2	Drive connection OK	CONNECT (Green)	Light on	By connect command, motor drives are communicating with MOTIONGATE normally.
		ERROR (Red)	Light off	
	Drive connection error	CONNECT (Green)	Light off	No motor drives running connection command among RS-485 network connected motor drives No motor drives in communication status with MOTIONGATE No communication with drive RS-485 network disconnected Baud rate setting error
		ERROR (Red)	Light on	
	Communication error	CONNECT (Green)	Light on	Communication error with motor drive(CRC error occurrence)
		ERROR (Red)	Random blinking	
	Communication error in multiaxial connection status	CONNECT (Green)	Light on	No response to connection command at more than a motor drive connected to RS-485 Network disconnection Abnormality in the topology composition Run connection command at IP-Map area of not existing motor drive.
		ERROR (Red)	Light off	



Attention

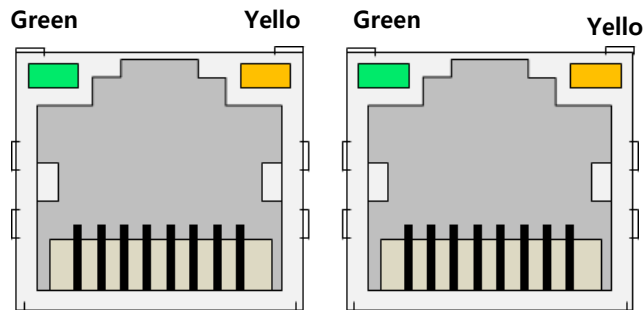
Drive status display LED should check motor activation state after inspecting communication state of MOTIONGATE and drive.

■ EtherNet/IP LED (LED3, LED4)

LED No.	LED Status	Operation Status	Explanation
NS LED	Off	Offline	No Power. Not connected to host controller
	Green	Online (RUN)	Connected to host controller and Run state
	Green, flashing	Online (STOP)	Connected to host controller but Stop state
MS LED	Off	Not Initialized	No Power or, network module is not initialization
	Green	Normal Operation	Module exits initialization state and performs normal operation
	Green, 1 flash	Diagnostic Event(s)	There is a diagnostic event.
	Green, 1 Hz	DCP Flash	Used to identify nodes in a network at engineering tools.
	Red	Exception Error	Occur to an exceptional error of module
	Red, 1 flash	Configuration	The expected device information from the host controller is different from the actual device information.
	Red, 2 flashes	IP Address Error	A setting error of IP address
	Red, 3 flashes	Station Name Error	Did not specify the name of the device.
	Red, 4 flashes	Internal Error	Occur to a crucial inner error at module

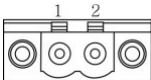
2.7.5 PROFINET LINK/Activity

It is Link/Activity LED that indicatd Ethernet Link status and activity status. Yellow LED is turned ON when Ethernet is linked, Green LED blinks when it is connected to master normally.



2.7.6 Power Connector(DC POWER)

This is a connector for power supply

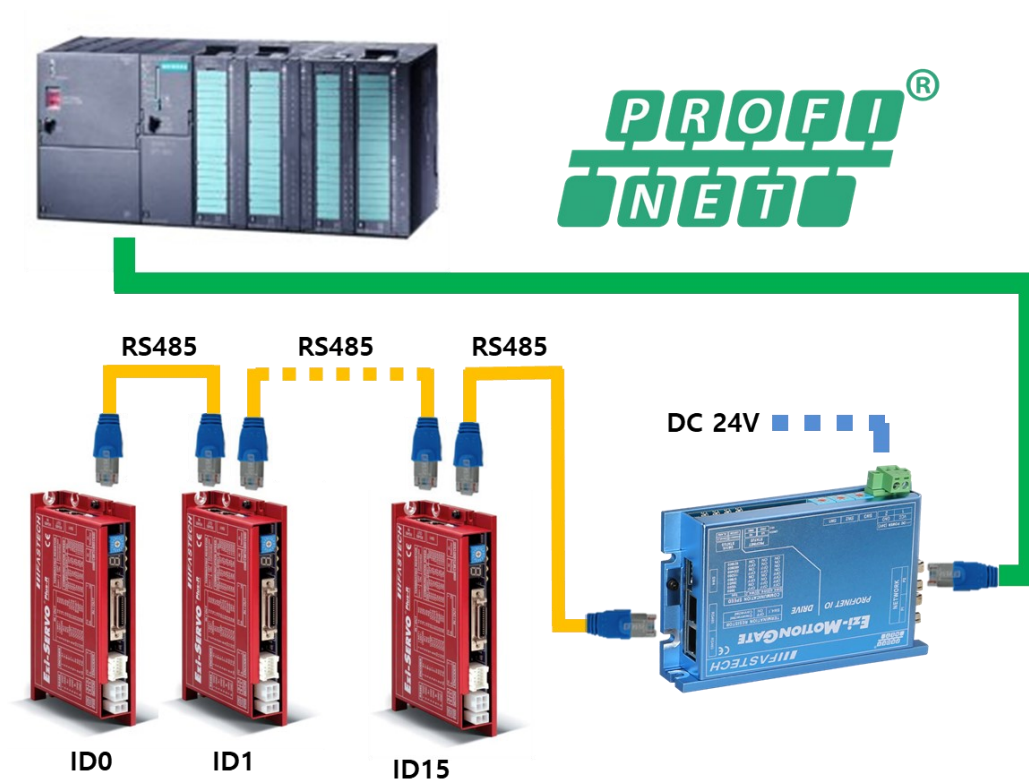
No.	Function	Pin Map
1	Input Voltage : 24VDC $\pm$ 10%	
2	Input Voltage : GND	

3. Installation and connection method

3.1 Network system diagram

MOTIONGATE's network is connected to the host controller via PROFIBUS, and is connected to the built-in motion drive of the FASTECH controller via RS485. Also, it supports PROFIBUS topology and can be configurable as follows.

■ MOTIONGATE network diagram



Attention

When connecting MOTIONGATE to PROFINET, it is recommended to use shielded STP / FTP Ethernet cable or PROFINET dedicated communication cable.

3.2 Network connection

PROFINET is a network based on Ethernet. You can connect to the network using the RJ-45 connector. Direct cable (T568B) used in PC can be used.

RJ-45 connector Pin map(T568B)



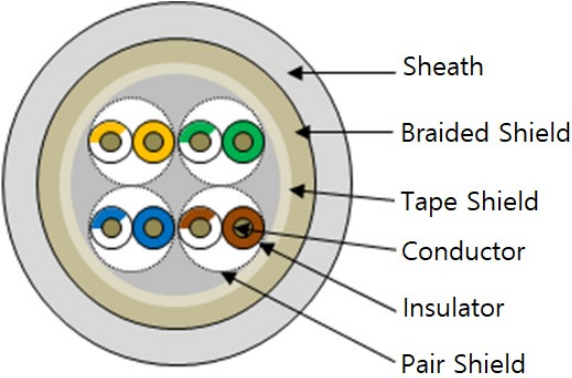
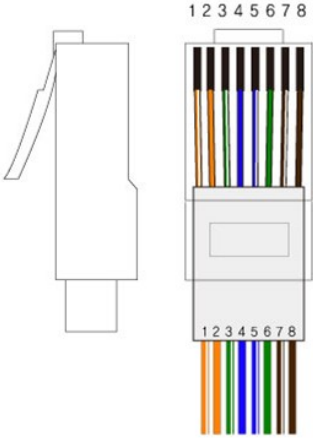
Pin No.	RS-485 Data name	Ethernet Data name	Wire Color		Wire Color	Ethernet Data name	RS-485 Data name	Pin No.
1	S-GND	TX+	White-Orange		White-Orange	TX+	S-GND	1
2	-	TX-	Orange		Orange	TX-	-	2
3	Data+	RX+	White-Green		White-Green	RX+	Data+	3
4	-	Blank	Blue		Blue	Blank	-	4
5	-	Blank	White-Blue		White-Blue	Blank	-	5
6	Data-	RX-	Green		Green	RX-	Data-	6
7	-	Blank	White-Brown		White-Brown	Blank	-	7
8	-	Blank	Brown		Brown	Blank	-	8
Connector Hood			Cable Shield		Cable Shield			Connector Hood



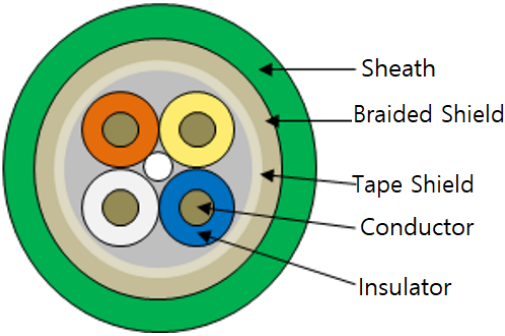
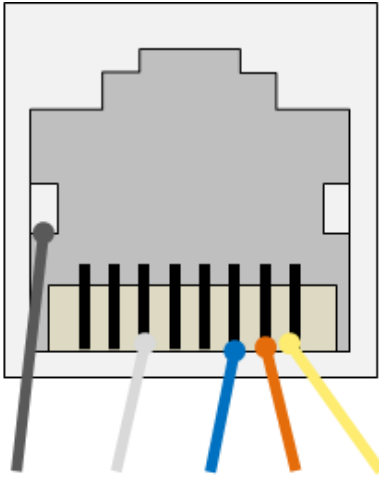
Attention

You can use normal UTP cable to connect MOTIONGATE to PROFINET network, but data loss may occur due to noise effect when constructing network in industrial field. As a countermeasure, it is recommended to use STP cable and dedicated cable.

RJ45 cable structure using UTP/STP cable

UTP/STP Cable	RJ-45 Connector pin map
 * Above picture is STP cable standard and UTP cable is shieldless cable.	 * The figure above shows the dimensions of the T568B.

Ethernet network cable structure

Ethernet Cable	LAN port pin map												
 <table><thead><tr><th>Core wire type</th><th>Data name</th></tr></thead><tbody><tr><td>Yellow</td><td>Tx+</td></tr><tr><td>Orange</td><td>Tx-</td></tr><tr><td>White</td><td>Rx+</td></tr><tr><td>Blue</td><td>Rx-</td></tr><tr><td>Modulation Shield</td><td>Shield</td></tr></tbody></table>	Core wire type	Data name	Yellow	Tx+	Orange	Tx-	White	Rx+	Blue	Rx-	Modulation Shield	Shield	 Shield 6. Rx- 3. Rx- 2. TX- 1. Tx+ * When using a shielded connector, the shield will be in contact with the connector of RJ-45.
Core wire type	Data name												
Yellow	Tx+												
Orange	Tx-												
White	Rx+												
Blue	Rx-												
Modulation Shield	Shield												

3.3 Connection of host controller (SIEMENS STEP 7 SIMATIC 5.x)

3.3.1 GSD file

GSD file is a file developed by PROFIBUS & PROFINET and contains all the attributes of the Slave device. The GSD file of PROFIBUS DP is a *.gsd file, which can be modified with a plain text editor, but the GSD file of the PROFINET IO device is saved using a *.xml file, the structure and principle of which are determined by GSDML schma.

The name structure of the GSD file for the PROFINET IO device is as follows:

“GSDML-V2.25-FASTECH-Ezi_MOTIONGATE_PNIO-20190709.xml”

Part name of file	Explanation
GSDML	All PROFINET IO Device GSD files begin with this character
V2.25	Version of GSDML schma
FASTECH	Product manufacturer
Ezi_MOTIONGATE_PNIO	Device name
20190709	Version creation date
.xml	File extension

You can download GSD file of Ezi-MOTIONGATE PROFIBUS from FASTECH homepage's download section as follows.

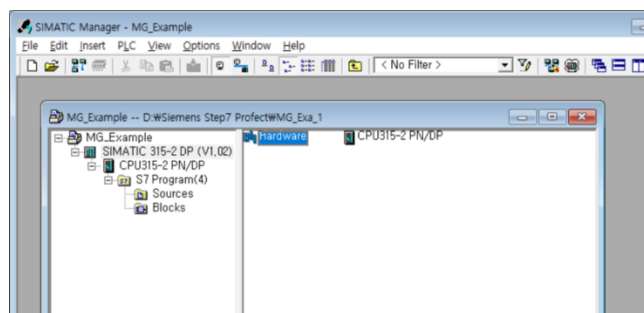
- **EDS file download route**

KOR Address: https://fastech.co.kr/new/board/bbs/board.php?bo_table=sub0302

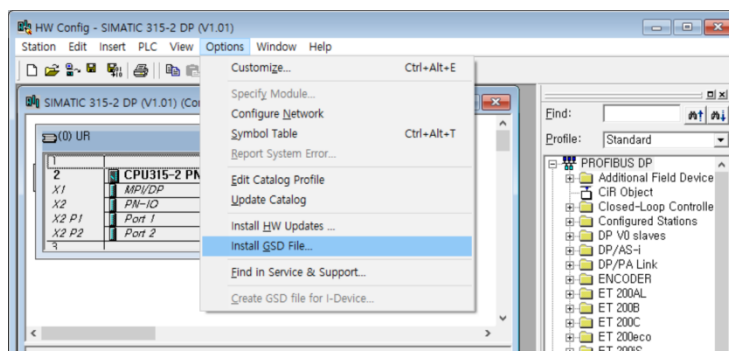
ENG Address: https://fastech.co.kr/new/board/bbs/board.php?bo_table=sub0302_en&sca=Software

3.3.2 Register GSD file

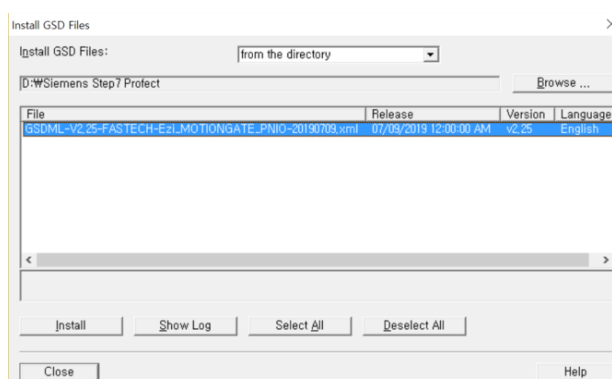
STEP 7 Create a project file and double click [Hardware] which is confirmed when selecting [Station] to open "H / W config" window.



Select [Options] -Install GSD File ..] from the menu of the "H / W config" window.

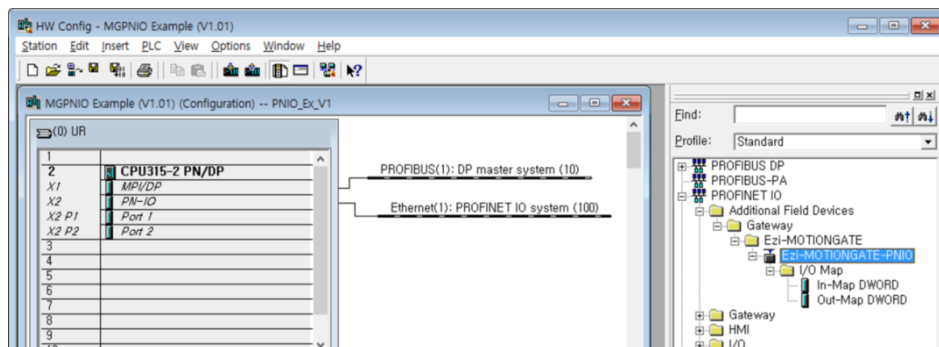


In the Install GSD Files window, click the [Browse] button to select the folder containing the MOTIONGATE GSD files.



Selecting a folder displays all the GSD files present in that folder. Select "GSDML-V2.25-FASTTECH-Ezi_MOTIONGATE_PNIO" and click [Install] button to install.

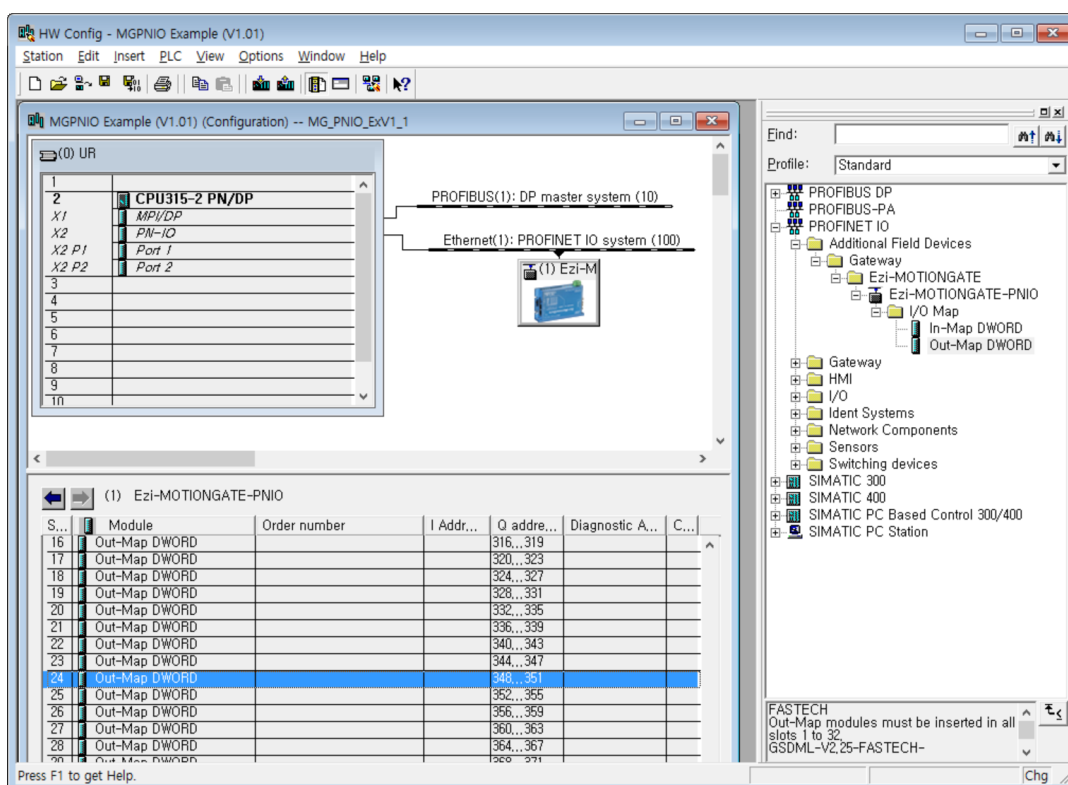
If the GSD file is installed properly, [Ezi-MOTIONGATE] is added to [PROFINET IO]-[Additional Field Devices] – [Gateway] in the directory tree.



Input and output modules are added to the Ezi-MOTIONGATE-PNIO tree, and both In-Map and Out-Map must be added to all 32 slots.

Out-Map : slot 01~32

In-Map : slot 33~64



3.4 Set Network IP of MOTIONGATE

Unlike Ezi-MOTIONGAE of another network, Ezi-MOTIONGATE PROFINET IO sets IP by a dedicated setting program, not IP setting by rotary switch.

3.4.1 IP Config Setup program

You can get "IP Config" to set IP of MOTIONGATE from the download folder of the FASTECH's homepage.

- **Download route**

Korean site : https://fastech.co.kr/new/board/bbs/board.php?bo_table=sub0302

English site : https://fastech.co.kr/new/board/bbs/board.php?bo_table=sub0302_en&sca=Software



IPconfig
Setup.exe



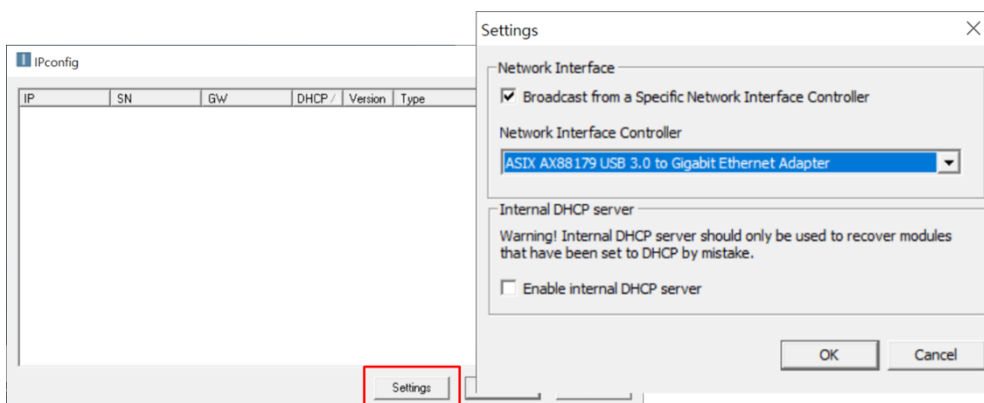
3.4.2 Check the Ethernet device of PC

In Device Manager, connect the Ethernet cable with the available Ethernet devices in the entry of the network adapter.

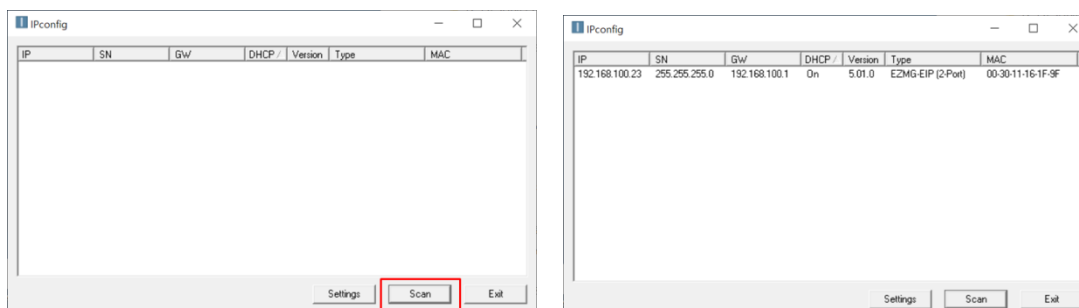


3.4.3 Use of IPconfig Program

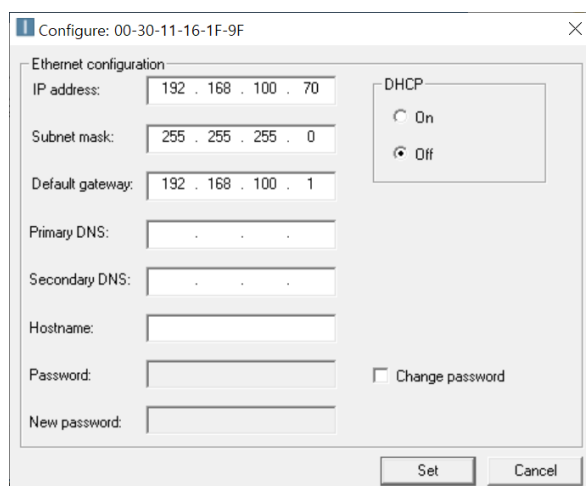
Run the installed "IP config" and click the "Settings" button to open the Setting window.



Select the network interface controller connected to the same network as MOTIONGATE and click the Scan button to search for MOTIONGATE connected to the network. When the MOTIONGATE is searched, the target information connected to the list is checked, and you can double-click to configure the settings.



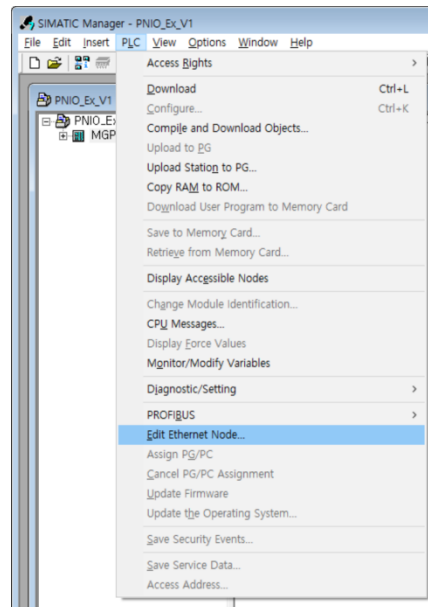
Ethernet connection information can be entered in the configuration window. If DHCP is On, it is automatically set through the router. However, to make it easier to find the MOTIONGATE from the host controller, turn off this function and assign it to the same network of the host controller.



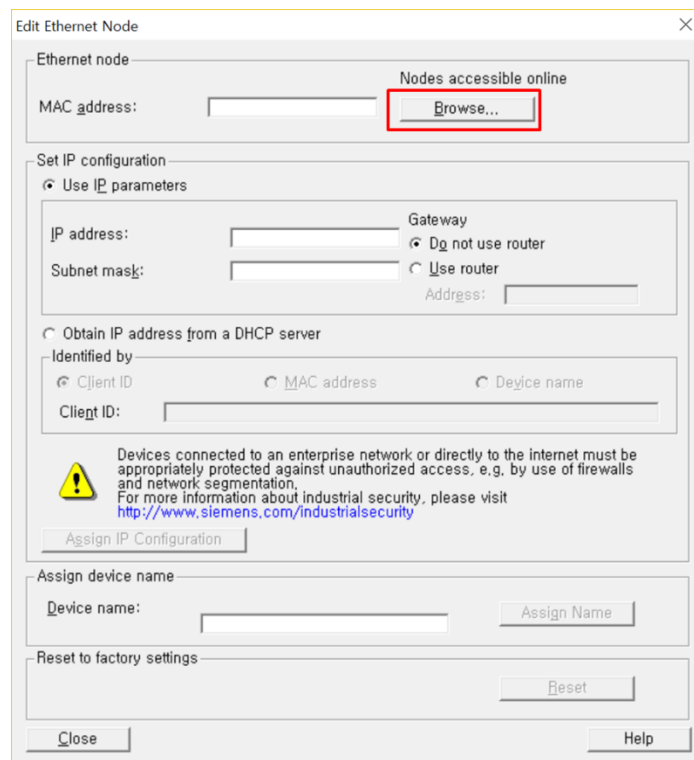
3.4.4 Use of PLC software

The IP of MotionGate can be changed in PLC software. The examples in this manual are changed using SIMATIC Manager.

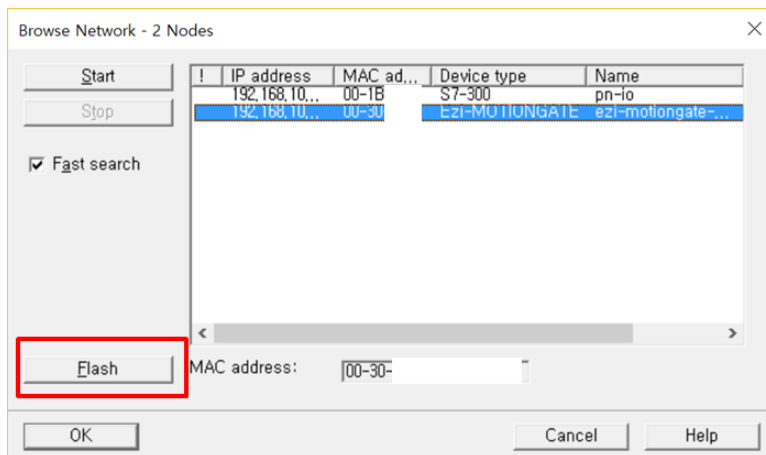
Select [PLC] – [Edit Ethernet Noode] on the menu bar.



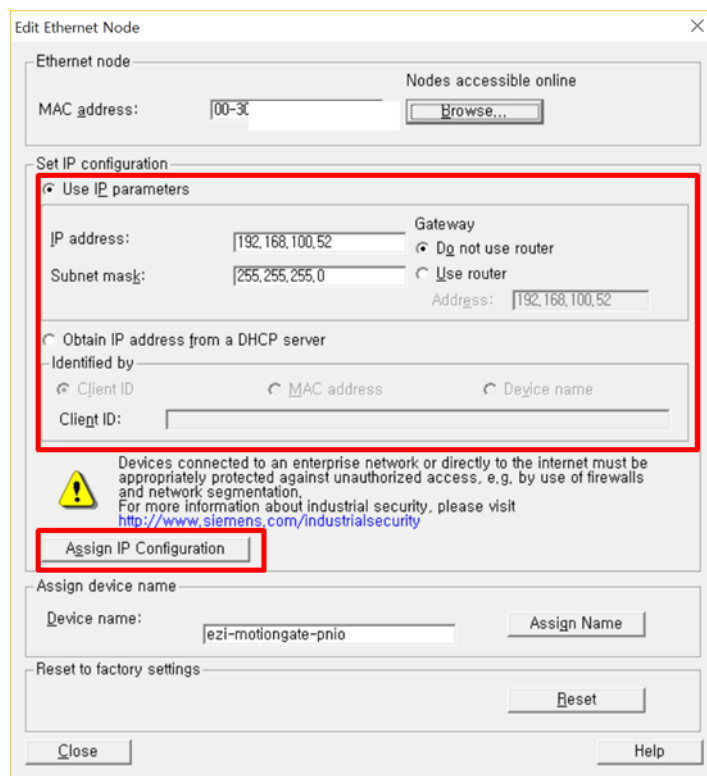
You can search the connected MOTIONGATE by pressing the [Browse] button in the Ethernet Node field.



When the search is completed, the list is checked as follows. To check if the device in the list is the one you want to change, click the [Flash] button.



To change the IP of the selected device, click the [Assign IP Configuration] button after selecting the input value or whether the DHCP of the router uses and the IP of the MotionGate will be changed.

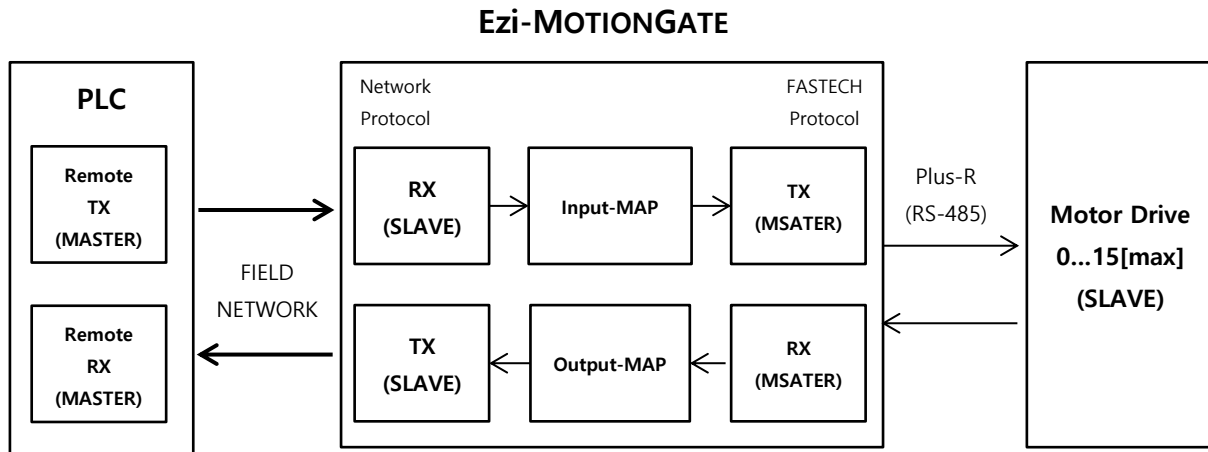


Please refer to the SIEMENS SIMATIC STE: P7 Program User's Manual.

4. I/O-Map configuration

4.1 MOTIONGATE system of Industrial network

MOTIONGATE works as a slave in the industrial network. Host controller(PLC) which is the master device of the industrial network should be a master system that able to access the T/RX memory address of industrial network connected with MOTIONGATE.

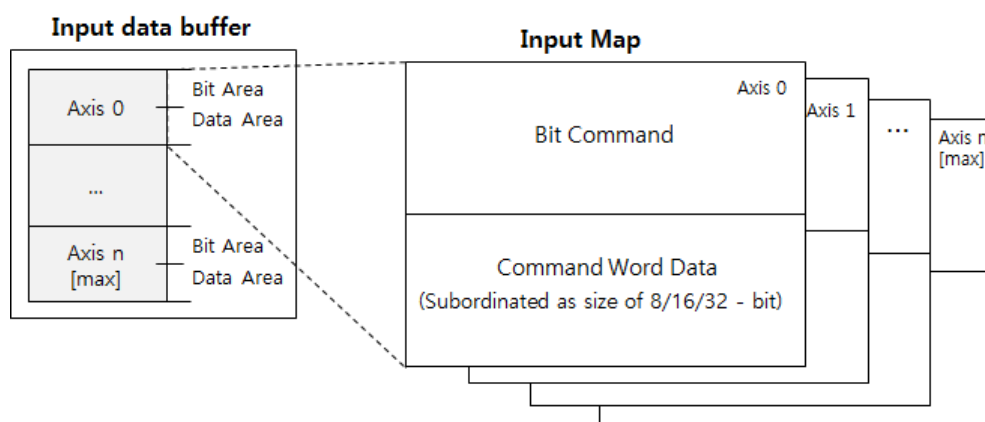


- ① Host controller receive data through the industrial network by combination of bitmap.
- ② MOTIONGATE receives Transmitted data through the industrial network.
- ③ MOTIONGATE analyzes the transmitted data with specified Input-Map.
- ④ MOTIONGATE sends the command of Input-Map to the motor drive connected as a slave.
- ⑤ The response information of the motor drive according to the control command is configured as an output map by the MOTIONGATE.
- ⑥ MOTIONGATE sends the data of Output-Map to the industrial network.

4.2 MOTIONGATE I/O-Map

The I / O data buffer transmitted and received from the host controller has an IO-Map of the number of motor drives (the number of drives that can be connected to the motion gate). An IO-Map to control one motor drive is divided into bit area[0-3] and data area[4-7] and has a total size of 8 bytes.

4.2.1 Input Map structure



The bit area in the Input-Map is used as the interval for the bit command of the motor axis. However, when using IO-Map in setting mode, 2-3 byte area of command bit is used as INDEX No. The command word data area is used as a section for inputting the data information used in bit instruction when the bit instruction is executed. Command word data is a 1 DWORD format data composed of 32 bit data structure.

■ Input Map bit configuration

Input-Map is area commanding control of motor drive. With combination of bit on command, it can set up selection of motion control of motor drive and information type or value of PT information and so on.

0						1					
Response Type		Command Code				0		Command Code			
Motion Command Bit						INDEX No. (Parameter, Setting Item, PT Item)					
Command Word Data (Subordinated as size of 8/16/32 - bit)						Command Word Data (Subordinated as size of 8/16/32 - bit)					

< Input Map configuration of motion mode > < Input Map configuration of setting mode >



NOTE

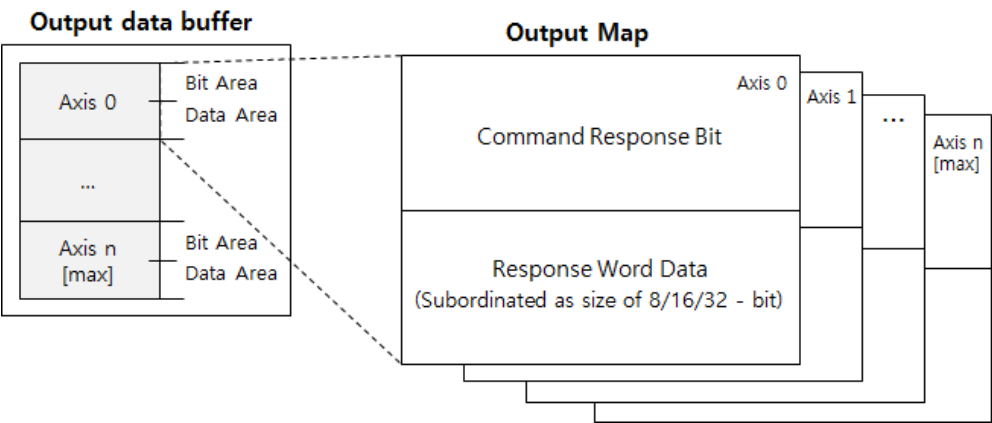
The device memory 1WORD of the host controller is 16bit data and has a size of 2 bytes. Therefore, the 00.0 ~ 00.7 area of address 0h of the device memory occupies 0Byte area of IO-Map, and 00.8 ~ 00.15 occupies 1Byte area.



NOTE

The device occupancy memory used by the data area is 2WORD. Therefore, you can use a DWORD address for the start address of the data area.

4.2.2 Output Map structure



The bit area in the Output-Map is used as the status flag of the corresponding axis or as the response bit to the control command. In setting mode, INDEX No. used in Input-Map is loop-backed. The response word data area is the section in which the response data for the command in the Input-Map is specified. This area can respond to four data in one BYTE structure or one data in one DWORD depending on the command.

■ Output Map bit configuration

The Output-Map section has a loop-back bit for the data flag and the bit command. The loop-back bit is a bit that reacts in the same way as a command event of the corresponding bit, and it can check whether the input-map bit is input. The status flag is based on the received data information in communication with the corresponding motor drive.

0					
Response Type Resp		CMD Code Resp.			
Motion Command Response Bit					
Command Word Data (Subordinated as size of 8/16/32 - bit)					

< Output Map configuration of motion mode >

1					
0		CMD Code Resp.			
INDEX Number Resp. (Parameter, Setting Item, PT Item)					
Response Word Data (Subordinated as size of 8/16/32 - bit)					

< Output Map configuration of setting mode >



NOTE

The device memory 1WORD of the host controller is 16bit data and has a size of 2 bytes. Therefore, the 00.0 ~ 00.7 area of address 0h of the device memory occupies 0Byte area of IO-Map, and 00.8 ~ 00.15 occupies 1Byte area.



NOTE

The device occupancy memory used by the data area is 2WORD. Therefore, you can use a DWORD address for the start address of the data area.

4.2.3 IO-Map motion / setting command select bit

1) Motion control mode

When the MOTION / SETTING bit of the Input-Map is 0, the allocated data area is switched to the motion control form. When used as motion control, the data area 1-3 byte area is the motion control selection bit, and the 4-7 byte area is used as the value for motion control.

Input-Map: MOTION/SETTING [0.7]

Output-Map: MOTION/SETTING [0.7] (Loop-Back)

■ Types of motion control commands

- Jog move - Step move - Position move
- PT operation - Zero point move - Origin move



NOTE

The data area is classified as Big-Endian and Little-Endian depending on the approach for data processing of the host controller.
The Output-Map is the area where the MOTIONGATE outputs the response information to the host controller.

SERVO Drive Input Map

Input-Map

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	MOTION/ SETTING	-	-	CMD START	ALARM RESET	nESTOP	ENABLE	CONNECT
Byte 1	RESPONSE_TYPE				Motion CMD_CODE			
Byte 2	+STEP MOV	- STEP MOV	+ Jog MOV	- Jog MOV	GO_ZERO POS	-	HOLD	CANCEL
Byte 3				SINGLE PT	-	SPD MODE	-	INC/ABS
	POS MOVE SPD MAGNIFICATION VALUE							
Byte 4-7	Data Area							

STEP Drive Input Map**Input-Map**

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	MOTION/ SETTING	-	-	CMD START	ALM_RST/ MOTOR FREE	nESTOP	IGNORED	CONNECT
Byte 1	RESPONSE_TYPE				Motion CMD_CODE			
Byte 2	+STEP MOV	- STEP MOV	+ Jog MOV	- Jog MOV	GO_ZERO POS		HOLD	CANCEL
Byte 3	-	-	-	SINGLE PT	-	SPD MODE	-	INC/ABS
	POS MOVE SPD MAGNIFICATION VALUE							
Byte 4-7	Data Area							

SERVO Drive Output Map**Output-Map**

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	MOTION/ SETTING_ RESP	READY	OUT_RANGE	CMD_RESP.	ALARM /ERROR	ESTOP_ RESP	FLAG_ ENABLE	AXIS_ CONNECT
Byte 1	RESPONSE TYPE RESP				Motion CMD CODE RESP			
Byte 2	STEP_RESP.	-	JOG_RESP	-	GO_ZERO POS_RESP	ORG_RET_OK	HOLD_RESP.	MOTIONING
Byte 3	H/W +Limit	H/W - Limit	S/W +Limit	S/W -Limit	ORIGIN SENSOR	INP	MOV_DIR	PT_RUNNING
Byte 4-7	Data Area							

STEP Drive Output Map**Output-Map**

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	MOTION/ SETTING_ RESP	READY	OUT_RANGE	CMD_RESP.	ALM/ERROR	ESTOP_ RESP	MOTOR_ FREE	AXIS_ CONNECT
Byte 1	RESPONSE TYPE RESP				Motion CMD CODE RESP			
Byte 2	STEP_RESP	-	JOG_RESP		GO_ZERO POS_RESP	ORG_RET_O K	HOLD_RESP.	MOTIONING
Byte 3	H/W +Limit	H/W - Limit	S/W +Limit	S/W -Limit	ORIGIN SENSOR	INP	MOV_DIR	PT_RUNNIN G
Byte 4-7	Data Area							

The Output-Map in motion mode has a loop-back bit in the Input-Map, a response bit to the motion control command, and a status flag bit in the corresponding axis.

Motion control response bit

Loop-Back bit	Command response bit	Status flag bit
ESTOP_RESP	AXIS_CONNECT	FLAG_ENABLE
CMD_RESP.	MOTION_CMD_CODE_RESP	ALARM/ERROR, MOTOR_FREE (Step drive)
RESPONSE_TYPE_RESP	SETTING_CMD_CODE_RESP	
STEP_RESP.	INDEX_VALUE_RESP	READY
GO_ZERO_POS_RESP	OUT_RANGE	MOTIONING
JOG_RESP		HOLD_RESP.
		ORG_RET_OK
		PT_RUNNING
		MOV_DIR
		INP
		ORIGIN SENSOR
		S/W -Limit
		S/W +Limit
		H/W -Limit
		H/W +Limit

2) Setting control mode

When the MOTION / SETTING bit of the Input-Map is '1', the allocated data area is switched to the setting control mode. When used in setting control mode, 1 byte area of the memory area is used as command code, 2-3 byte area is used as parameter number, and 4-7 byte area is used as data value for parameter number.

SERVO drive Input Map**Input-Map**

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	MOTION/ SETTING	-	-	CMD START	ALARM RESET	ESTOP	ENABLE	CONNECT
Byte 1	0				SETTING_CMD_CODE			
Byte 2	INDEX_VALUE							
Byte 3								
Byte 4-7	Data Area							

STEP Drive Output Map**Input-Map**

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	MOTION/ SETTING	-	-	CMD START	ALM/RST MOTOR_ FREE	ESTOP	-	CONNECT
Byte 1	0				SETTING_CMD_CODE			
Byte 2	INDEX_VALUE							
Byte 3								
Byte 4-7	Data Area							

In the setting control mode, the drive connection bit, motor enable bit, emergency stop command bit, alarm release / motor-free bit operate the same as those in motion control mode.

SERVO drive Output Map**Output-Map**

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	SET_MOV RESP	READY	OUT_ RANGE	CMD_ RESP.	ALARM /ERROR	ESTOP_ RESP	FLAG_ ENABLE	AXIS_ CONNECT
Byte 1	0				SETTING_CMD_CODE_RESP			
Byte 2	INDEX_VALUE_RESP							
Byte 3								
Byte 4-7	Data area							

SERVO drive Output Map**Output-Map**

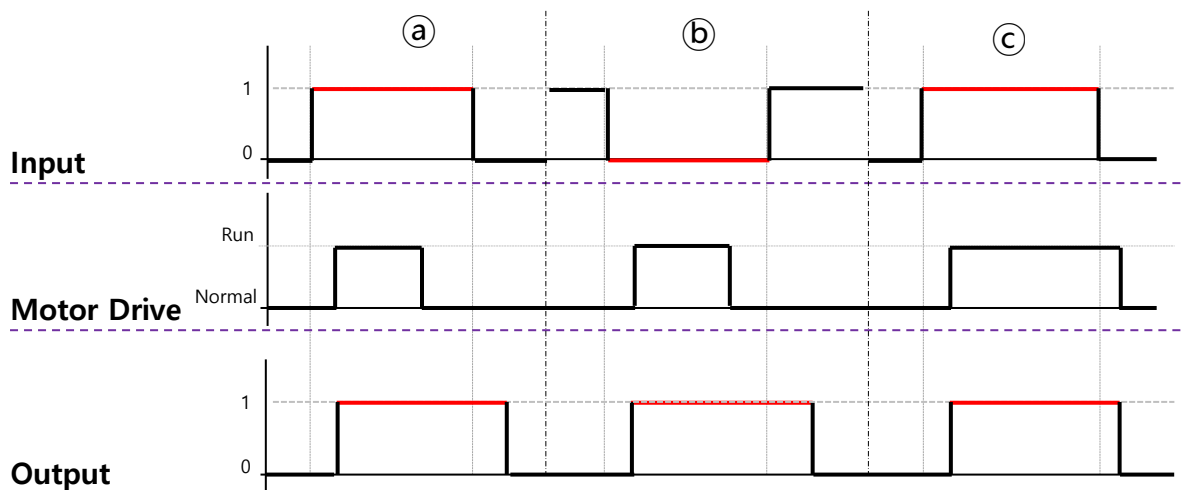
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	SET_MOV RESP	READY	OUT_ RANGE	CMD_ RESP.	ALARM /ERROR	ESTOP_ RESP	FLAG_ ENABLE	AXIS_ CONNECT
Byte 1	0				SETTING_CMD_CODE_RESP			
Byte 2	INDEX_VALUE_RESP							
Byte 3								
Byte 4-7	Data Area							

The connection command bit, motor enable bit, emergency stop command bit, and alarm release bit of the corresponding axis of Output-Map data in setting control mode are the same as Output-Map in motion control mode. The 1 to 3 byte area is the loop-back area for the command.

4.3 IO Map operation and data access method

4.3.1 IO-Map bit command method

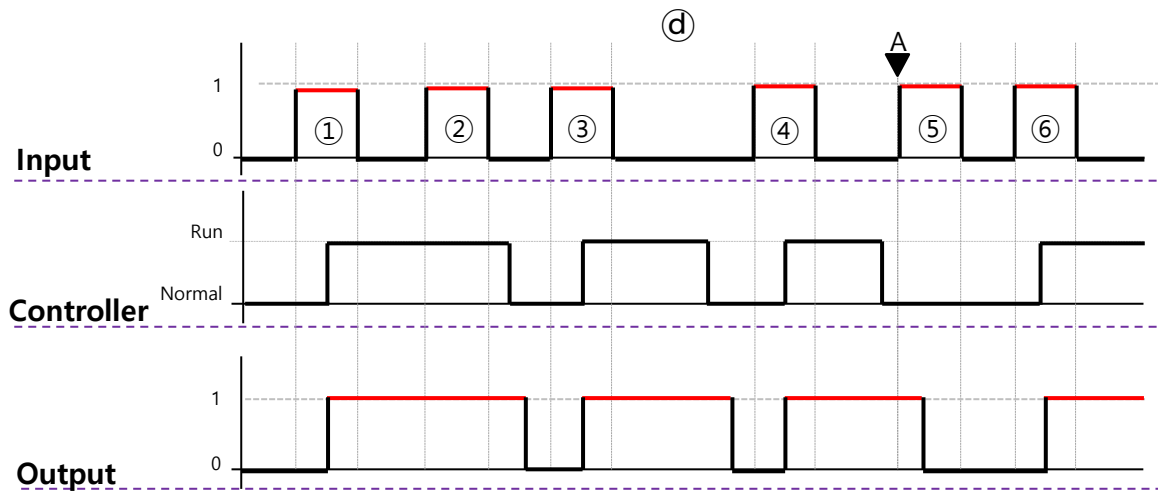
Bit command is divided to rising edge and falling edge.



The start of rising edge command of input is when the input command is changed from '0' to '1' like ① section. The MOTIONGATE that receives this command issues the command to the corresponding axis and responds to the command as Output when the command is executed.

The falling edge command starts when the input command changes from '1' state to '0', such as ② section. With this event, MOTIONGATE will issue a command to the corresponding axis and respond to the command with Output when the command is executed.

Bit command like section ③ is the rising edge command of input and as MOTIONGATE delivers the operation command of the corresponding axis, maintains ongoing command until there is a falling edge command. When the corresponding axis is operated by the Rising Edge of Input, the bit command responds to the operation as an output. And when the operation of the corresponding axis is stopped by the Falling Edge command of Input, the bit command responds to the stop of operation as Output.



④ Section is when the Input command has been operated continuously. In this case, the command starts same as in section ③ with the command ①. At this time, the command ②, which is entered while the MOTIONGATE is operating, is not operated. The command ③, which is input after the operation of the MOTIONGATE operated by the command ① is completed, is operated.

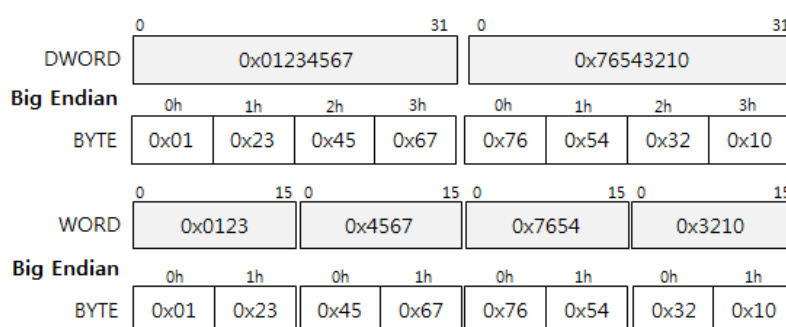
The command ⑤ at point A is ignored, which is before the operation executed by command ④ is done and output responds. However, the command ⑥ is valid, which is after output responds. In other words, input command is valid only after the operation is done by output.

4.3.2 IO-Map data area

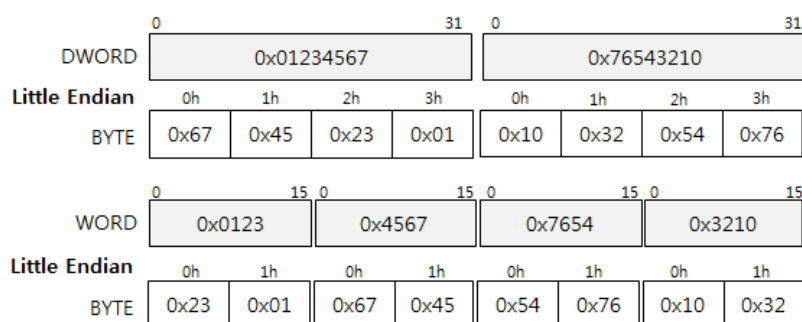
■ Types of data access methods

The data of the system is stored as an integer. It is stored in the system memory, and according to the type of processor (CPU) built in the controller, it is classified into Big-Endian and Little-Endian. Endian is the way to access the memory that stores the data.

Big-Endian stores the most significant byte with the highest address. This is the way used in RISC or MOTOROLLA series of processors.



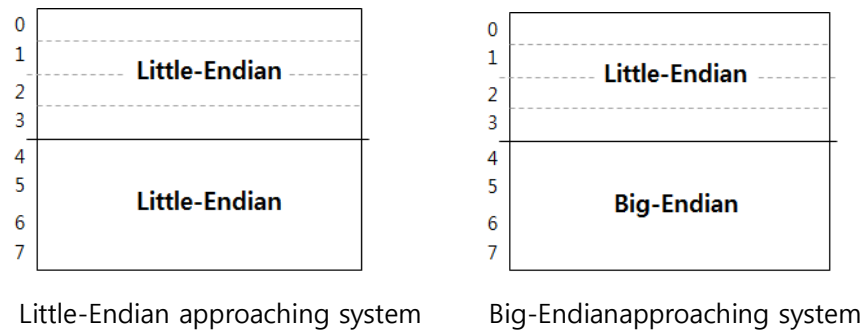
Little-Endian stores the most significant byte as the lowest address. This is the method used by Intel processors.



■ Byte Ordering of Data

The data area of the MOTIONGATE uses 4-7byte area of IO-Map as 1 DWORD data. In setting mode, 2-3 byte area is used as 1 WORD data. Depending on the processor of the host controller, the approach of the data address varies.

The bit area of MOTIONGATE IO-Map uses Little-Endian approaching system for equal command of all systems. However, the Data area uses 4 BYTE data as 1DWORD data, it supports data approaching system by two types according to a system of the host controller.

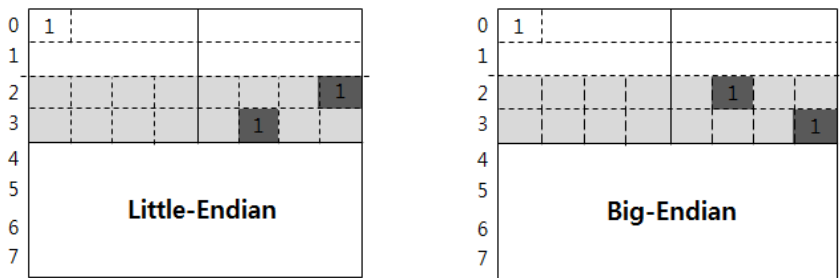


NOTE

The factory setting of the MOTIONGATE is set according to the host system environment.

In the system of the host controller that processes data in the Big-Endian method, in the motion mode of MOTIONGATE's IO-Map, 0-3 BYTE area, which is bit area, is processed in byte unit, so it can be used as actual value. However, since the 2-3 BYTE area of the IO-MAP in the setting mode is used in word units, byte-swap of 2 BYTE and 3 BYTE must be performed in order to be as described in Index No. in this manual.

When Index No. data is set to # 0401, Little-Endian and Big-Endian are displayed as follows.



NOTE

The above Endian condition is a condition of the value that is written to the address where the actual I / O Map is mapped. This manual is an example of using MotionGate PROFIBUS with Siemens PLC. The values in the examples used here are examples of handling Endian conditions to match the notation in the manual.

4.4 I/O-Map Table (Motion control Mode)

When I / O-Map is set to motion control mode, it consists of the following I / O Map.

- You can set motion control mode by setting W0.7 of Input Map to Low.

DW	W	Bit	Input Map (PLC -> MOTIONGATE)			Input Map (MOTIONGATE -> PLC)		
			Operating level	Name	Description	Response level	Name	Description
0	0	0	H	CONNECT		H	CONNECTED	Axis connected
		1	H	ENABLE, IGNORED (STEP Drive)		H	ENABLED Motor Free (STEP Drive)	Motor is activated
		2	L:	nESTOP		H	ESTOP_RESP	ESTOP executed
		3	Rising /Falling	ALARM_RESET ,MOTOR_FREE (STEP Drive)		H	ALARM_ERROR	Error occurred
		4	Rising Edge	CMD_START		H	CMD_RESP	CMD Start response bit
		5	-	-		H	OUT_RANGE	Input value error
		6	-	-		H	READY	Motion ready
		7	L	MOTION / SETTING	Switch between motion and setting mode	H/L	SET_MOV_RESP	Response bit of motion or setting mode
		8	H/L	CMD_CODE0	Command code	H/L	CMD_CODE_RESP0	Response to command code
		9	H/L	CMD_CODE1	Command code	H/L	CMD_CODE_RESP1	Response to command code
		10	H/L	CMD_CODE2	Command code	H/L	CMD_CODE_RESP2	Response to command code
		11	H/L	CMD_CODE3	Command code	H/L	CMD_CODE_RESP3	Response to command code
		12	H/L	RESPONSE_TYPE_0	Response data request	H/L	RESPONSE_TYPE_RESP0	Code of response data
		13	H/L	RESPONSE_TYPE_1	Response data request	H/L	RESPONSE_TYPE_RESP1	Code of response data
		14	H/L	RESPONSE_TYPE_2	Response data request	H/L	RESPONSE_TYPE_RESP2	Code of response data
		15	H/L	RESPONSE_TYPE_3	Response data request	H/L	RESPONSE_TYPE_RESP3	Code of response data
	1	0	High	CANCEL	Motion canceled	H/L	MOTIONNING	Motor is running
		1	High	HOLD	Pause	H/L	HOLD_RESP	Pause command response
		2	-	-		H/L	ORG_RET_OK	Origin return done
		3	Rising Edge	GO_ZERO_POS	Zero position movement	H	GO_ORIGIN_RESP	Origin movement command response
		4	High	-JOG_MOV	Jog – movement	-	-	
		5	High	+JOG_MOV	Jog + movement	H	JOG_RESP	Jog command response
		6	Rising Edge	-STEP_MOV	Step – movement	-	-	

DW	W	Bit	Input Map (PLC -> MOTIONGATE)			Input Map (MOTIONGATE -> PLC)		
			Operating level	Name	Description	Response level	Name	Description
		7	Rising Edge	+STEP_MOV	Step + movement	H	STEP_RESP	Step movement command response
		8	High /Low	INC/ABS	Position movement command type	L/H	PT_RUNNING	Position table running
		9	-	-		L/H	MOV DIR	Motion direction (+Dir:0, -Dir: 1)
		10	High /Low	SPD_MODE	Jog mode setting	L/H	INP	In-Position Operation complete
		11	-	-		H	ORIGIN_SENSOR	Origin sensor is ON
		12	High /Low	SINGLE_PT ; POS MOVE SPD MAGNIFICATION VALUE 0	PT operation method; Position movement speed scale value 0	H	SW_LIMIT_N	Under -direction program limit
		13	High /Low	POS MOVE SPD MAGNIFICATION VALUE 1	Position movement speed scale value 1	H	SW_LIMIT_P	Over +direction program limit
		14	High /Low	POS MOVE SPD MAGNIFICATION VALUE 2	Position movement speed scale value 2	H	HW_LIMIT_N	-direction limit sensor is on
		15	High /Low	POS MOVE SPD MAGNIFICATION VALUE 3	Position movement speed scale value 3	H	HW_LIMIT_P	+direction limit sensor is on
1	2	0	data	Command Data L	Command data area	Data	Response Data L	Response data area Response data by Response Code or Access verification data for the setting area in setting mode
		1						
		2						
		3						
		4						
		5						
		6						
		7						
		8						
		9						
		10						
		11						
		12						
		13						
		14						
		15						
	3	0	data	Command Data H	Command data area	data	Response Data H	Response data area Response data by Response Code or Access verification data for the setting area in setting mode
		1						
		2						
		3						
		4						
		5						
		6						
		7						
		8						
		9						
		10						
		11						
		12						
		13						
		14						
		15						

4.5 I/O-Map Table (Setting Mode)

When I / O-Map is set to setting control mode, it consists of the following I / O Map.

- You can set setting control mode by setting W0.7 of Input Map to High.

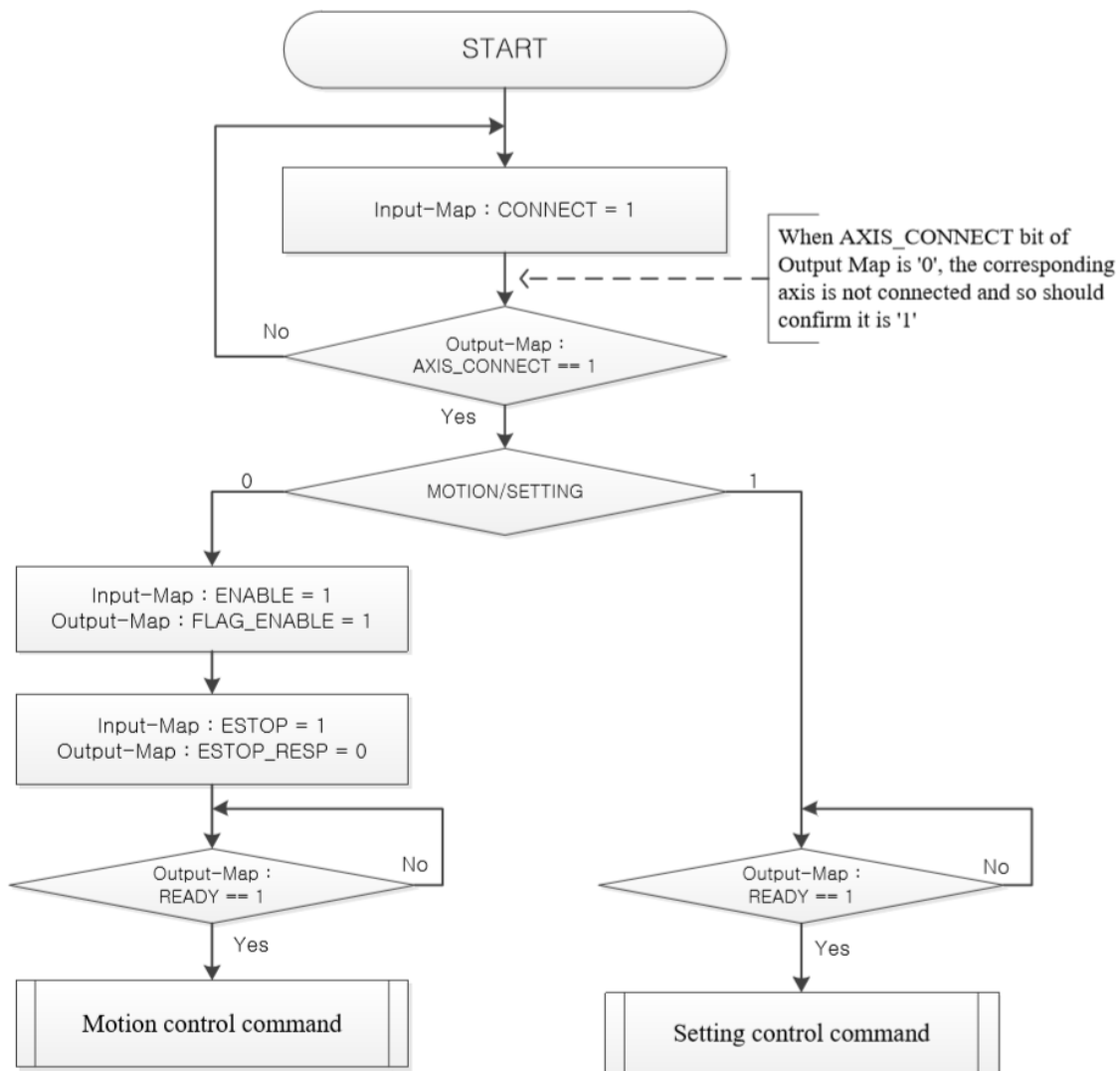
DW	W	Bit	Input Map (PLC -> MOTIONGATE)			Input Map (MOTIONGATE -> PLC)		
			Operating level	Name	Description	Response level	Name	Description
0	0	0	H	CONNECT		H	CONNECTED	Axis connected
		1	H	ENABLE, IGNORED (STEP Drive)		H	ENABLED Motor Free (STEP Drive)	Motor is activated
		2	L	nESTOP		H	ESTOP_RESP	ESTOP executed
		3	Rising /Falling	ALARM_RESET, MOTOR_FREE (STEP Drive)		H	ALARM_ERROR	Error occurred
		4	Rising Edge	CMD_START		H	CMD_RESP	CMD Start response bit
		5	-	-		H	OUT_RANGE	Input value error
		6	-	-		H	READY	Motion ready
		7	H	MOTION / SETTING	Switch between motion and setting mode	H/L	SET_MOV_RESP	Response bit of motion or setting mode
		8	High /Low	CMD_CODE0	Command code	H/L	CMD_CODE_RESP0	Response to command code
		9	High /Low	CMD_CODE1		H/L	CMD_CODE_RESP1	
		10	High /Low	CMD_CODE2		H/L	CMD_CODE_RESP2	
		11	High /Low	CMD_CODE3		H/L	CMD_CODE_RESP3	
		12						
		13						
		14						
		15						
0	1	0	data	INDEX Code	Data access code (Parameter No.)	data	INDEX Code Response	Data access response code
		1						
		2						
		3						
		4						
		5						
		6						
		7						
		8						
		9						
		10						
		11						
		12						
		13						
		14						

DW	W	Bit	Input Map (PLC -> MOTIONGATE)			Input Map (MOTIONGATE -> PLC)		
			Operating level	Name	Description	Response level	Name	Description
1	2	15						
		0		Write Data L		data	Response Data L	
		1						
		2						
		3						
		4						
		5						
		6						
		7						
		8						
		9						
		10						
		11						
		12						
		13						
		14						
		15						
	3	0		Write Data L			Response Data L	
		1						
		2						
		3						
		4						
		5						
		6						
		7						
		8						
		9						
		10						
		11						
		12						
		13						
		14						
		15						

4.6 IO-Map control command preparation order

MOTIONGATE requires the following sequence of steps when executing the command.

Flowchart 1. Activation condition of motion and setting control command



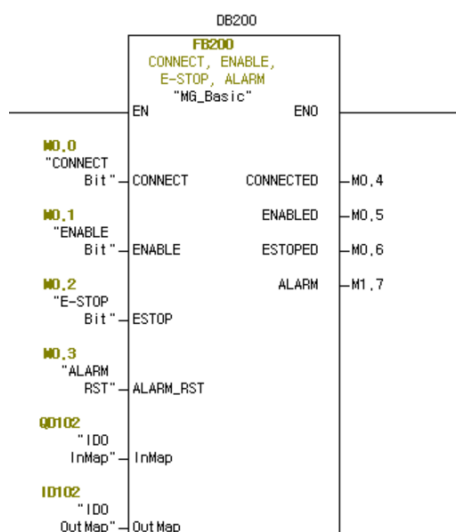
※ MOTIONGATE command

- ① Fulfill command by setting CONNECT bit of input-map to '1'.
 - CONNECT bit is to select use of the corresponding axis, should be set to '1'.
 - Confirm that the response status of CONNECTED bit Output-Map is '1'.
- ② Select MOTION/SETTING bit of Input-Map <Reference *4.2.3>
 - Select motion control to '0' and setting control to '1'.
- ③ Motion control set ENABLE bit of Input-Map and ESTAOP bit to '1'.
 - Confirm that Response bit of Output-Map, FLAG_ENABLE bit is '1'.
 - Confirm that ESTOP_RESP bit is '0'.
- ④ When try to fulfill command, confirm state of READY bit of Output-Map.
 - While other commands are fulfilling, READY bit is maintained as '0'.
 - If there is no motion command, READY bit is maintained as '1'.
 - On setting command, it is maintained as '0' until the corresponding command is completed.
- ⑤ Motion control of drive is fulfilled with bit combination of IO-Map on motion command.
 - Set up MOTION/SETTING bit of Input-Map to '0'.
 - Command fulfillment of motion control should set up "CONNECT= 1, ENABLE=1, nESTOP=1".
- ⑥ Confirmation and modification on the set-up value of drive and MOTIONGATE is fulfilled with bit combination of IO-Map on setting control.
 - Set up MOTION/SETTING bit of Input-Map to '1'.
 - Command fulfillment of setting control should set up "CONNECT= 1".

4.7 I/O-Map basic function

The "MG_Basic" function block in the example is configured to execute axis connection command, Servo On / Off, emergency stop, and alarm release command to the address where I / O-Map of MOTIONGATE is mapped and to check the response status.

Command Type		Status Information	
CONNECT	Connection command	CONNECTED	Connection check
ENABLE	Servo On/Off, Step On/Motor Free	ENABLED	Servo On status
ESTOP	Emergency stop (N.C)	ESTOPED	Emergency stop running
ALARM_RST	Alarm release	ALARM	Drive alarm occurred



4.7.1 Connect

This bit determines whether to use the corresponding axis. When set to '1', it tries communication connection with the corresponding axis. If communication with the axis is not required, set this bit to '0'. When set to '0', MOTIONGATE excludes communication processing with the axis and does not execute any command.

When command events for several axes occur at the same time, the events are processed in ascending order from lowest drive number to highest drive number. If the processing of an event for one axis is complete, it will be changed to a process action for the axis with the next ID.

Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name
0	0	High	CONNECT	0	0	H	CONNECTED

- It can be controlled in motor's motion command mode and setting command mode.
 - When the CONNECT bit is not set to '1', the MOTIONGATE will not receive any communication command or data with the axis.
 - When the connection of the MOTIONGATE to the axis is completed, the CONNECTED bit of the receive data section is set to '1'. If not connected, it is cleared to '0'.
 - If the CONNECTED bit of the used axis is not set to '1', check the status of the connected equipment.

Example 1. Axis CONNECT

Network 1 : CONNECT
 MOTIONGATE Axis Connect Command

Network 2 : DISCONNECT
 MOTIONGATE Axis Disconnect Command

Network 9 : CONNECTED
 MOTIONGATE Axis Connect Check



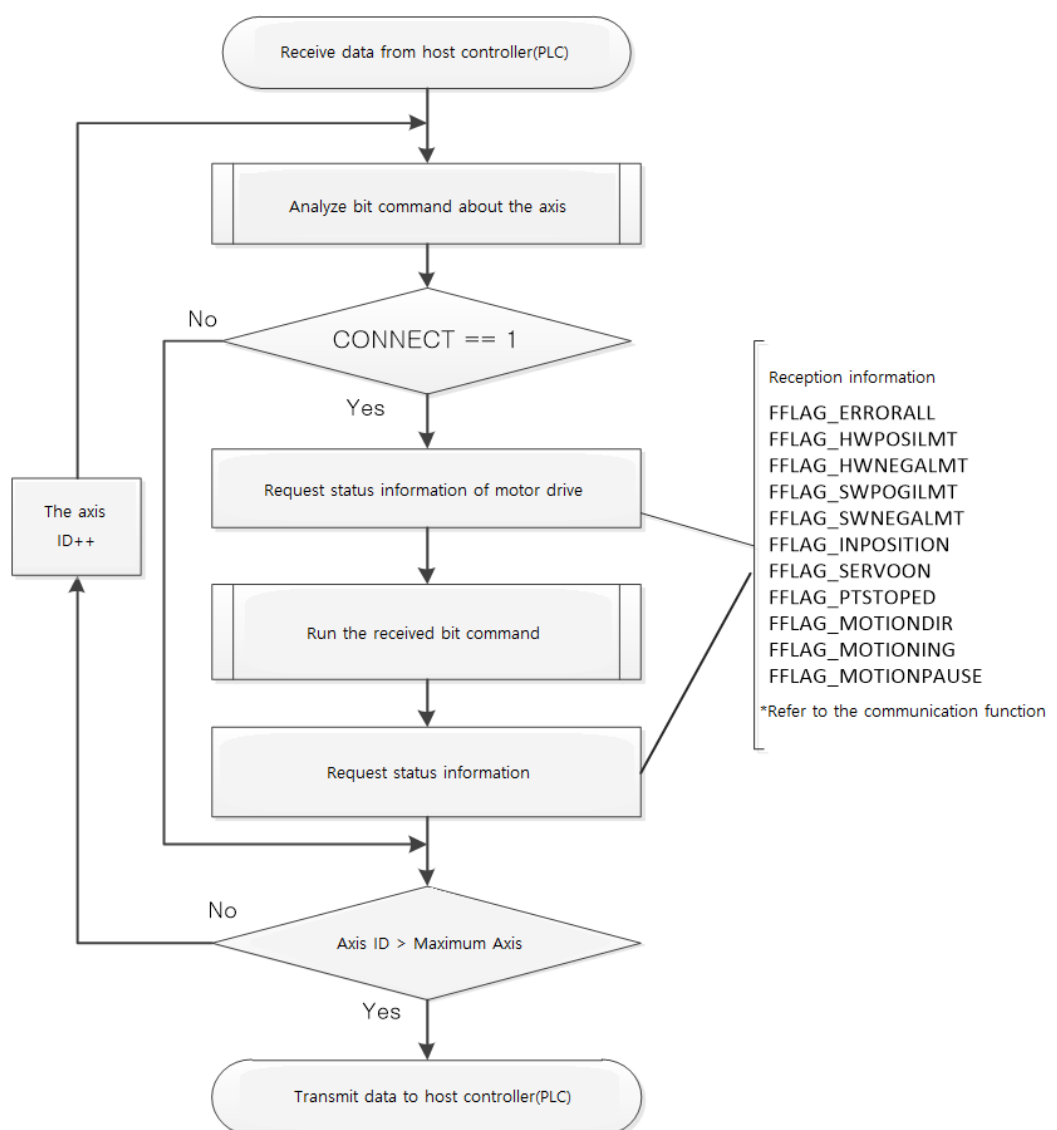
NOTE

This bit executes the command which is checking the status of a set axis. The communication delay time between axes is extended by the number of connected axes by CONNECT command.

- Status information of the axis (flags FLAG-define)
- Command position value (signed long 32-bit)
- Actual position value (signed long 32-bit)
- Position error value (signed long 32-bit)
- Current running speed value (signed long 32-bit)
- Current PT number

Below is the process flowchart of MOTIONGATE for all axes of MOTIONGATE. The setting of the CONNECT bit determines whether bit command processing for the corresponding axis is executed. Therefore, when CONNECT bit is set to '0', MOTIONGATE does not process the bit command of the corresponding axis but processes the bit command of the next motor axis. Therefore, the axis not in use can set the CONNECT bit of the corresponding Input-Map to '0' to speed up the processing of the bit command for all axes of the MOTIONGATE.

Process order of MOTIONGATE according to setting of CONNECT bit



4.7.2 Servo On/Off

The ENABLE bit in the Input-Map is a bit that changes the motor status of the axis configured as SERVO motor to the state that enables motion control. This bit can be used in motion mode and setting mode, and the response bit for the command is the FLAG_ENABLE bit of the receive data section. The FLAG_ENABLE bit is maintained constantly according to the motor status of the corresponding axis.

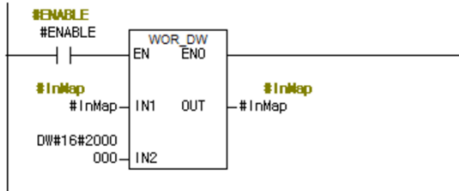
Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name
0	1	Rising Edge	ENABLE, IGNORED (STEP Drive)	0	1	H	ENABLED Motor Free (STEP Drive)

- It can be controlled in motion command mode and setting command mode.
- When the corresponding axis is SERVO drive Servo ON / OFF (1: ON, 0: OFF)
- This bit must be set to '1' in order to control the motor's motion. If it is cleared to '0', motion will not be executed because Servo is kept OFF.
- If the axis is a STEP drive, this command is an unused bit.

Example 2. ENABLE

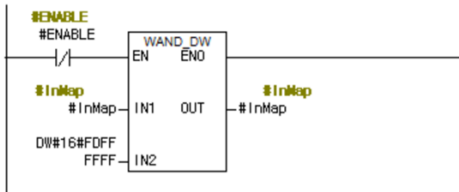
Network 3 : ENABLE

MOTIONGATE Axis Enable Command



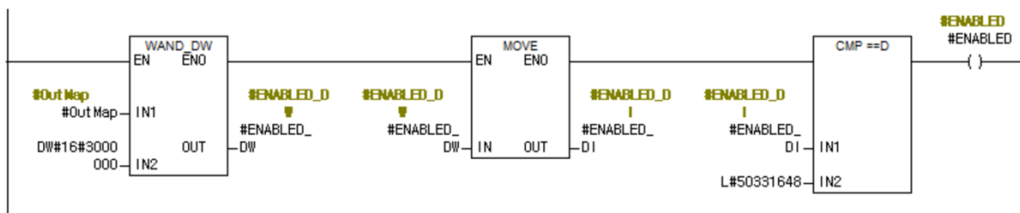
Network 4 : DISABLE

MOTIONGATE Axis Disable Command

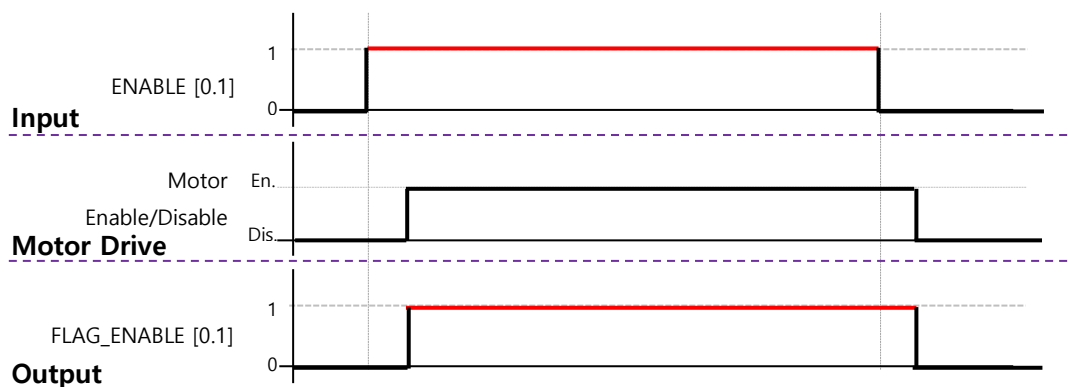


Network 10 : ENABLED

MOTIONGATE Axis Enable Check



With the ENABLE bit command of the Input-Map, the motor activation command starts with the rising edge command as shown below. At this time, the FLAG_ENABLE bit of the output responds as the value of the activation state of the motor. If there is a falling edge command of the ENABLE bit, the MOTIONGATE issues a motor deactivation command to the corresponding axis. Therefore, the ENABLE bit must be set to '1' in the motor's motion command.



4.7.3 E-STOP

The motor drive's emergency stop command uses the nESTOP bit of the Input-Map. This bit operates when cleared to 0. Also, if this bit is not low, no motion command is performed.

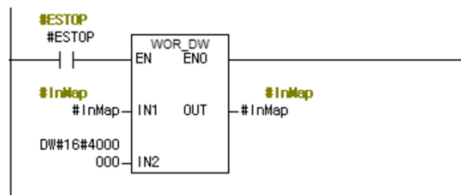
Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name
0	0	H	CONNECT	0	0	H	CONNECTED
0	1	H	ENABLE, IGNORED (STEP Drive)	0	1	H	ENABLED Motor Free (STEP Drive)
0	2	Falling Edge	nESTOP	0	2	H	ESTOP_RESP

- The motor can be controlled in motion command mode and setting command mode.
- When the emergency stop command is issued, the SERVO drive becomes Servo OFF state.
- The EMERGENCY STOP command is executed when it reaches '0'. In addition, the motor activation command is not executed when the nESTOP bit is '0'. After the EMERGENCY STOP command is executed, the ENABLE bit must be changed from '0' to '1' before motion control can be executed.

Example 3. E-STOP

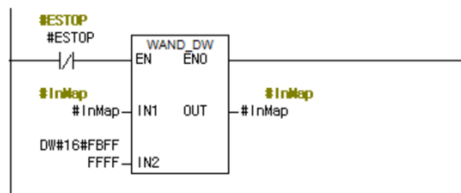
Network 5 : E-STOP

MOTIONGATE Axis Emergency STOP Set Command



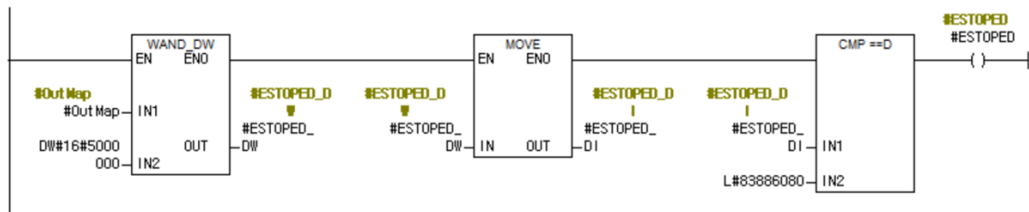
Network 6 : E-STOP Clear

MOTIONGATE Axis Emergency STOP Clear Command



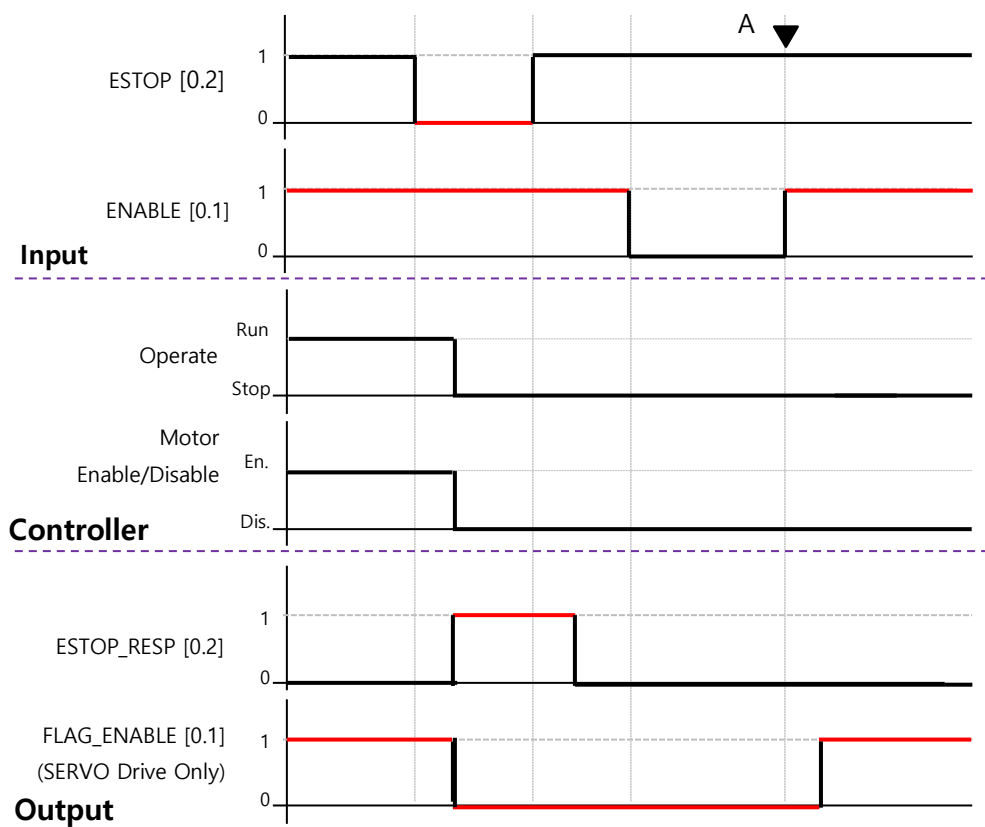
Network 11 : ESTOPED

MOTIONGATE Axis Emergency Stop Check



The nESTOP bit command in Input-Map initiates an emergency stop command with the falling edge command as shown below, and outputs data to Output-Map for this. When the emergency stop command is executed, the ESTOP_RESP bit is loop-back, and the ENABLE command status on that axis is released, causing the FLAG_ENABLE bit on the SERVO Drive to be '0'.

To re-enable the motor in the Emergency Stop state, you can activate it with the ENABLE's rising edge command, as shown in Section A.



4.7.4 Alarm reset command and STEP Motor Free

The alarm status generated in each axis can be checked by the status of ALARM / ERROR bit in Output-Map. The Alarm Reset command is generated by setting the ALARM_RESET bit in the Input-Map to '1'. When the generated alarm is released, the ALARM / ERROR bit becomes '0'. This command in STEP Drive is also used as a command to switch to Motor-Free status. This bit is available in motion mode and setting mode.

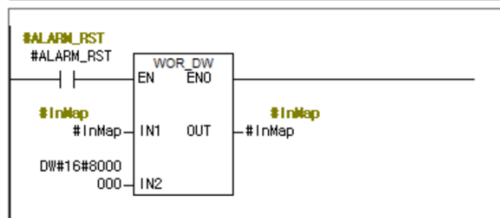
Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name
0	0	H	CONNECT	0	0	H	CONNECTED
				0	1	H->	ENABLED Motor Free (STEP Drive)
0	3	Rising /Falling	ALARM_RESET ,MOTOR_FREE (STEP Drive)	0	2	H	"ALARM_ERROR" Status Flag

- Can be controlled in motion command mode and setting command mode
- In the event of an alarm or error, the ALARM_ERROR bit of the Output-Map is set to 1.
- When an alarm is triggered, the ENABLED bit is cleared to zero.
- When the alarm is released by ALARM_RESET bit, the servo is OFF for SERVO drive and motor-free state for STEP drive, and FLAG_ENABLE, MOTOR_FREE bit becomes '0'.

Example 4. Alarm Reset

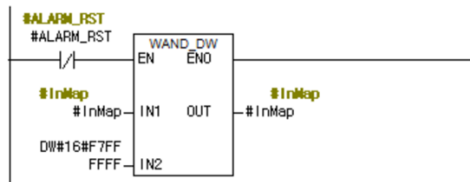
Network 7: ALARM Reset

MOTIONGATE Axis Alarm Reset Set Command



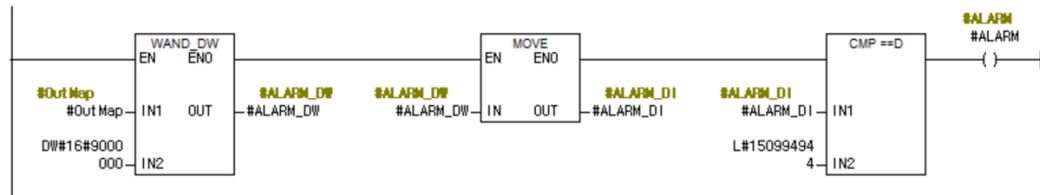
Network 8: ALARM Reset Clear

MOTIONGATE Axis Alarm Reset Clear Command

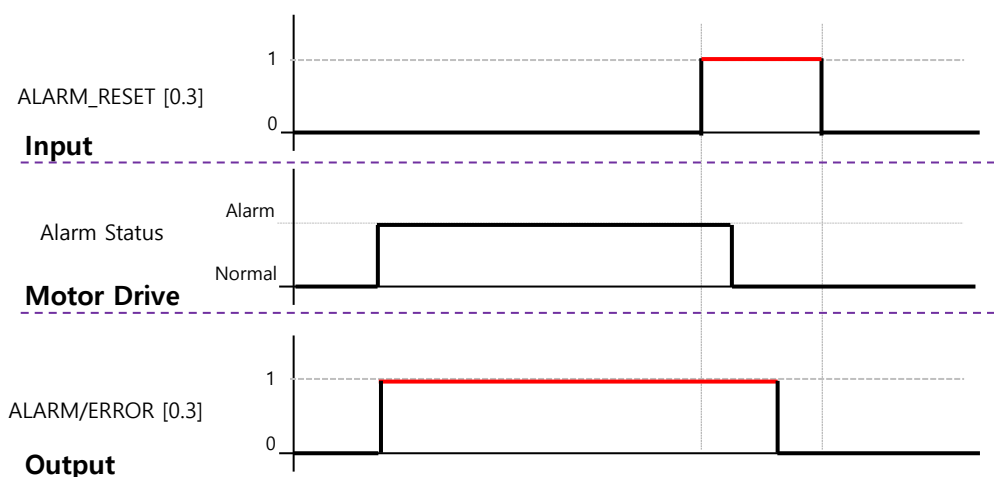


Network 12: ALARM

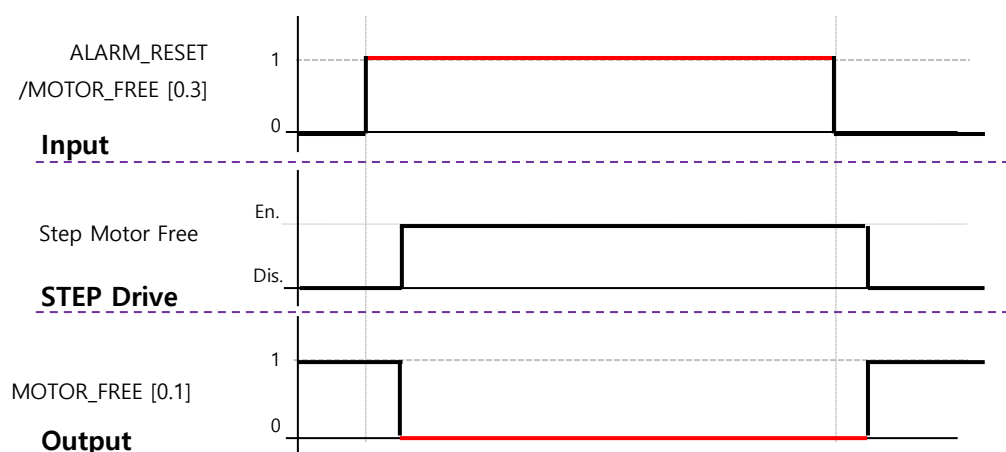
MOTIONGATE Axis ALARM Status Check



When an alarm occurs in the motor drive, the status of the ALARM / ERROR bit in the Output Map is set to '1' as shown below. The alarm release command must keep the ALARM_RESET bit at '1' until the ALARM / ERROR bit of the Output-Map is cleared to '0'.



In order to maintain the Motor-Free status of the step drive motor, set the MOTOR-FREE bit of the Input-Map to '1' as shown below. The motor will remain in the Motor-Free state while held in the '1' state.



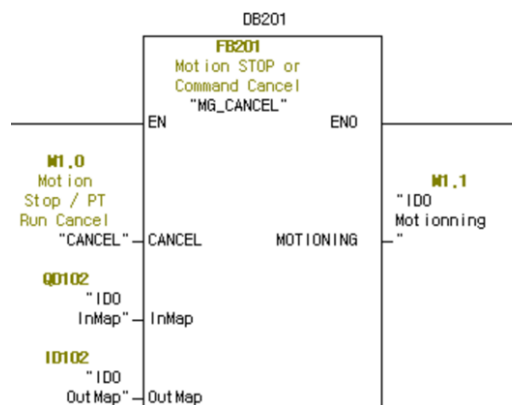
4.7.5 Stop commande (CANCEL)

The CANCEL bit in the Input-Map command cancels the motion or motion of the axis. With this command, the MOTIONING bit of the Output-Map set to '1' during motion works as the status flag bit, and it is changed to '0' due to the stop command. In addition, the HOLD state is canceled by the stop command and the PT command is canceled.

Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name
0	0	H	CONNECT	0	0	H	CONNECTED
0	1	H	ESTOP	0	1	H	ENABLED
0	2	H	ENABLE	0	7	L	Motion /Setting
0	7	L	Motion /Setting	1	0	H	"MOTIONING" Status Flag
1	0	Rising /Falling	CANCEL				

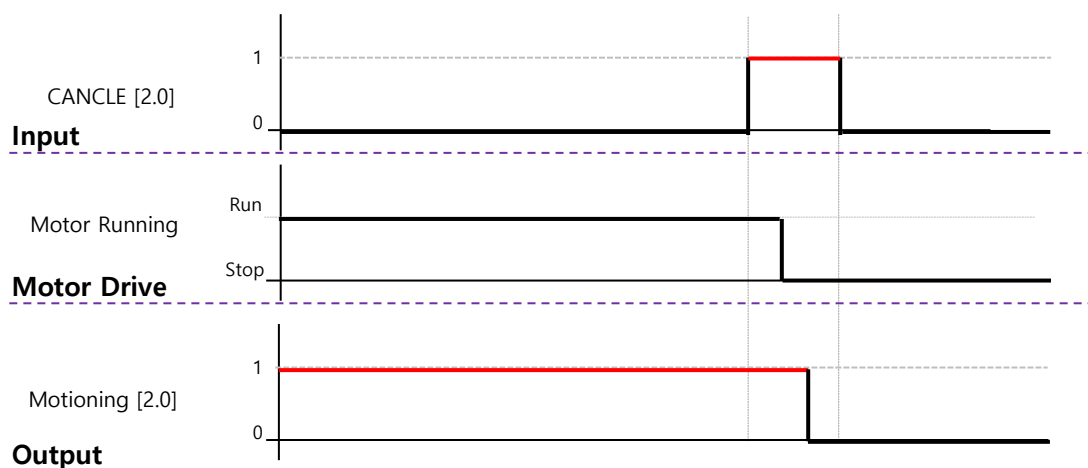
- It is controllable only in motor's motion command mode.
- Since the stop command is a command to cancel the operation, the MOTIONING Status Flag becomes Low when the command is executed.
- If the stop command remains high, the motion command is not executed.

Example 5. CANCEL



Function block "MG_CANCEL" in example 5 is input "CANCEL", which is a function block that cancels motion command of the relevant axis by combining W1.0 bit of Input Map to High / Low.

To stop a motion or cancel a MOTIONGATE command, set the CANCEL bit of the Input-Map to '1' as shown below. To make a stop command while the motor is in motion, the CANCEL bit must be kept at '1' until the MOTIONING bit of the Output-Map is cleared to '0'.



4.7.6 Pause command

HOLD bit of Input-Map is a command to pause the motion of the corresponding axis. When motion is paused, the HOLD_RESP bit in the Output-Map is set to 1 and this is the status flag bit about the corresponding axis of HOLD bit.

Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name
0	0	H	CONNECT	0	0	H	CONNECTED
0	1	H	ESTOP	0	1	H	ENABLED
0	2	H	ENABLE	0	7	L	Motion /Setting
0	7	L	Motion /Setting	1	0	H->L	MOTIONING Status Flag
1	0	L	CANCEL	1	1	H, L	HOLD_RESP.
1	1	H	HOLD				
-	-	-	-				

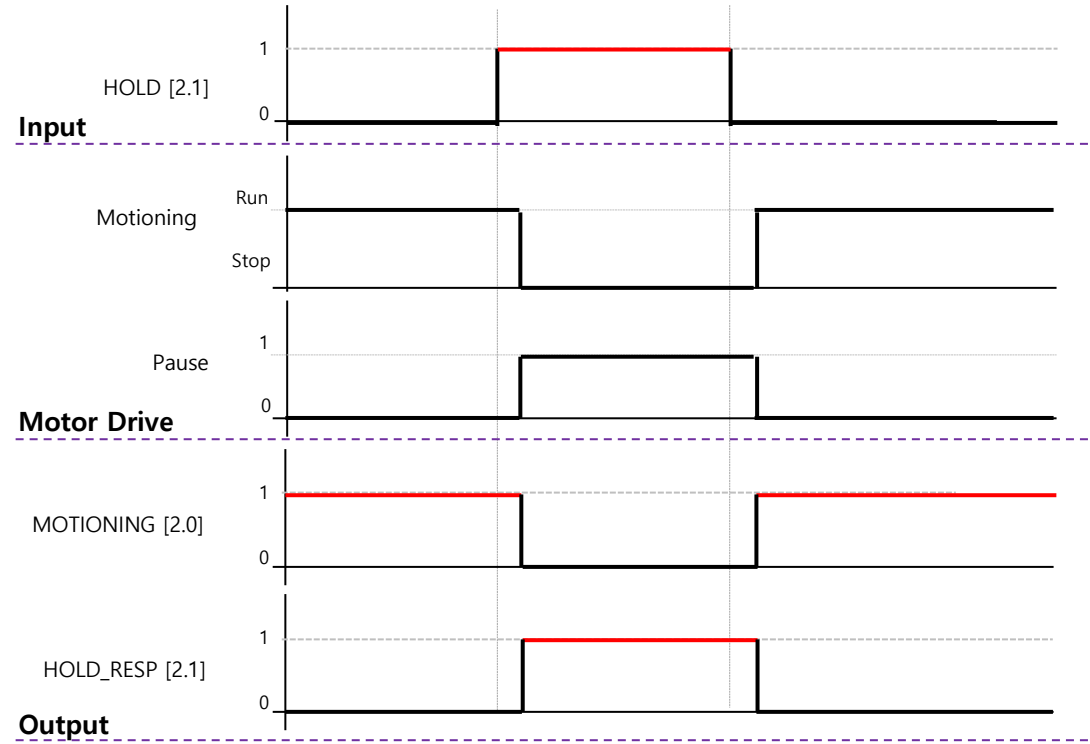
- It is controllable only in motor's motion command mode.

- The MOTIONING Status Flag is cleared to Low because the HOLD command is a command to pause the running motion profile, but it is set to High again when motion is resumed.

- Motion is stopped while the HOLD command is held high, and motion is resumed when it is cleared to Low.

Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name
Example 6. HOLD DB202 FB202 Motion Hold Command "MG_HOLD" EN ——— ENO ——— W1.2 "Pause" — HOLD ——— Q0102 "IDO InMap" — InMap ——— I0102 "IDO Out Map" — Out Map ——— HOLD_Resp ——— M1.3 "IDO Paused" Function block "MG_HOLD" in example 6 is input "HOLD", which is a function block that executes pause command by combining W1.1 bit of Input Map to High / Low.							

The motion pause command is controlled by the rising edge command of the HOLD bit of the Input-Map as shown below. In order to maintain the pause state of motion, HOLD bit should be kept at '1', and the pause state is canceled at the falling edge which is cleared to '0'.



4.7.7 Select motion control type (Motion Command Code)

The selection of motion type can be controlled in the MOV_CMD_CODE area in motion control mode. The commands of the Input-Map bits become loop-back to the MOV_CMD_COD_RESP area of the Output-Map.

Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name
0	0	H	CONNECT	0	0	H	CONNECTED
0	1	H	ESTOP	0	1	H	ENABLED
0	7	L	Motion /Setting	0	7	L	Motion /Setting
1	8	Bit Combine	CMD_CODE0	0	12	Bit Combine	CMD_CODE_RESP0
1	9		CMD_CODE1	0	13		CMD_CODE_RESP1
0	10		CMD_CODE2	0	14		CMD_CODE_RESP2
0	11		CMD_CODE3	0	15		CMD_CODE_RESP3
0	4	Rising Edge	CMD_START	0	4	H	CMD_START_RESP
1	0	H	CANCEL				
1	1	H	HOLD	1	1		HOLD_RESP
1	3	↑ H	GO_ZERO POS	1	3		GO_ZERO_POS_RESP
1	4	H	- Jog MOV				
1	5	H	+Jog MOV	1	5		JOG_RESP
1	6	↑ H	- STEP MOV				
1	7	↑ H	+ STEP MOV	1	7		STEP_RESP
1	8	↑ H	INC/ABS				
1	10	H	SPD MODE				
1	12	H	SINGLE PT				
	0-15	Data	Command Data L				
	0-15	Data	Command Data H				

- Motion commands can be set according to the command code in motion control mode.

- Before you run a new command after the command is finished, you must release the finished command.

■ Types of Command Code

Command code [DEC]	Command code [BIN]	Type	Function
0	0000b	Normal motion	Jog move, Step move, Zero point movement
1	0001b	Position Movement	Relative position movement, Absolute position movement
2, 3	0010b-0011b	-	-
4	0100b	PT Operation	Normal PT operation, Single PT operation
5, 6	0101b-0110b	-	-
7	0111b	Origin Movement	Origin movement
8-15	1001b-1111b	-	-

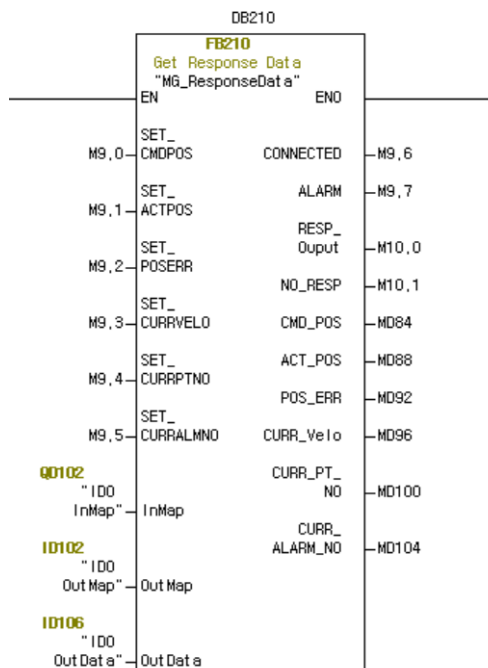
4.7.8 Response data setting (Response Type)

The information of the corresponding axis is the RESPONSE_TYPE, and it can select information received as Output-Map. When receiving information, it loop-back as RESPONSE_TYPE_RESP of Output-Map and can know the type of data which is received to the word area of Output-Map.

Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name
0	0	H	CONNECT	0	0	H	CONNECTED
0	1	H	ESTOP	0	1	H	ENABLED
0	7	L	Motion /Setting	0	7	L	Motion /Setting
1	12	Bit Combine	RESPONSE_TYPE0	0	12	Bit Combine	RESPONSE_TYPE0
1	13		RESPONSE_TYPE1	0	13		RESPONSE_TYPE1
0	14		RESPONSE_TYPE2	0	14		RESPONSE_TYPE2
0	15		RESPONSE_TYPE3	0	15		RESPONSE_TYPE3
				2	0-15	Data	Response Data L
				3	0-15	Data	Response Data H

- Response data setting is possible only in motion control mode.
- Set the value of RESPONSE_TYPE to '0' in setting control mode.
- The response data differs for each network master, but the response data code is specified in W0.12 ~ W0.15 area as follows.

Example 7. Specify Response Data Codes



Function block "MG_ResponseData" in Ex 7 is the function block to save the response data of the selected input to the output address. In the motion mode, the response data is valid and the output data is valid when the "RESP_Output" signal is high in this function block.

Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name

Response data code

Response code [DEC]	Response code [BIN]	Type	Function
0	0000b	No Info.	No information request
1	0001b	Command Position	Request command position
2	0010b	Actual Position	Request actual position
3	0011b	Position Error	Request difference between the actual position and the command position
4	0100b	Actual Velocity	Request actual velocity of the motor currently in operation
5	0101b	Current PT No.	Request PT number currently in operation
6, 7	0110b-0111b	-	-
8	1000b	Current Alarm No.	Request the currently generated alarm code
9 - 15	1001-1111	-	-


NOTE

In the function block of Example 7, response data is displayed as the output of the function block after bit operation processing for the response data code. To check how to handle this, right-click on the function block "MG_ResponseData" and check [Called Block]-> [Open].

4.7.9 Status information(Drive Status)

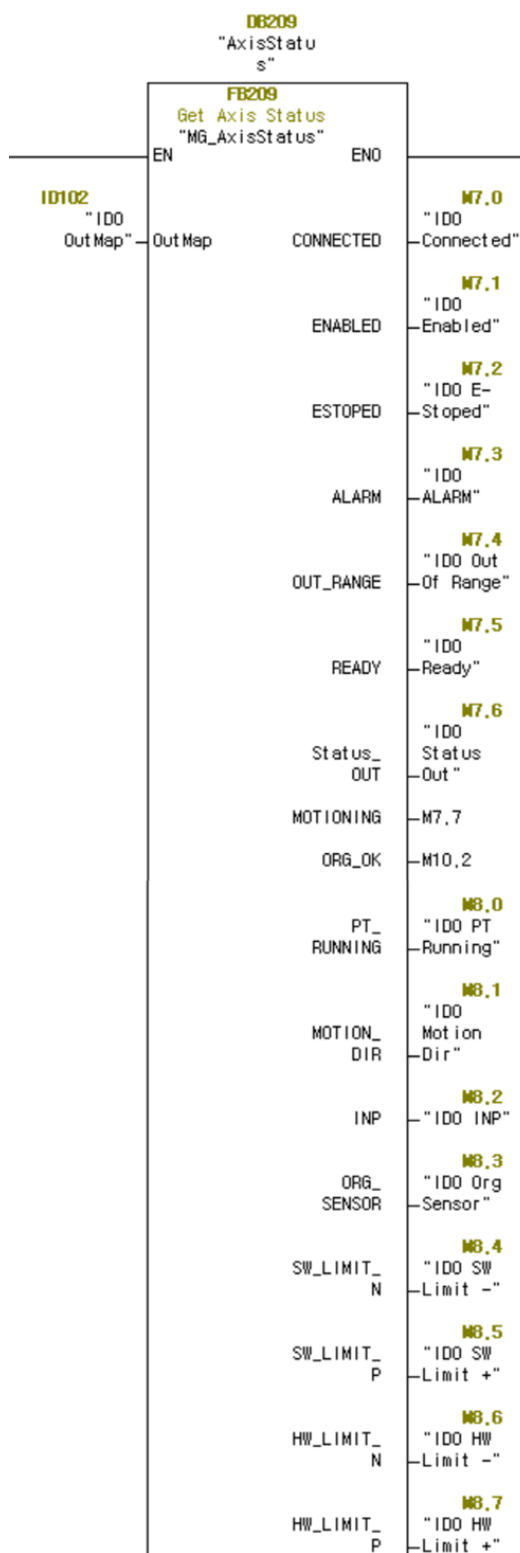
The status flag of the motor drive connected to each axis can be checked by Output-Map in the motion control mode.

Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name
0	0	H	CONNECT	0	0	H	CONNECTED
0	1	H	ESTOP	0	1	H	ENABLED
0	7	L	Motion /Setting	0	7	L	Motion /Setting
						H	ENABLEd
						H	ALARM/ERROR
						H	READY
						H	MOTIONING
						H	HOLD_RESP.
						H	ORG_RET_OK
						H	PT_RUN
						H/L	MOV_DIR
						H	INP
						H	ORIGIN SENSOR

Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)			
Word	Bit	Operatin g level	Name	Word	Bit	Response level	Name
						H	S/W -Limit
						H	S/W +Limit
						H	H/W -Limit
						H	H/W +Limit

- Response data setting is possible only in motion control mode.
- Set the value of RESPONSE_TYPE to '0' in setting mode

Example 8 Status Flag bit



Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name

Name of status flag bit	Valid status value	Meanings
ENABLE	1	Motor is active.
ALARM/ERROR	1	One or more errors have occurred.
READY	1	The motion gate is capable of motion control or setting control command for the axis.
MOTIONING	1	The motor is now running.
HOLD_RESP.	1	The motor is in the normal stop state.
ORG_RET_OK	1	The drive has completed the homing command
PT_RUN	1	Position table is in operation.
MOV_DIR	0, 1	Motor direction (+ direction: 0, - direction: 1)
INP	1	In position operation completed
ORIGIN SENSOR	1	Origin sensor is ON.
S/W -Limit	1	When the - direction program limit is exceeded
S/W +Limit	1	When the + direction program limit is exceeded
H/W -Limit	1	When the - direction limit sensor is ON
H/W +Limit	1	When the + direction limit sensor is ON

The drive status of the corresponding axis is valid when the I / O Map is in motion control mode.



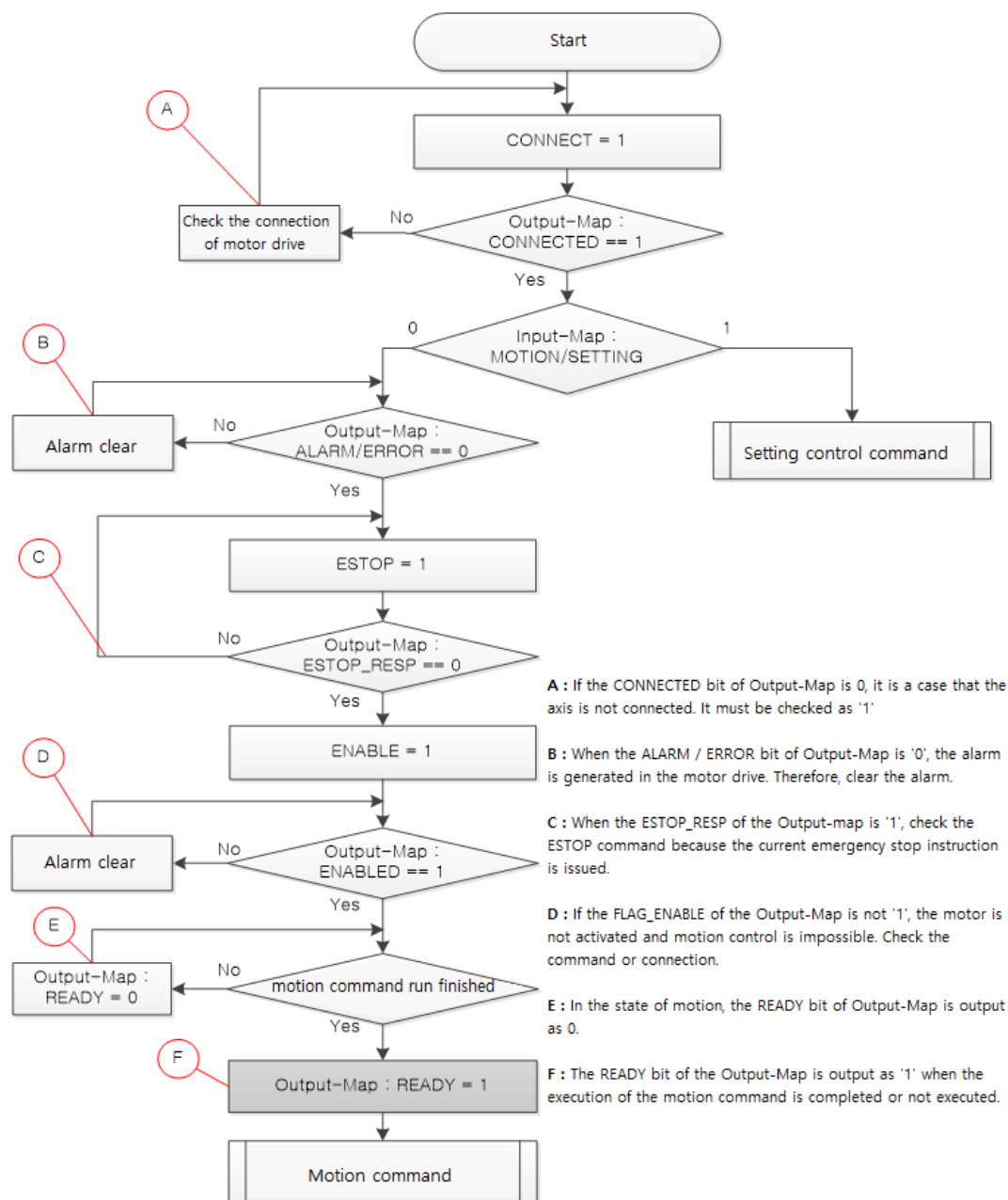
Attention

Valid of the response data and status information is when the I / O Map of the corresponding axis is set to the motion control mode (Output Map W0.7 == '0').

4.7.10 Command status bit (READY)

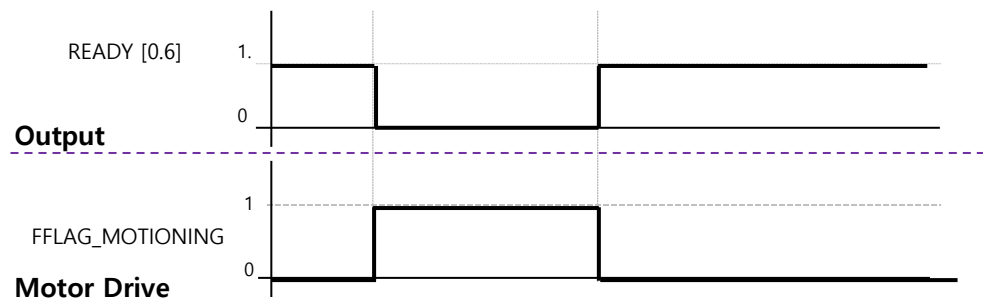
The motion control command is executed only when the READY bit of the Output-Map is '1'. The condition that the READY bit becomes '1' is as follows

Response condition of READY bit according to processing order of MOTIONGATE

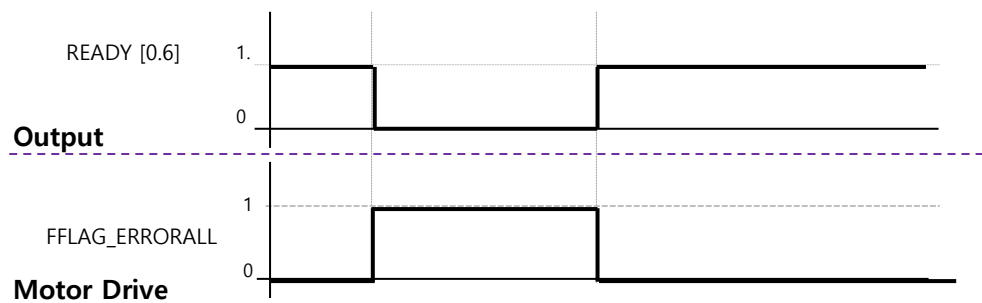


The READY bit is changed according to the motion state or the instruction processing conditions of the MOTIONGATE.

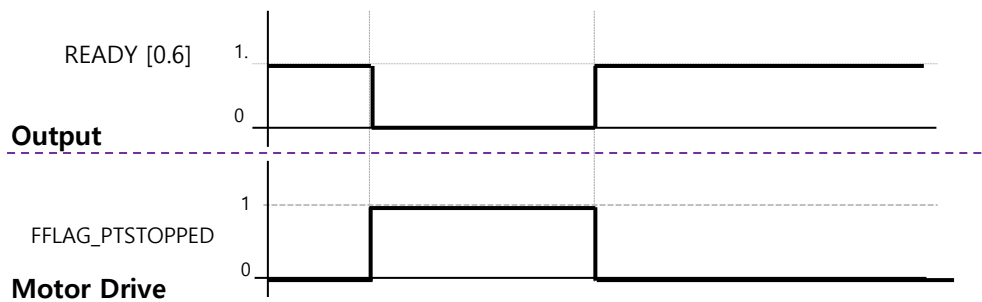
- ① When the drive of the corresponding axis is not in the motion state



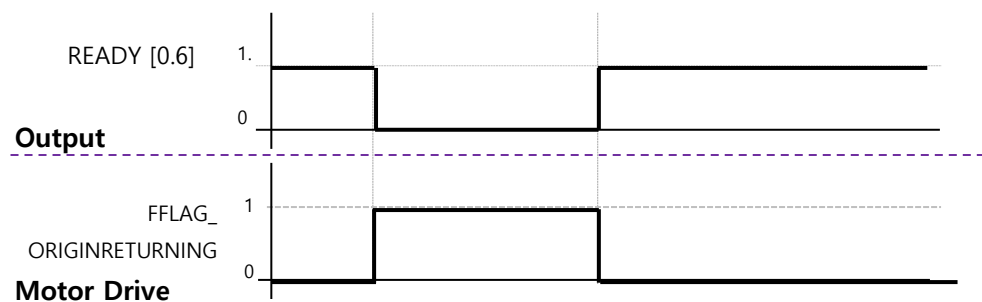
- ② If the drive on that axis is not in an error or alarm state,



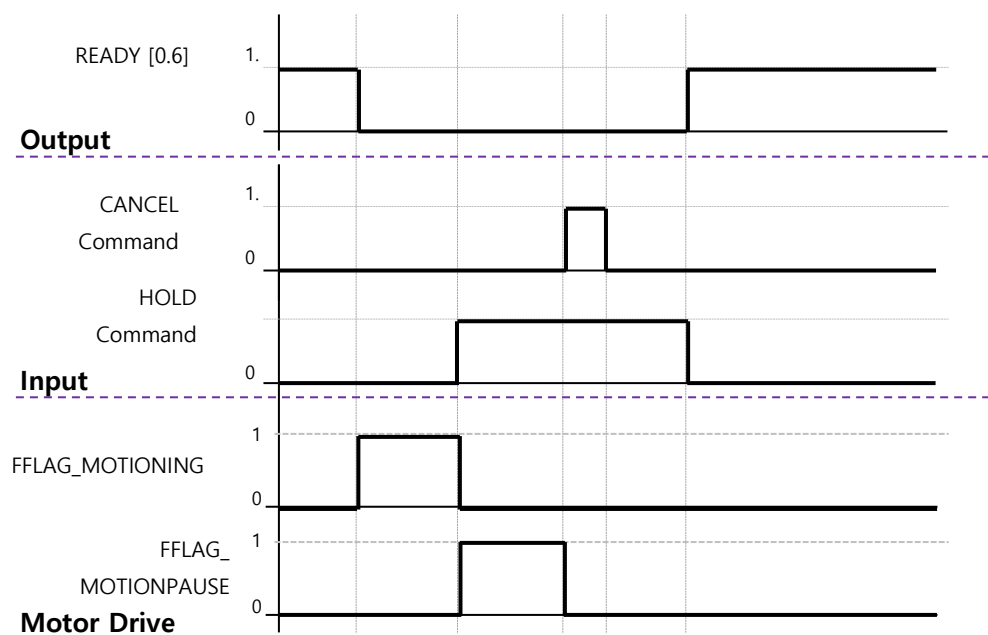
- ③ When the drive of the corresponding axis is not in the PT RUN state



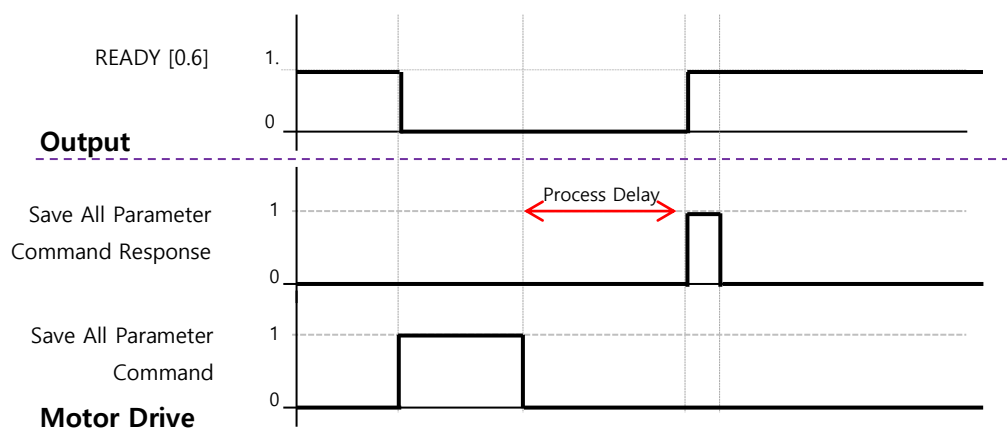
- ④ When the drive of the corresponding axis is not in the origin return state



- ⑤ When the drive of the corresponding axis is not in the pause state during motion



- ⑥ When the save parameters command completes saving data in the EEPROM area



NOTE

For information on the status FLAG of the drive, refer to the Status FLAG section of the "User's Manual Communication Functions".

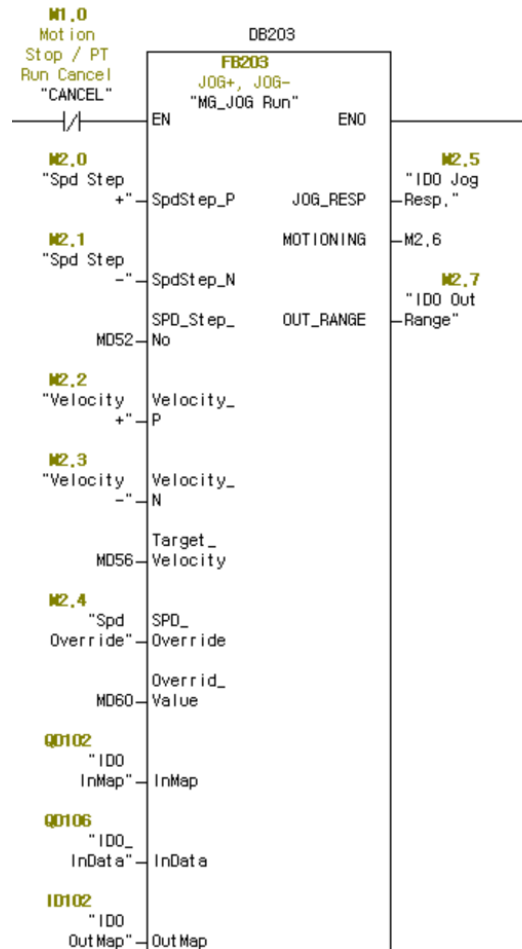
Even if the Ezi-STEP series drive does not have the ENABLE command, the READY bit is set to '1'. However, when the ALARM RESET bit is set to '1', the motor is in the FREE state and the drive is disabled. Therefore, the READY bit is cleared to '0'.

5. Motion Control

5.1 Jog Move

The operation to drive the motor at a given speed value by the user is called jog move..

Example 9 Jog Move



Ex 9 is a function block of jog operation command. Receives and processes two kinds of jog commands and command speed information. The response to this command can be seen in the output.

Attention

In a function block that processes motion instructions, the "CANCEL" command may be preprocessed depending on the execution order of the function blocks. In this case, the function block should be deactivated when "CANCEL" command exists.

Attention

The "SPD_Override" command here only applies in Velocity mode.

5.1.1 Jog Move command bit

This operation uses the JOG_MOV bit and is divided into forward (+ JOG_MOV) operation and reverse (-JOG_MOV) operation. The jog move command is looped back to the JOG_RESP bit of the Output Map.

Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name
0	0	H	CONNECT	0	0	H	CONNECTED
0	1	H	ESTOP	0	1	H	ENABLED
0	2	H	ENABLE	0	7	L	Motion /Setting
0	7	L	Motion /Setting	1	0	H->L	MOTIONING Status Flag
0	8	L	CMD_CODE 0	0	8	H	CMD_CODE RESP 0
0	9	L	CMD_CODE 1	0	9	L	CMD_CODE RESP 1
0	10(A)	L	CMD_CODE 2	0	10(A)	L	CMD_CODE RESP 2
0	11(B)	L	CMD_CODE 3	0	11(B)	L	CMD_CODE RESP 3
1	1	L	CANCEL	1	9	H/L	H : CCW L : CW
1	2	L	HOLD	1	1	H, L	HOLD_RESP.
1	4	H	-JOG_MOV	1	5	H	JOG_RESP
1	5	H	+JOG_MOV	0	4	H	CMD_START_RSEP.
0	4	H	Command Start	-	-	-	-

- The Speed Step mode has 4 speeds and is input to the data area with a value from 0 to 3.
- The speed of the Speed Step mode is parameter Pn # 100 ~ 103 of the MOTIONGATE.
- Speed Step mode is applied when parameter Pn # 104 "Use Jog Speed Ratio" of MOTIONGATE is '0'.
- Speed Rate mode enters and uses data from 1 to 255 in [%].
- The reference speed of the Speed Rate mode is parameter Pn # 105 『Move Speed for Jog Move: Ratio』 in MOTIONGATE.
- Speed Ratio mode is applied when parameter Pn # 104 『Use Jog Speed Ratio』 of MOTIONGATE is '1'.
- Speed Value mode is used by entering the actual speed of the motor in the word data.
- If the data entered in the data area is not suitable for JOG driving, the Out_Range bit in Output-Map is set to '1'.
- Speed can be changed by inputting CMD START bit after inputting speed value to change during jog operation in the data area with the Speed Override function. The acceleration / deceleration time of the changed speed is operated under the conditions of Pn # A03 『Axis Acc Time』 and Pn # A04 『Axis Dec Time』.

■ JOG Move – Speed Step Move or Speed Ratio Move

The operation instructions are the same for Speed Step Move and Speed Ratio Move in jog operation. This operation method is selected by the setting value of 『Use Jog Speed Ratio』 of PN # 0104 of the MOTIONGATE parameter.

Speed Step Move in jog operation is jog operation in the saved 0 ~ 3 speed step. Speed Ratio Move of jog operation is operated by ratio of PN # 0105 『Move Speed for Jog Move: Ratio』 of stored parameter.

Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)																																																																																																																			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name																																																																																																																
✓ IO-Map command and response - When executing -JOG command Input-Map <table> <tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr> <tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr> </table> InBMap <table> <tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr> <tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr> </table> InData <table> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table> MOTION/SETTING bit = 0 CMD_CODE = 0000b , SPD_MODE bit = 0; +JOG bit = 0, -JOG bit = 1 Output-Map <table> <tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr> <tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr> </table> OutBMap <table> <tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr> <tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr> </table> OutData <table> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table> MOTION/SETTING_RESP bit = 0 CMD_CODE_RESP = 0000b JOG_RESP bit = 1, MOTIONING bit = 1								7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8																									7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8																								
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Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)																																																																			
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- When executing +JOG command Input-Map <table border="1"> <tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr> <tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr> <tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr> <tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr> </table> InBMap InData MOTION/SETTING bit = 0 CMD_CODE = 0000b , SPD_MODE bit = 1; +JOG bit = 1, -JOG bit = 0 Output-Map <table border="1"> <tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr> <tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr> <tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr> <tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr> </table> OutBMap OutData MOTION/SETTING_RESP bit = 0 CMD_CODE_RESP = 0000b JOG_RESP bit = 1, MOTIONING bit = 1								7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8
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7	6	5	4	3	2	1	0																																																																
F	E	D	C	B	A	9	8																																																																

When you run JOG MOVE, you can select the type of JOG MOVE using SPD_MODE [3.2] in Input-Map. When the SPD_MODE bit is 1 and JOG MOVE uses the word data value as the speed value. When 0 the speed value is determined by the parameter setting value of the MOTIONGATE.

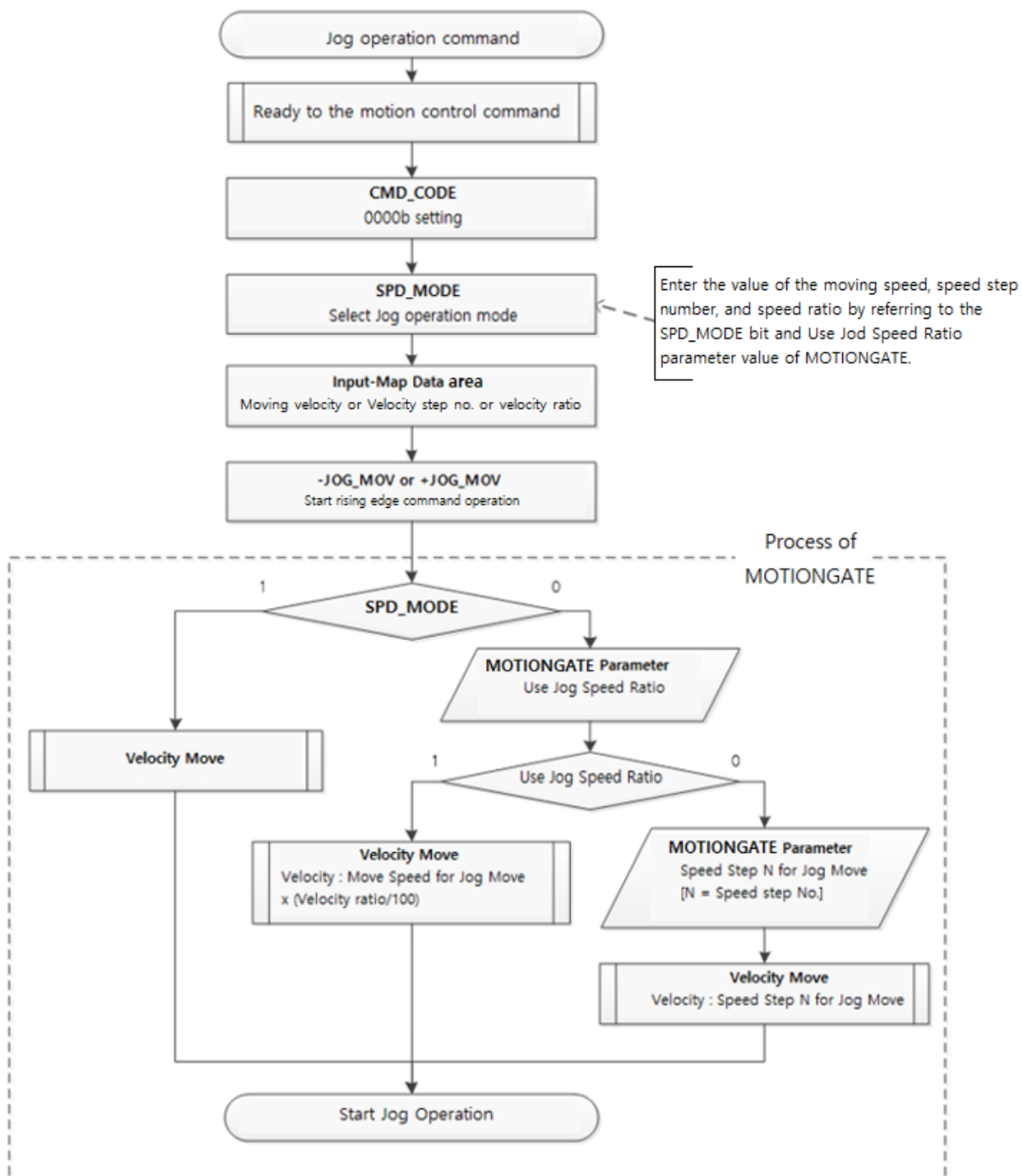
You can cancel the current operation speed without stopping the operation during the jog move, and execute the Speed Override command, which can apply the new speed value to the operation.

5.1.2 Jog Move parameter

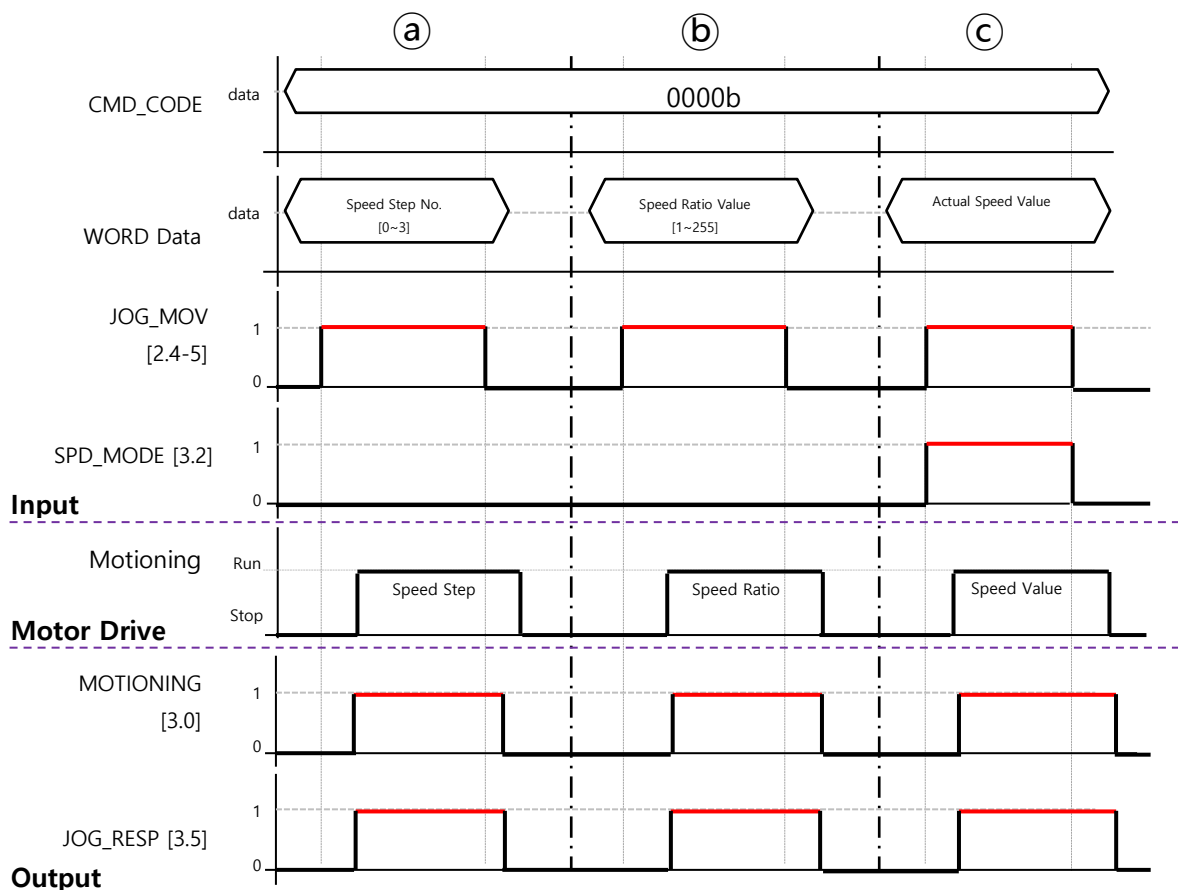
Jog operation parameter list

Parameter number	Parameter name	Setting range	Unit	Default setting	Meaning
MOTIONGATE parameters					
Pn#0100	Speed Step 0 for Jog Move	1 to 10,000,000	pps	100	Speed value
Pn#0101	Speed Step 1 for Jog Move	1 to 10,000,000	pps	1,000	
Pn#0102	Speed Step 2 for Jog Move	1 to 10,000,000	pps	10,000	
Pn#0103	Speed Step 3 for Jog Move	1 to 10,000,000	pps	100,000	
Pn#0104	Use Jog Speed Ratio	0, 1		0	0: Use Speed Step 1: Use speed ratio
Pn#0105	Move Speed for Jog Move: Ratio	1 to 10,000,000	pps	100,000	Reference speed value of jog operation
Motor drive parameters					
Pn#0A00	Pulse Per Revolution	0 to 9 0 to 15 ^{*)}		9 10 ^{*)}	* For Ezi-STEP Plus-R, it only works when there is an external encoder.
Pn#0A01	Axis Max Speed	1 to 500,000	pps	500,000	Operation speed through acceleration process
Pn#0A02	Axis Start Speed	1 to 35,000	pps	1	Starting speed before acceleration
Pn#0A03	Axis Acc Time	1 to 9,999	msec	100	Acceleration time
Pn#0A04	Axis Dec Time	1 to 9,999	msec	100	Deceleration time
Pn#0A05	Speed Override	1 to 500	%	100	Motor operating speed ratio
Pn#0A07	Jog Start Speed	1 to 35,000	pps	1	Parameters of the motor drive
Pn#0A08	Jog Acc Dec Time	1 to 9,999	msec	100	Parameters of the motor drive
Pn#0A1C	Motion Dir	0, 1		0	Selecting driving direction (CW, CCW)

5.1.3 Jog operation processing order



5.1.4 Timing chart



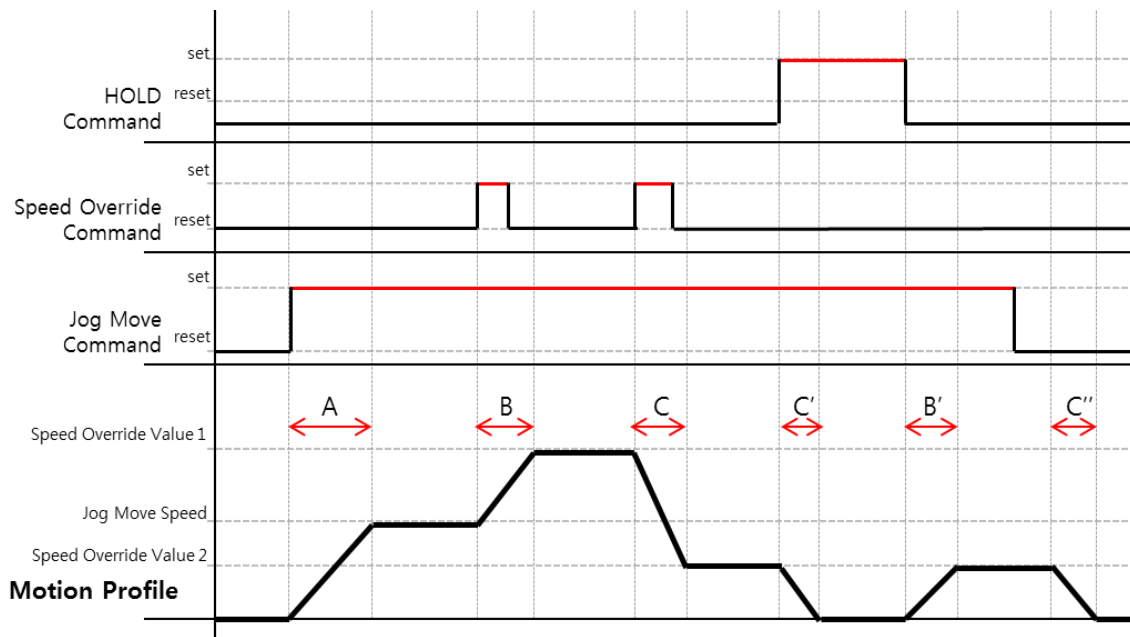
Jog operation starts operation at the rising edge of the JOG_MOV bit and stops at the falling edge. In order to execute this motion, moving speed value is required.

Ⓐ section is a jog operation command in Speed Step mode. When Input-Map's SPD_MODE bit is '0', and MOTIONGATE parameter PN#104 'Use Jog Speed Ratio' is '0', it is driven by the speed value of the stored MOTIONGATE parameter. (* If the word data area is 0 in the shipping state and the jog operation command is executed, the motor is driven at 100 [pps].)

Ⓑ Section is the jog operation command in Speed Rate mode. When the SPD_MODE bit in Input-Map is '0', and MOTIONGATE parameter PN#104 'Use Jog Speed Ratio' is '1', the value in the word data area is driven by the speed value in percentage PN#105 'Move Speed for Jog Move: Ratio'.

Ⓒ Section is jog operation command in Speed Value mode. This command is used to drive the motor using the word data as the speed value when the SPD_MODE bit in Input-Map is '1'.

► Motion profile for the Speed Override command



The section A is the section in which the operation is started by the jog operation command and operation starts by applying the parameter value of 『Pn # A08 Jog Acc Dec Time 』.

Section B increases speed by executing the Speed Override command with the Speed Override 1 value. The acceleration time is applied to Pn#A03 『Axis Ac Time 』 parameter values.

Section C reduces speed by executing the Speed Override command with the Speed Override 2 value. The acceleration time is then applied to Pn#A04 『Axis Dec Time 』 parameter values.

Section C' is the section in which the operation is stopped by the pause command and the deceleration time is the parameter value of Pn # A04 『Axis Dec Time 』.

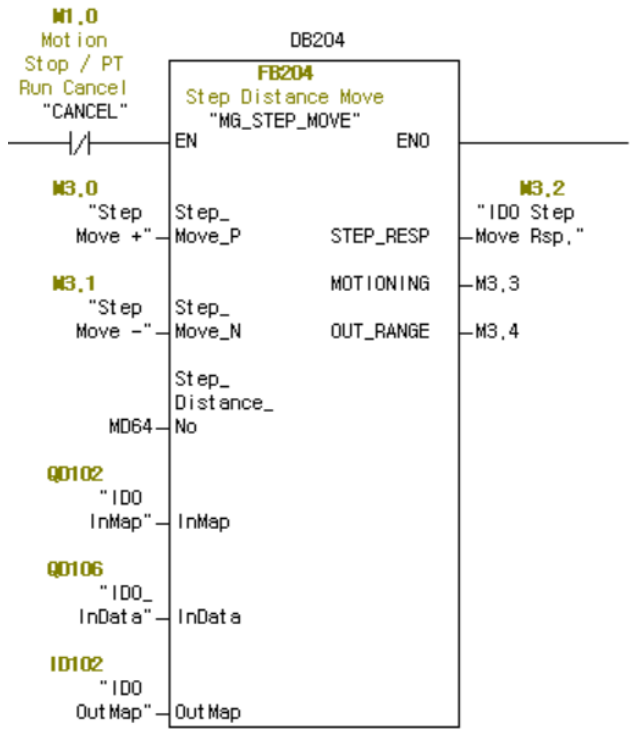
B' is the section where operation is resumed by the pause release command. Acceleration time is applied to Pn # A03 『Axis Acc Time 』 parameter value.

C'' section is the section where operation is stopped by Jog operation stop command and the deceleration time parameter value of Pn # A04 『Axis Dec Time 』 is applied.

5.2 Step Movement

Step movement is a motion that moves the specified distance by one pulse input.

Example 10 Step Move



Function block "MG_STEP_MOVE" in example 10 executes step command by combining I / O-Map when step move command and step number information are input, and outputs response and status for this command. If the step number exceeds the range of 0 ~ 3, it checks Out_Of_Range of W0.5 of Output-Map of MotionGate and outputs it.



Attention

In a function block that processes motion command, the "CANCEL" instruction may be preprocessed depending on the execution order of the function blocks. In this case, the function block should be deactivated when "CANCEL" instruction exists.

5.2.1 Step movement command bit

MOTIONGATE can store and manage 4 steps travel distance. Motion uses the STEP_MOV bit and is classified into forward motion (+ STEP_MOV) and backward motion (-STEP_MOV). The instructions of the bits of both Input-Map are looped back to the STEP_RESP bit of the Output Map.

Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name
0	0	H	CONNECT	0	0	H	CONNECTED
0	1	H	ESTOP	0	1	H	ENABLED
0	2	H	ENABLE	0	7	L	Motion /Setting
0	7	L	Motion /Setting	1	0	H->L	MOTIONING Status Flag
0	8	L	CMD_CODE 0	0	8	H	CMD_CODE RESP 0
0	9	L	CMD_CODE 1	0	9	L	CMD_CODE RESP 1
0	10(A)	L	CMD_CODE 2	0	10(A)	L	CMD_CODE RESP 2
0	11(B)	L	CMD_CODE 3	0	11(B)	L	CMD_CODE RESP 3
1	1	L	CANCEL	1	9	H/L	H : CCW L : CW
1	2	L	HOLD	1	1	H, L	HOLD_RESP.
1	6	Rising Edge	-STEP_MOV	1	7	H	STEP_RESP
1	7	Rising Edge	+STEP_MOV	-	-	-	-

- In Step Distance, 4 position information is managed in 『Step Distance n』 parameter of Pn # 200 ~ Pn # 203.
- "n" in 『Step Distance n』 is in the range of 0 ~ 3, and the step moves by inputting the range in the data area of Input-Map.
- The speed of the step movement is the value of the parameter Pn # 204 『Move Speed for Step Move』 of the MOTIONGATE.
- If the data entered in the data area does not match the step distance number range, the Out_Range bit of the Output-Map is set to '1'.

■ Step Move

✓ IO-Map command and response

- When executing -STEP Move Command

		Input-Map							
InBMap		7	6	5	4	3	2	1	0
		F	E	D	C	B	A	9	8
		7	6	5	4	3	2	1	0
		F	E	D	C	B	A	9	8
InData									

MOTION/SETTING bit = 0
 CMD_CODE = 0000b
 +STEP bit = 0, -STEP bit = 1

		Output-Map							
OutBMap		7	6	5	4	3	2	1	0
		F	E	D	C	B	A	9	8
		7	6	5	4	3	2	1	0
		F	E	D	C	B	A	9	8
OutData									

MOTION/SETTING_RESP bit = 0
 CMD_CODE_RESP = 0000b
 STEP_RESP bit = 1, MOTIONING bit = 1

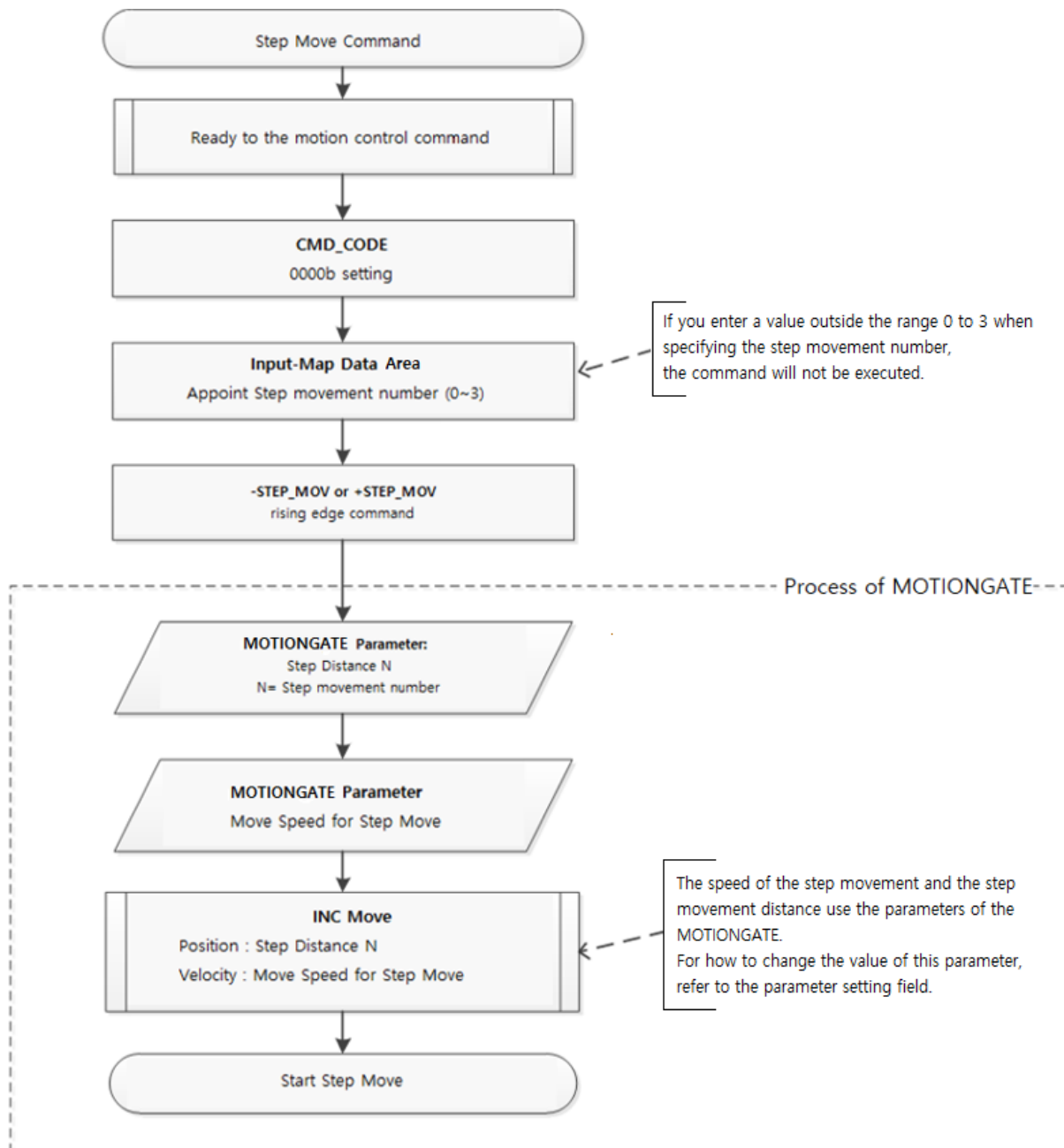
Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)																																																																																																																			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name																																																																																																																
- When executing + STEP Move command Input-Map <table><tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr></table> InBMap <table><tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr></table> InData <table><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> Output-Map <table><tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr></table> OutBMap <table><tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr></table> OutData <table><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> MOTION/SETTING bit = 0 CMD_CODE = 0000b +STEP bit = 1, -STEP bit = 0 MOTION/SETTING_RESP bit = 0 CMD_CODE_RESP = 0000b STEP_RESP bit = 1, MOTIONING bit = 1								7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8																									7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8																								
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5.2.2 Step movement parameter

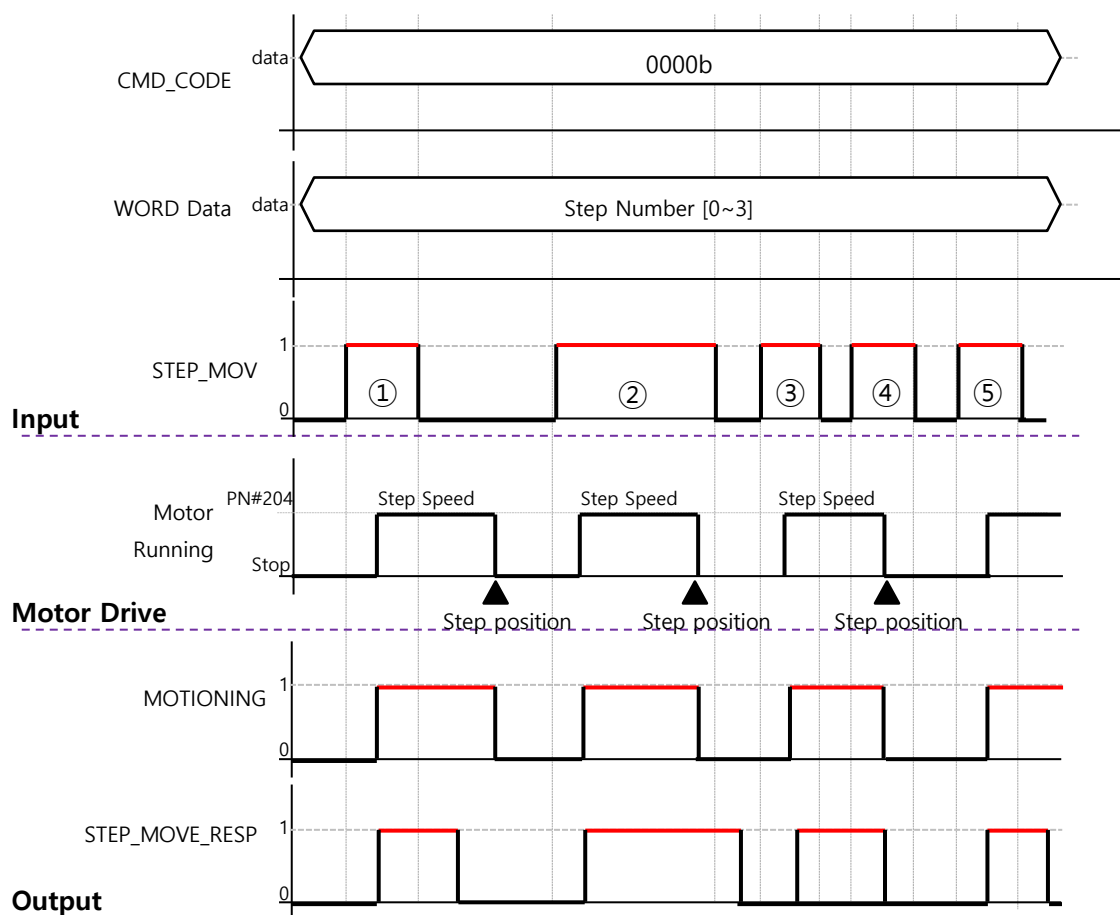
Step movement parameter list

Parameter number	Parameter name	Setting range	Unit	Default setting	Meaning
MOTIONGATE parameter					
Pn#0200	Step Distance 0	0 to 99,999,999	pulse	1	1 Step movement distance
Pn#0201	Step Distance 1	0 to 99,999,999	pulse	10	
Pn#0202	Step Distance 2	0 to 99,999,999	pulse	100	
Pn#0203	Step Distance 3	0 to 99,999,999	pulse	1000	
Pn#0204	Move Speed for Step Move	1 to 10,000,000	pps	10,000	Step movement speed
Motor drive parameter					
Pn#0A00	Pulse Per Revolution	0 to 9 0 to 15 ^(*)		9 10	^(*) For Ezi-STEP Plus-R, it only works when there is an external encoder.
Pn#0A01	Axis Max Speed	1 to 500,000	pps	500,000	Operation speed through acceleration process
Pn#0A02	Axis Start Speed	1 to 35,000	pps	1	Starting speed before acceleration
Pn#0A03	Axis Acc Time	1 to 9,999	msec	100	Acceleration time
Pn#0A04	Axis Dec Time	1 to 9,999	msec	100	Deceleration time
Pn#0A05	Speed Override	1 to 500	%	100	Motor operating speed ratio
Pn#0A1C	Motion Dir	0 , 1		0	Selecting driving direction (CW, CCW)

5.2.3 Step movement processing order



5.2.4 Timing chart



The step move command moves the STEP_MOV bit with one command, as shown in ①.

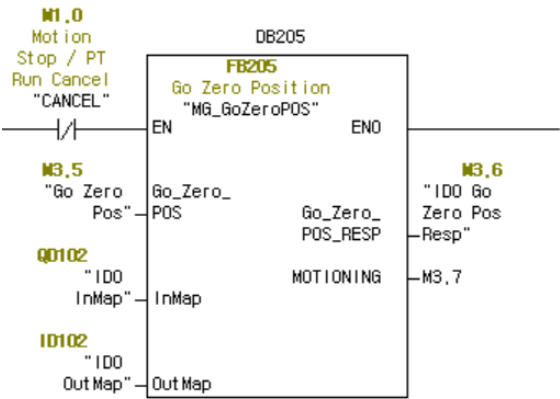
When you enter a command continuously, as shown in ②, make one step shift, and the STEP_MOVE_RESP bit outputs '1' while it is entered.

The command from ④ entered while step movement is running with the command from ③ is ignored. Command ⑤ works because it is input after the step movement is completed. The loop-back bit for the command of ③ and ⑤ which is normally operated is output.

5.3 Zero position movement (Go Zero Position)

Zero position movement is a motion that moves to 0 [pulse] which is the absolute position of the motor drive.

Example 11 Go Zero postion



The function block "MG_GoZeroPOS" in Ex 11 is a function block in which a command is executed as a start input. If a command is input, after processing it, the command response and a flag confirming that it is in motion is output.



Attention

In a function block that processes motion command, the "CANCEL" command may be preprocessed depending on the execution order of the function blocks. In this case, the function block should be deactivated when the "CANCEL" command exists.

5.3.1 Zero position movement command bit

This command uses the GO_ZERO_POS bit of the Input-Map. When moving to the zero point, the moving speed is determined by the value of the parameter 『Origin Speed』 of the motor drive. When the command is executed, the response to the zero position movement command is output with the Go_ZERO_POS_RESP bit of the Output-Map.

Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name
0	0	H	CONNECT	0	0	H	CONNECTED
0	1	H	ESTOP	0	1	H	ENABLED
0	2	H	ENABLE	0	7	L	Motion /Setting
0	7	L	Motion /Setting	1	0	H->L	MOTIONING Status Flag
0	8	L	CMD_CODE 0	0	8	H	CMD_CODE RESP 0
0	9	L	CMD_CODE 1	0	9	L	CMD_CODE RESP 1
0	10(A)	L	CMD_CODE 2	0	10(A)	L	CMD_CODE RESP 2
0	11(B)	L	CMD_CODE 3	0	11(B)	L	CMD_CODE RESP 3
1	1	L	CANCEL	1	9	H/L	H : CCW L : CW
1	2	L	HOLD	1	1	H, L	HOLD_RESP.
1	3	Rising Edge	GO_ZERO_POS	1	5	H	ZERO_POS_MOVE_RESP

- In Step Distance, 4 position information is managed in 『Step Distance n』 parameter of Pn # 200 ~ Pn # 203.
- "n" in 『Step Distance n』 is in the range of 0 ~ 3, and the step moves by inputting the range in the data area of Input-Map.
- The speed of the step movement is the value of the parameter Pn # 204 『Move Speed for Step Move』 of the MOTIONGATE.
- If the data entered in the data area does not match the step distance number range, the Out_Range bit of the Output-Map is set to '1'.

■ Go Zero Position Move

✓ IO-Map command and response

- When executing zero point movement command

		Input-Map							
		7	6	5	4	3	2	1	0
InBMap	F	E	D	C	B	A	9	8	
	7	6	5	4	3	2	1	0	
InData	F	E	D	C	B	A	9	8	

MOTION/SETTING bit = 0

CMD_CODE = 0000b

GO_ZERO_POS bit = 1

		Output-Map							
		7	6	5	4	3	2	1	0
OutBMap	F	E	D	C	B	A	9	8	
	7	6	5	4	3	2	1	0	
OutData	F	E	D	C	B	A	9	8	

MOTION/SETTING_RESP bit = 0

CMD_CODE_RESP = 0000b

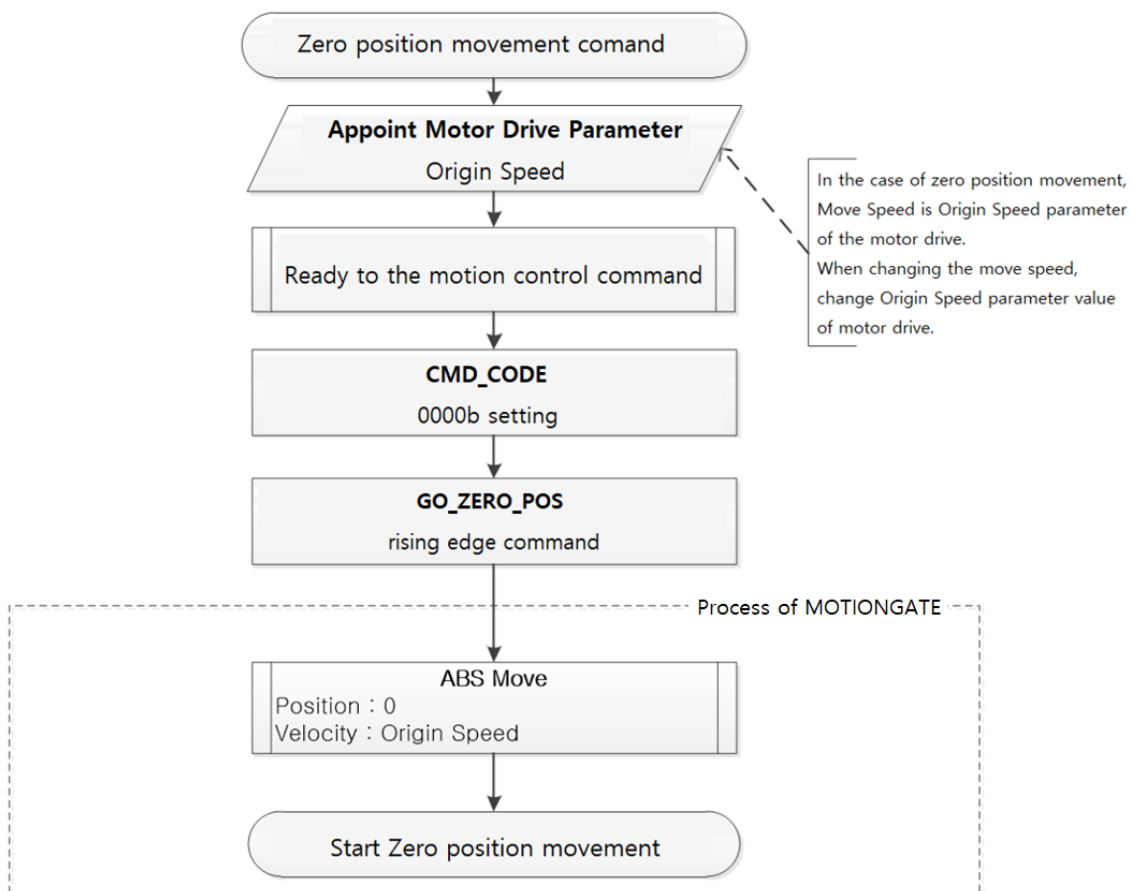
GO_ZERO_POS_RESP bit = 1, MOTIONING bit = 1

Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)																																																																			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name																																																																
- When setting GO_ZERO_POS bit at zero point Input-Map <table><tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr><tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr></table> InBMap InData Output-Map <table><tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr><tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr></table> OutBMap OutData Response Data = 0 (Actual Position) MOTION/SETTING bit = 0 CMD_CODE = 0000b RESPONSE_TYPE = 0001b GO_ZERO_POS bit = 0 MOTION/SETTING_RESP bit = 0 CMD_CODE_RESP = 0000b RESPONSE_TYPE_RESP = 0001b GO_ZERO_POS_RESP bit = 1, MOTIONING bit = 1 RESPONSE_DATA = Actual Position (0)								7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8
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F	E	D	C	B	A	9	8																																																																

5.3.2 Zero position movement parameter

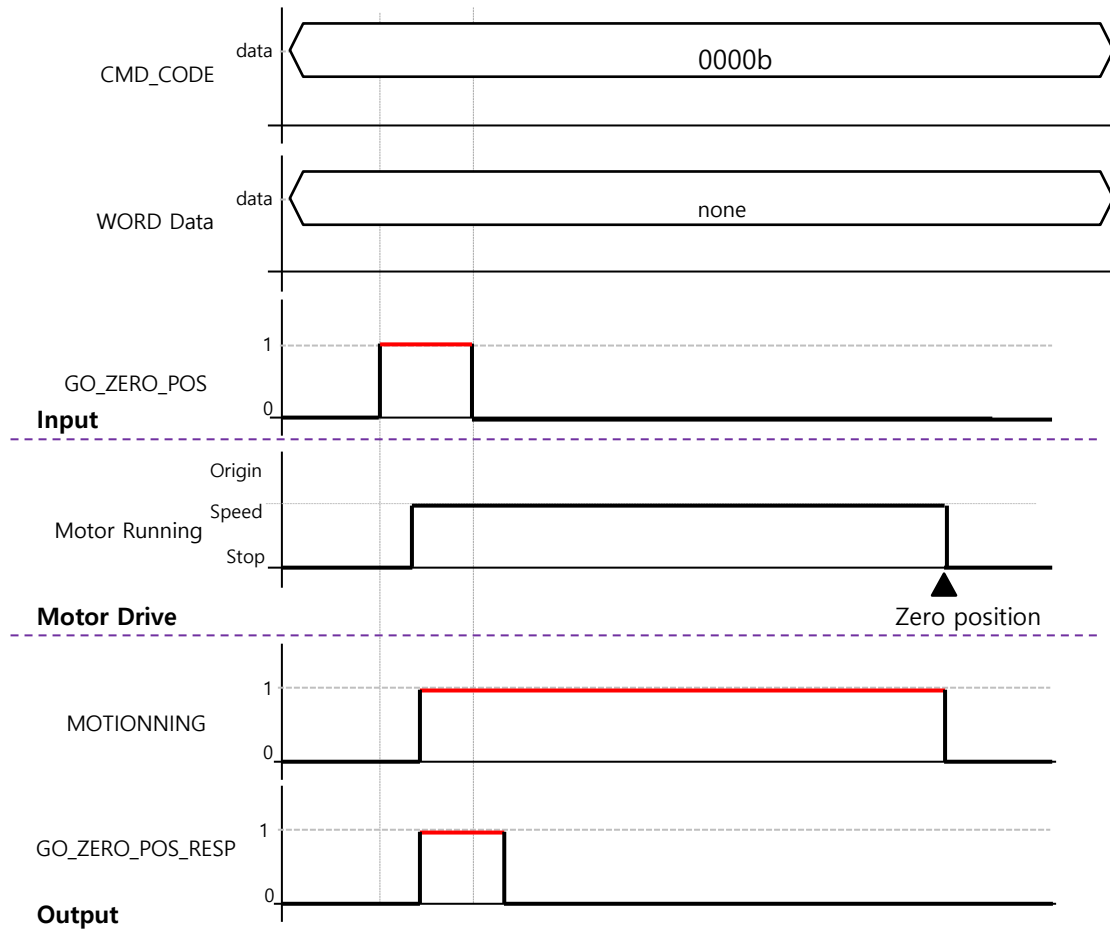
Parameter number	Parameter name	Setting range	Unit	Default setting	Meaning
MOTIONGATE parameters					
Pn#0A00	Pulse Per Revolution	0 to 9 0 to 15 ^{*)}		9 10 ^{*)}	^{*)} For STEP drive, it only works when there is an external encoder.
Pn#0A01	Axis Max Speed	1 to 500,000	pps	500,000	Operation speed through acceleration process
Pn#0A02	Axis Start Speed	1 to 35,000	pps	1	Starting speed before acceleration
Pn#0A03	Axis Acc Time	1 to 9,999	msec	100	Acceleration time
Pn#0A04	Axis Dec Time	1 to 9,999	msec	100	Deceleration time
Pn#0A05	Speed Override	1 to 500	%	100	Motor operating speed ratio
Pn#0A11	Org Speed	1 to 500,000	pps	50,000	Motor drive parameter
Pn#0A1C	Motion Dir	0, 1		0	Selecting driving direction (CW, CCW)

5.3.3 Zero position movement processing order



5.3.4 Timing chart

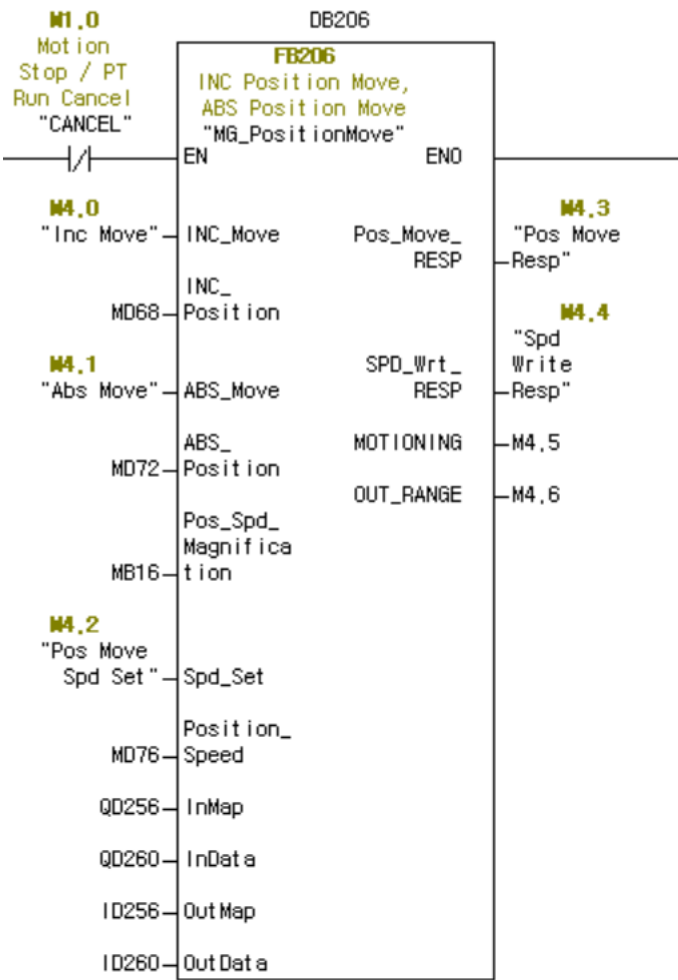
Zero position movement is a motion that starts operation at the rising edge of GO_ZERO_POS bit. Motion initiated by command input moves to absolute value position 0, and the state value of GO_ZERO_POS bit of Input-Map is looped back to GO_ZERO_POS bit of Output-Map.



5.4 Position Movement

Position movement is motion that moves relative position (INC Move) or absolute position movement (ABS Move) as the value entered in the data area.

Example 12 Postion Move



Function block "MG_PositionMove" in Example 12 includes two kinds of position movement command and the function to change parameter Pn # 0400 Position Move Speed parameter. When executing relative position movement command and absolute position command, it executes a command by inputting velocity ratio and position information and outputs response and status information.



Attention

In a function block that processes motion instructions, the "CANCEL" instruction may be preprocessed depending on the execution order of the function blocks. In this case, function block should be deactivated when "CANCEL" instruction exists.

5.4.1 Position movement command bit

The CMD_CODE value for this command is 0001b. The INC / ABS bit can be set to '0' to move the relative value or '1' to move to the absolute value.

Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name
0	0	H	CONNECT	0	0	H	CONNECTED
0	1	H	ESTOP	0	1	H	ENABLED
0	2	H	ENABLE	0	7	L	Motion /Setting
0	7	L	Motion /Setting	1	0	H->L	MOTIONING Status Flag
0	8	H	CMD_CODE 0	0	8	H	CMD_CODE RESP 0
0	9	L	CMD_CODE 1	0	9	L	CMD_CODE RESP 1
0	10(A)	L	CMD_CODE 2	0	10(A)	L	CMD_CODE RESP 2
0	11(B)	L	CMD_CODE 3	0	11(B)	L	CMD_CODE RESP 3
1	1	L	CANCEL	1	9	H/L	H : CCW L : CW
1	2	L	HOLD	1	1	H, L	HOLD_RESP.
0	4	Rising Edge	CMD START	0	4	H	CMD START_RESP
1	8	H L	INC/ABS (Low : INC POS Move) (High : ABS POS Move)				
1	12(C)	data	Speed magnification value 0				
1	13(D)	data	Speed magnification value 1				
1	14(E)	data	Speed magnification value 2				
1	15(F)	data	Speed magnification value 3				

- The moving speed at the time of position movement is multiplied by W1.12 ~ 15 "Speed magnification value" based on the parameter Pn # 400 『Move Speed for positioning』 of the MOTIONGATE, and it is applied up to 15 times. If the multiplier is 0, the speed multiplier is multiplied by 1.

Ex) Pn # 400 = 20,000; Speed magnification value = 10; ∴ Position Move Speed = 200,000 [pps]

- The two command responses, INC POS Move and ABS POS Move, are determined by the INC / ABS select bits.

Attention

When executing Single-PT operation, make sure that the value is written in the position movement speed multiplier. Both areas (W1.12) are mixed in both instructions.

Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)																																																																																																																																			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name																																																																																																																																
■ Position Move ✓ IO-Map command and response When executing INC POS Move command Input-Map <table> <tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr> <tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr> <tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr> <tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr> </table> InBMap InData Incremental Position Value Output-Map <table> <tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr> <tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr> <tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr> <tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr> </table> OutBMap OutData MOTION/SETTING bit = 0 CMD_CODE = 0001b INC/ABS bit = 0 Command Data = Relative position value Speed magnification value = Position movement speed multiplier CMD_START bit = 1 MOTION/SETTING_RESP bit = 0 CMD_CODE_RESP = 0001b CMD_RESP bit = 1, MOTIONING bit = 1 Releasing CMD_START bit after INC POS Move command Input-Map <table> <tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr> <tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr> <tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr> <tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr> </table> InBMap InData Incremental Position Value Output-Map <table> <tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr> <tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr> <tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr> <tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr> </table> OutBMap OutData MOTION/SETTING bit = 0 CMD_CODE = 0001b INC/ABS bit = 0 Command Data = Relative position value Speed magnification value = Position movement speed multiplier CMD_START bit = 0 MOTION/SETTING_RESP bit = 0 CMD_CODE_RESP = 0001b CMD_RESP bit = 0, MOTIONING bit = 1								7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8
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F	E	D	C	B	A	9	8																																																																																																																																

Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name

- **When executing ABS POS Move command**

Input-Map

7	6	5	4	3	2	1	0
F	E	D	C	B	A	9	8

InBMap

7	6	5	4	3	2	1	0
F	E	D	C	B	A	9	8

InData

Absolute Position Value							
-------------------------	--	--	--	--	--	--	--

MOTION/SETTING bit = 0
 CMD_CODE = 0001b
 INC/ABS bit = 1
 Command Data = Absolute position value
 Speed magnification value = Position movement speed multiplier
 CMD_START bit = 1

Output-Map

7	6	5	4	3	2	1	0
F	E	D	C	B	A	9	8

OutBMap

7	6	5	4	3	2	1	0
F	E	D	C	B	A	9	8

OutData

--	--	--	--	--	--	--	--

MOTION/SETTING_RESP bit = 0
 CMD_CODE_RESP = 0001b
 CMD_RESP bit = 1, MOTIONING bit = 1

- **Releasing CMD_START bit after ABS POS Move command**

Input-Map

7	6	5	4	3	2	1	0
F	E	D	C	B	A	9	8

InBMap

7	6	5	4	3	2	1	0
F	E	D	C	B	A	9	8

InData

Absolute Position Value							
-------------------------	--	--	--	--	--	--	--

MOTION/SETTING bit = 0
 CMD_CODE = 0001b
 INC/ABS bit = 1
 Command Data = Absolute position value
 CMD_START bit = 0

Output-Map

7	6	5	4	3	2	1	0
F	E	D	C	B	A	9	8

OutBMap

7	6	5	4	3	2	1	0
F	E	D	C	B	A	9	8

OutData

--	--	--	--	--	--	--	--

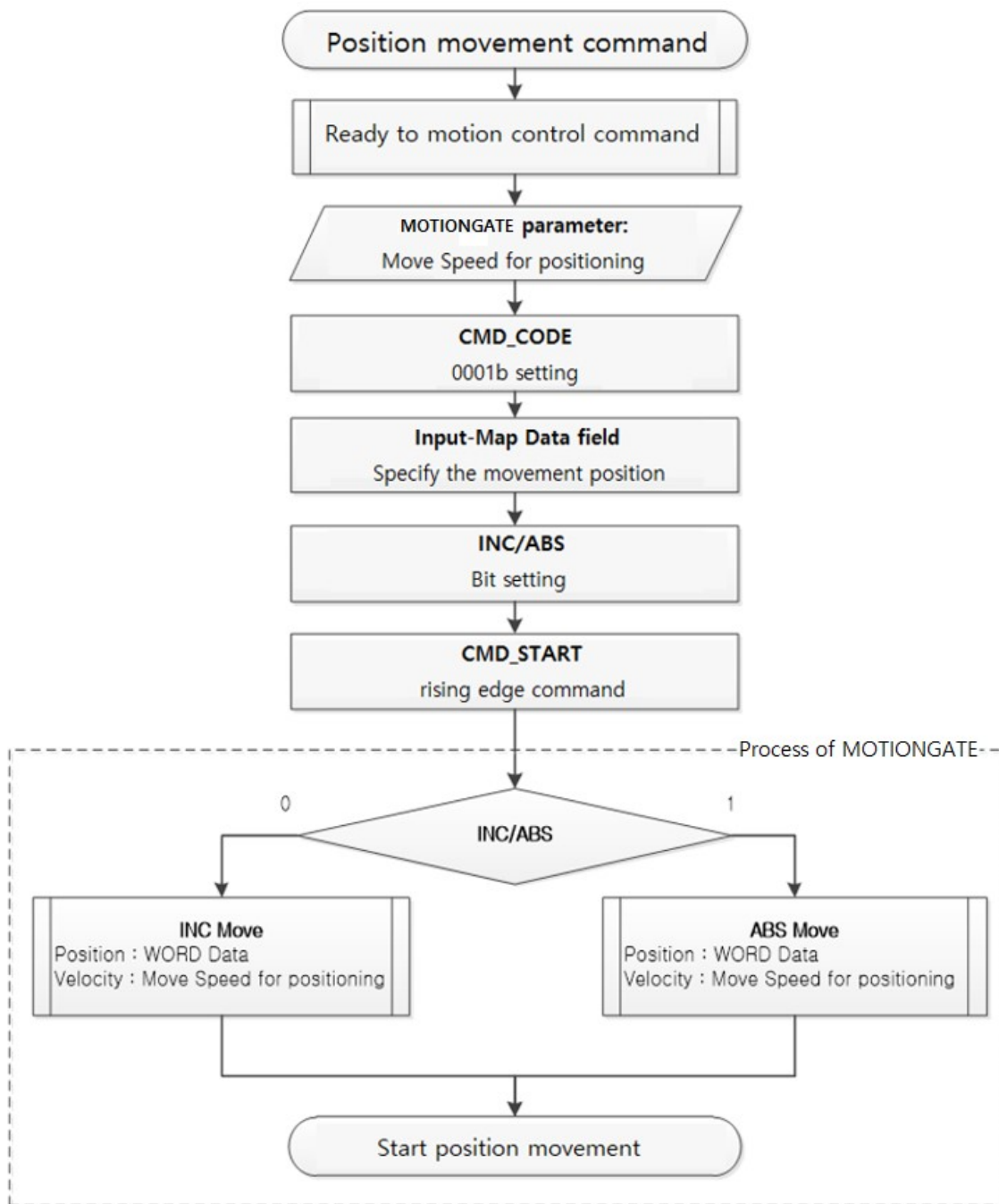
MOTION/SETTING_RESP bit = 0
 CMD_CODE_RESP = 0001b
 CMD_RESP bit = 0, MOTIONING bit = 1

5.4.2 Position movement parameter

Position movemet parameter list

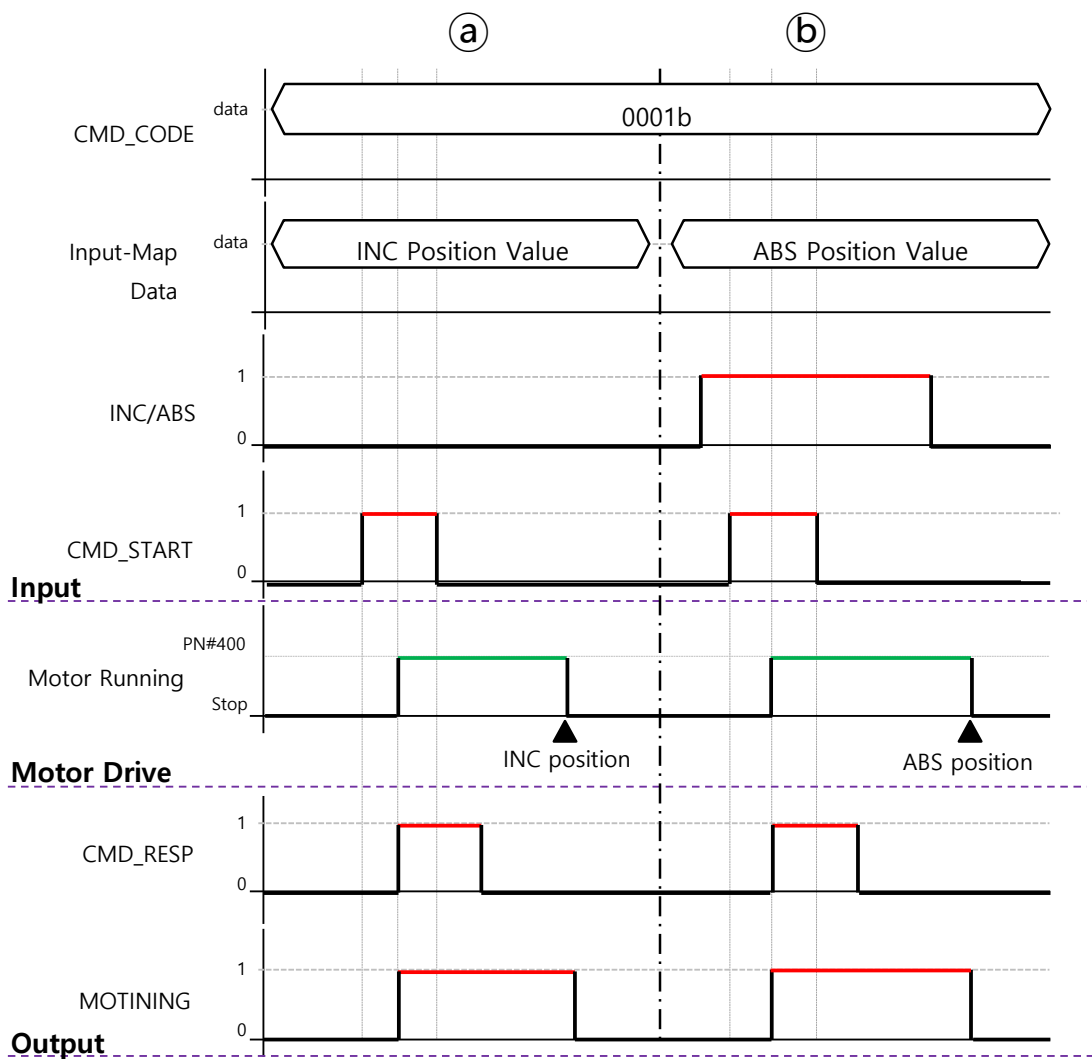
Parameter number	Parameter name	Setting range	Unit	Default setting	Meaning
MOTIONGATE parameter					
Pn#0400	Move Speed for positioning	1 to 10,000,000	pps	10,000	Position movement speed
Motor drive parameter					
Pn#0A00	Pulse Per Revolution	0 to 9 0 to 15 [*]		9 10	[*]) For Ezi-STEP Plus-R, it only works when there is an external encoder.
Pn#0A01	Axis Max Speed	1 to 500,000	pps	500,000	Operation speed through acceleration process
Pn#0A02	Axis Start Speed	1 to 35,000	pps	1	Starting speed before acceleration
Pn#0A03	Axis Acc Time	1 to 9,999	msec	100	Acceleration time
Pn#0A04	Axis Dec Time	1 to 9,999	msec	100	Deceleration time
Pn#0A05	Speed Override	1 to 500	%	100	Motor operating speed ratio
Pn#0A1C	Motion Dir	0 , 1		0	Selecting driving direction (CW, CCW)

5.4.3 Position movement processing order



5.4.4 Timing chart

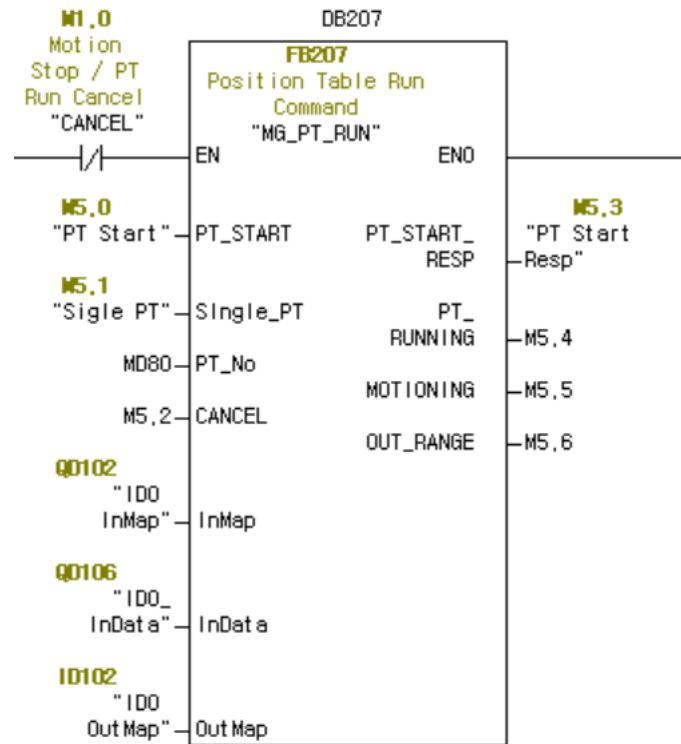
To move the position, set the value of CMD_CODE to 0001b, input the position value in the Input-Map data area, and set the INC / ABS bit to select INC Move and ABS Move. The selected motion starts with the rising edge instruction of the CMD_START bit



5.5 PT Operation

PT operation has general PT operation to sequentially operate PT items stored in the motor drive and single PT operation to operate one PT item.

Example 13 PT Run



Function block "MG_PT_RUN" in Ex 13 can select two types of PT operation as an input of "Single_PT". If you keep '0' signal at this input and input it to "PT_START", Normal PT operates by validating the continuous operation properties saved on the axis per axis. If you keep the '1' signal and input the command to "PT_START", Even if the motion profile saved in the table has the continuous operation properties, only the PT of the entered PT number is activated and completed.



Attention

In a function block that processes motion command, the "CANCEL" command may be preprocessed depending on the execution order of the function blocks. In this case, the function block should be deactivated when the "CANCEL" command exists.

5.5.1 PT operation command bit

PT operation is executed when CMD_CODE is '4' in motion control mode.

Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name
0	0	H	CONNECT	0	0	H	CONNECTED
0	1	H	ESTOP	0	1	H	ENABLED
0	2	H	ENABLE	0	7	L	Motion /Setting
0	7	L	Motion /Setting	1	0	H->L	MOTIONING Status Flag
0	8	L	CMD_CODE 0	0	8	L	CMD_CODE RESP 0
0	9	L	CMD_CODE 1	0	9	L	CMD_CODE RESP 1
0	10(A)	H	CMD_CODE 2	0	10(A)	H	CMD_CODE RESP 2
0	11(B)	L	CMD_CODE 3	0	11(B)	L	CMD_CODE RESP 3
1	1	L	CANCEL	1	9	H/L	H : CCW L : CW
0	4	Rising Edge	CMD START	0	4	H	CMD START_RESP
1	12(C)	H L	SINGLE_PT (Low : NORMAL_PT Mode) (High : SINGLE_PT Mode)	1	8	H/L	H : PT_RUNNING L : NONE

- The data of the Input-Map becomes the PT item number.
- When the SINGLE_PT bit is '0', it is a normal PT operation, and when it is '1', it is a single PT operation.
- The setting value of CMD_CODE is 0100b.
- The rising edge command of CMD_START is required to start the command.
- If the data entered in the data area matches the PT number range, the Out_Range bit of the Output-Map is set to '1'.
- Unlike other motion, HOLD command is not executed in PT operation.



Attention

When executing Single-PT operation, make sure that the value is written in the position movement speed multiplier. Both areas (W1.12) are mixed in both instructions.

Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)																																																																																																																																																																																																																																																			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name																																																																																																																																																																																																																																																
Position Table Run																																																																																																																																																																																																																																																							
IO-Map command and response																																																																																																																																																																																																																																																							
When executing Normal P.T Run command Input-Map <table><tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr></table> InBMap <table><tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr></table> InData <table><tr><td colspan="8">Position Table No.</td></tr></table> MOTION/SETTING bit = 0 CMD_CODE = 0100b SINGLE_PT bit = 0 Command Data = PT No. CMD_START bit = 1 Output-Map <table><tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr></table> OutBMap <table><tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr></table> OutData <table><tr><td colspan="8"></td></tr></table> MOTION/SETTING_RESP bit = 0 CMD_CODE_RESP = 0100b CMD_RESP bit = 1, PT_RUNNING bit = 1 Releasing CMD_START bit after Normal P.T Run command Input-Map <table><tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr></table> InBMap <table><tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr></table> InData <table><tr><td colspan="8">Position Table No.</td></tr></table> MOTION/SETTING bit = 0 CMD_CODE = 0100b SINGLE_PT bit = 0 Command Data = PT No. CMD_START bit = 0 Output-Map <table><tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr></table> OutBMap <table><tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr></table> OutData <table><tr><td colspan="8"></td></tr></table> MOTION/SETTING_RESP bit = 0 CMD_CODE_RESP = 0100b CMD_RESP bit = 0, PT_RUNNING bit = 1 When executing Single P.T Run command Input-Map <table><tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr></table> InBMap <table><tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr></table> InData <table><tr><td colspan="8">Position Table No.</td></tr></table> Output-Map <table><tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr></table> OutBMap <table><tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td><td>9</td><td>8</td></tr></table> OutData <table><tr><td colspan="8"></td></tr></table>								7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8	Position Table No.								7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8									7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8	Position Table No.								7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8									7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8	Position Table No.								7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	F	E	D	C	B	A	9	8								
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Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name
MOTION/SETTING bit = 0 CMD_CODE = 0100b SINGLE_PT bit = 1 Command Data = PT No. CMD_START bit = 1				MOTION/SETTING_RESP bit = 0 CMD_CODE_RESP = 0100b CMD_RESP bit = 1, PT_RUNNING bit = 1			

-

Releasing CMD_START bit after Single P.T Run command

Input-Map

7	6	5	4	3	2	1	0
F	E	D	C	B	A	9	8

InBMap

7	6	5	4	3	2	1	0
F	E	D	C	B	A	9	8

InData

Position Table No.							
--------------------	--	--	--	--	--	--	--

MOTION/SETTING bit = 0
CMD_CODE = 0100b
SINGLE_PT bit = 1
Command Data = PT No.
CMD_START bit = 0

Output-Map

7	6	5	4	3	2	1	0
F	E	D	C	B	A	9	8

OutBMap

7	6	5	4	3	2	1	0
F	E	D	C	B	A	9	8

OutData

MOTION/SETTING_RESP bit = 0
CMD_CODE_RESP = 0100b

CMD_RESP bit = 0, PT_RUNNING bit = 1

5.5.2 PT operation parameter

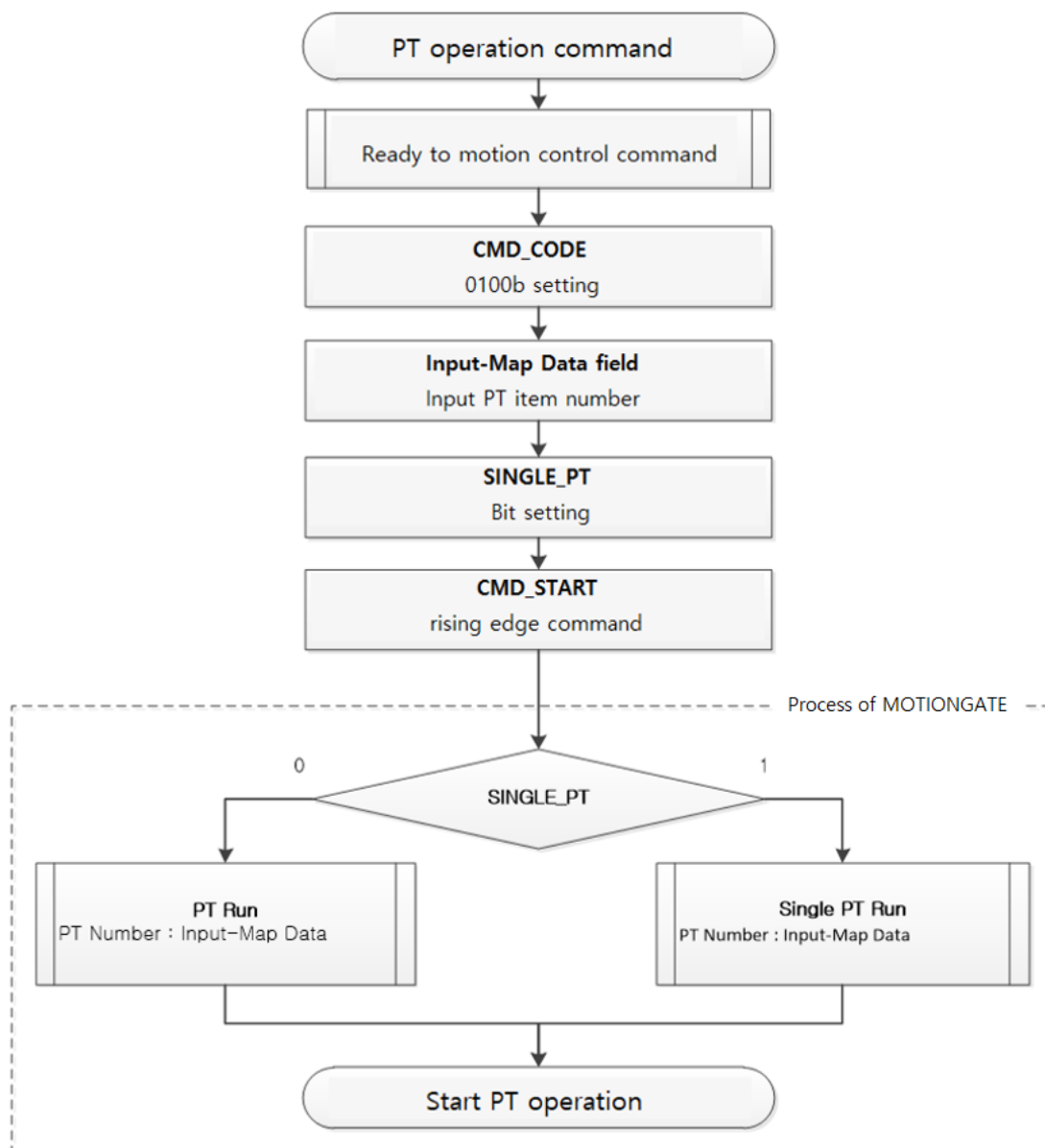
Accessing the parameters of the PT operation is to access the PT item. The PT number of each drive is written in the lower byte of the parameter number.

PT operation parameter list

Parameter number	Parameter name	Setting range	Unit
Pn#1000 + n	#n PT Command	0 to 9	
Pn#1200 + n	#n PT Position	-134,217,728 to 134,217,728	Pulse
Pn#1400 + n	#n PT Start Speed	1 to 500,000	pps
Pn#1600 + n	#n PT Move Speed	1 to 2,500,000	pps
Pn#1800 + n	#n PT Accel Time	1 to 9,999	msec
Pn#1A00 + n	#n PT Decel Time	1 to 9,999	msec
Pn#1C00 + n	#n PT Jump Table No.	0 to 255, 10000 to 10255	
Pn#1E00 + n	#n PT Jump PT0	0 to 255, 10000 to 10255	
Pn#2000 + n	#n PT Jump PT1	0 to 255, 10000 to 10255	

Pn#2200 + n	#n PT Jump PT2	0 to 255, 10000 to 10255	
Pn#2400 + n	#n PT Loop Count	0 to 100	
Pn#2600 + n	#n PT Loop Jump Table No.	0 to 255, 10000 to 10255	
Pn#2800 + n	#n PT PT Set	0 to 15	
Pn#2A00 + n	#n PT Loop count Clear	0 to 255	
Pn#2C00 + n	#n PT Wait Time	0 to 1	

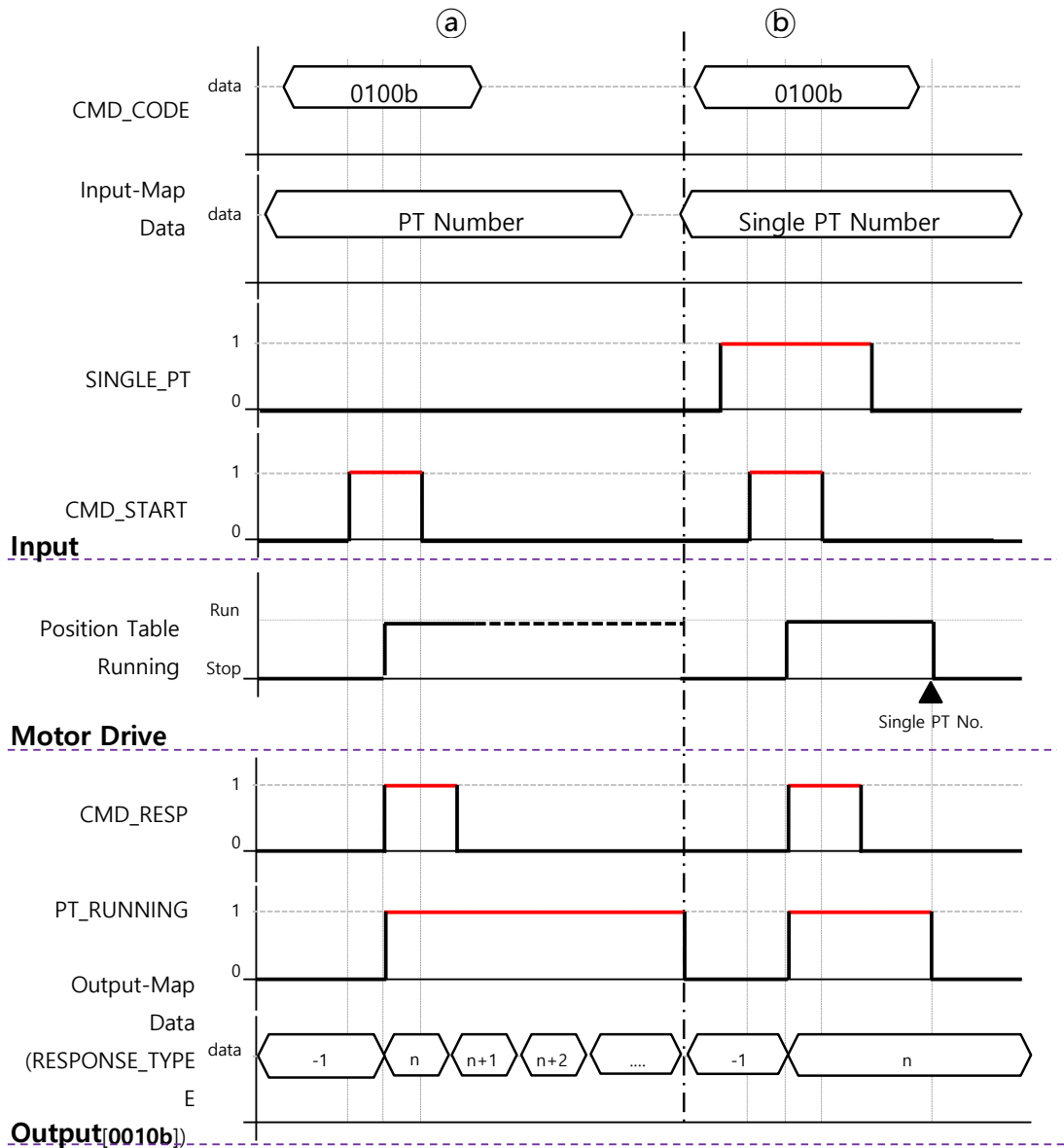
5.5.3 PT operation processing order



5.5.4 Timing chart

For normal PT operation, set the SINGLE_PT bit to '0' as in the section ㉔, and execute the command by setting the SINGLE_PT bit to '1' as in the section ㉕.

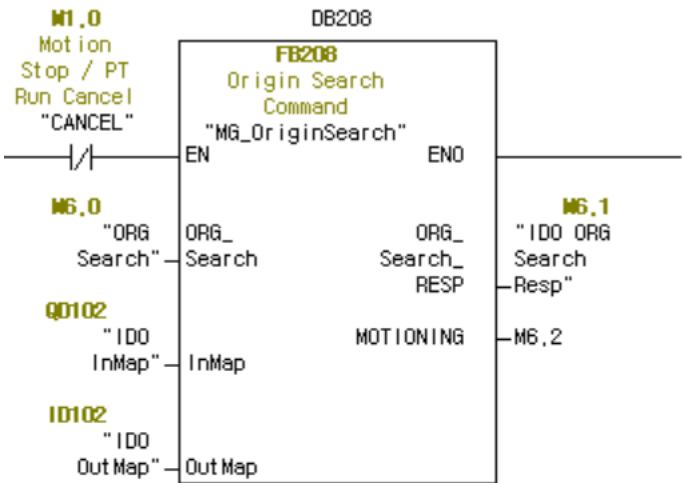
Response by PT operation command is set to '1' when PT_RUN bit of Output-Map is PT operation. Also, when RESPONSE_TYPE is set to [0101b], which is the PT number request code, the running PT number is returned as the data area of Output-Map.



5.6 Origin Movement

Origin movement command is to execute origin return with parameter value set in motor drive.

Example 14 Origin Move



Function block "MG_OriginSearch" in example 14 executes homing if there is command start input, and outputs command response and status.



Attention

In a function block that processes motion command, the "CANCEL" command may be preprocessed depending on the execution order of the function blocks. In this case, the function block should be deactivated when "CANCEL" command exists.

5.6.1 Origin movement command bit

Origin move command is executed when CMD_CODE is '7' in motion mode.

Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name
0	0	H	CONNECT	0	0	H	CONNECTED
0	1	H	ESTOP	0	1	H	ENABLED
0	2	H	ENABLE	0	7	L	Motion /Setting
0	7	L	Motion /Setting	1	0	H->L	MOTIONING Status Flag
0	8	H	CMD_CODE 0	0	8	H	CMD_CODE RESP 0
0	9	H	CMD_CODE 1	0	9	H	CMD_CODE RESP 1
0	10(A)	H	CMD_CODE 2	0	10(A)	H	CMD_CODE RESP 2
0	11(B)	L	CMD_CODE 3	0	11(B)	L	CMD_CODE RESP 3
1	1	L	CANCEL	1	9	H/L	H : CCW L : CW
0	4	Rising Edge	CMD START	0	4	H	CMD START_RESP

- The origin moving method is set by Pn # 0A14 『Org Method』 parameter of the motor drive. (* Refer to the 6.1 parameter type in the text or the user manual of the motor drive concerned)
- The value in the data area of Input-Map is ignored.
- When executing the command, check whether there is no risk of equipment collision.

■ Origin Searching

✓ IO-Map command and response

- When executing Origin movement command

Input-Map

	7	6	5	4	3	2	1	0
InBMap	F	E	D	C	B	A	9	8
	7	6	5	4	3	2	1	0
	F	E	D	C	B	A	9	8
InData								

MOTION/SETTING bit = 0
 CMD_CODE = 0111b
 CMD_START bit = 1

Output-Map

	7	6	5	4	3	2	1	0
OutBMap	F	E	D	C	B	A	9	8
	7	6	5	4	3	2	1	0
	F	E	D	C	B	A	9	8
OutData								

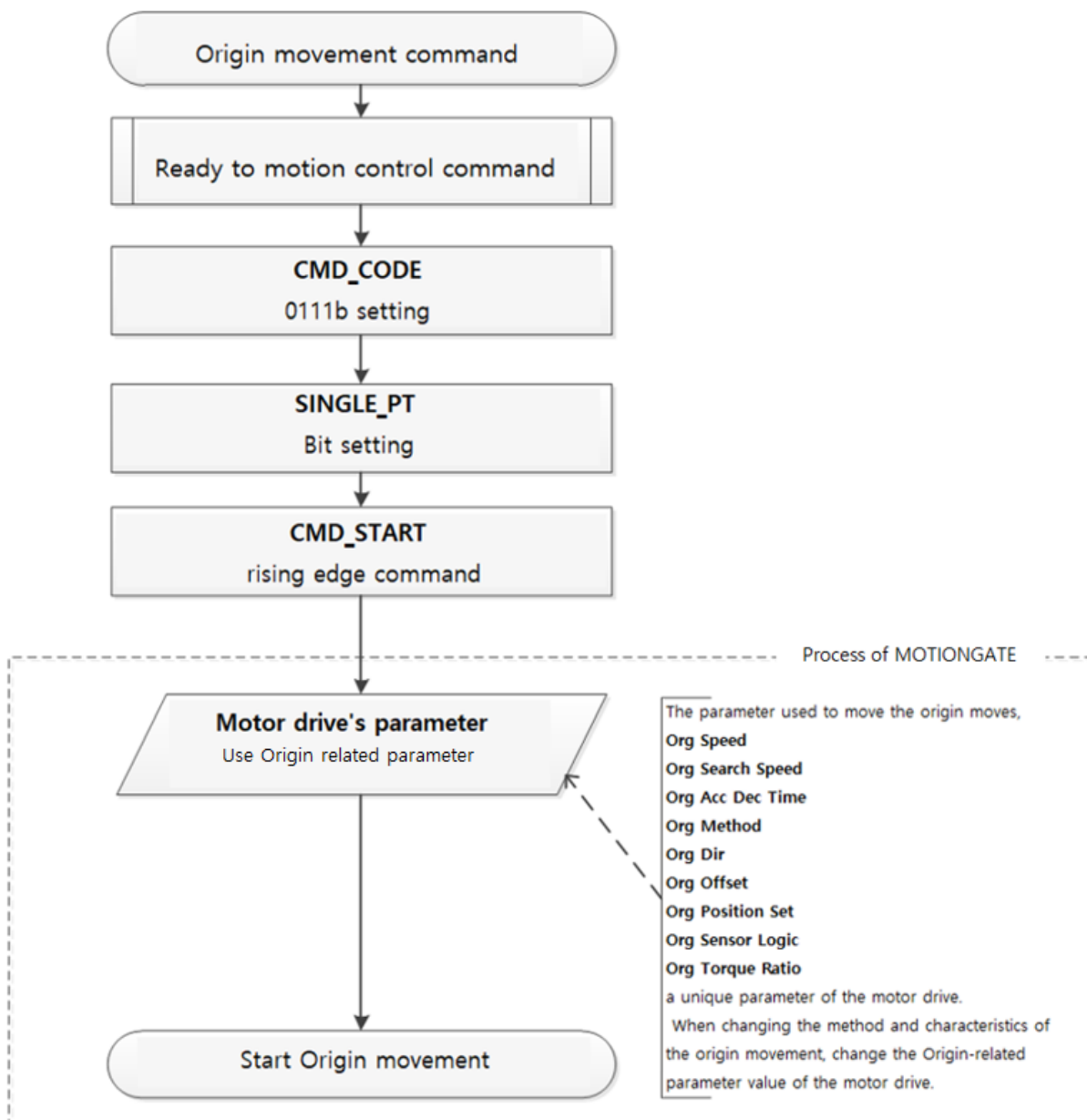
MOTION/SETTING_RESP bit = 0
 CMD_CODE_RESP = 0111b
 CMD_RESP bit = 1, PT_RUNNING bit = 1

5.6.2 Origin movement parameter

Position movement parameter list

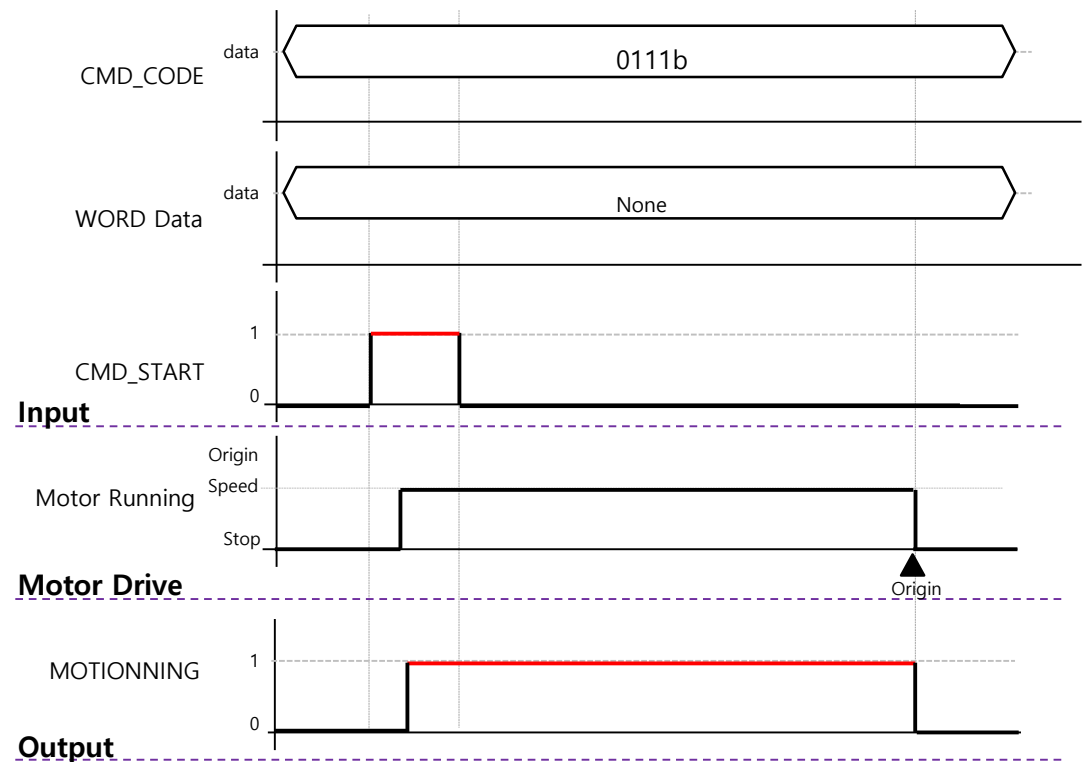
Parameter number	Parameter name	Setting range	Unit	Default setting	Meaning
Motor drive parameter					
Pn#0A11	Org Speed	1 to 500,000	Pps	5,000	Operation speed at origin start
Pn#0A12	Org Search Speed	1 to 50,000	Pps	1,000	Low speed operation speed after detection of origin sensor
Pn#0A13	Org Acc Dec Time	1 to 9,999	Msec	50	Assignment time of acceleration / deceleration section
Pn#0A14	Org Method	0 to 4		0	Selecting the origin moving method
Pn#0A15	Org Dir	0 to 1		0	Selecting driving direction
Pn#0A16	Org Offset	-134,217,727 to 134,217,727	pulse	0	After origin return is completed, move further by the distance of this set value and stop
Pn#0A17	Org Position Set	-134,217,727 to 134,217,727	pulse	0	'Command Pos' value is specified after homing is completed
Pn#0A18	Org Sensor Logic	0 to 1		0	Sets the signal level of origin sensor
Pn#0A1E	Org Torque Ratio	10 to 100[%]	%	50	Set the ratio value of force to stop at Torque Origin

5.6.3 Origin movement processing order



5.6.4 Timing chart

Set CMD_CODE to [0111b] and move to the rising edge command of CMD_START.

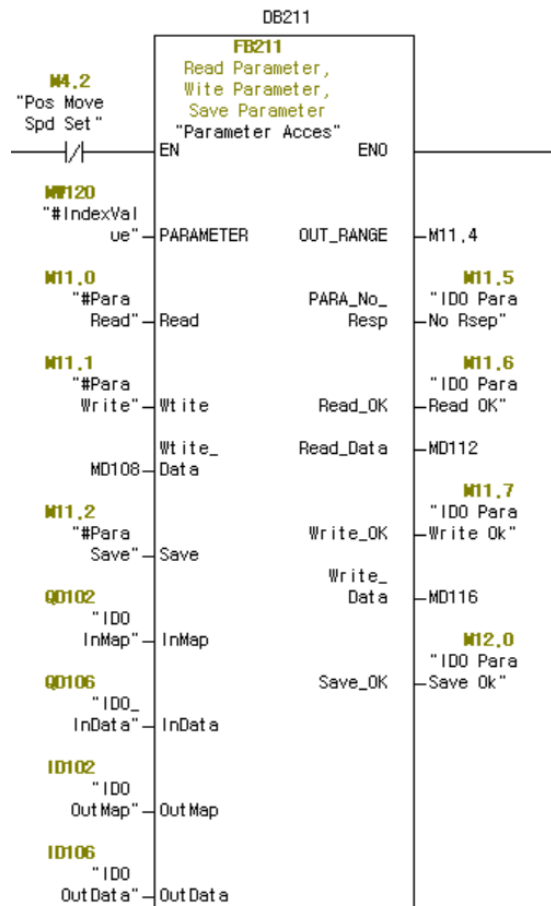


6. Parameter Access

The parameters accessible from MOTIONGATE are MOTIONGATE control parameter, the drive parameter, and the Position Table Item of the drive.

Drive parameters access the parameters present on each drive via unique INDEX No via MOTIONGATE. For example, Axis Max Speed, which indicates the maximum axis speed, is defined as INDEX No. "0x0A01" in MOTIONGATE, although the cognitive number of the function used to transmit RS-485 packets, or used in GUI or Windows library is '1'. INDEX No. here is not a value added to the drive parameter number you are trying to access. Please note this.

Example 15 Parameter Acces



Attention

This function block which is approaching parameter is overlap with a command which is approaching position movement velocity parameter at function block of position movement. Therefore, this function block should be deactivated when executing the command to change the position moving speed parameter.

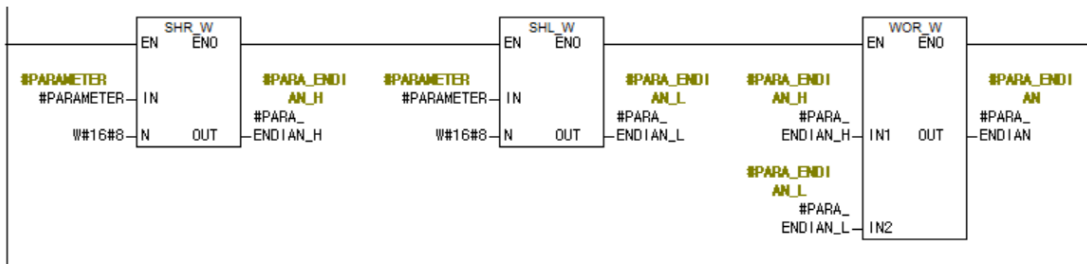
Function block "Parameter Access" in Example 16 is a function block included parameter read, write, save command.

When executing a command with this function block, "Index Value", parameter access No., can process command type of MOTIONGATE of another network equally.

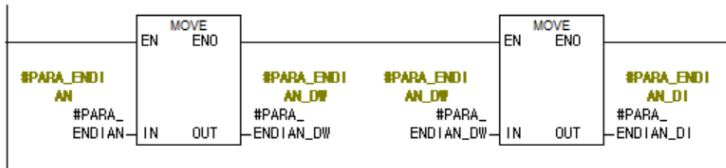
Example 16 Little Endian to Big Endian

□ Network 2 : Little Endian to Big Endian (WORD)

EX) [LE]0401 → [BE]0104

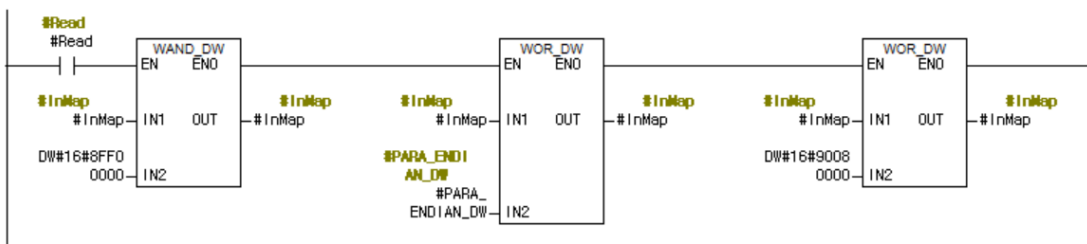


□ Network 3 : WORD to DINT



□ Network 4 : Read Parameter Set

MOTIONGATE Axis Parameter Read Command



You can change Little Endi to Big-Endian as in Ex 16, in order to use as common access value of the product.



Attention

The example in this manual is an example of STEP-7 to control the Ezi-MOTIONGATE-PNIO-P6B. Therefore, the byte order of the data area becomes Big Endian. However, the parameter INDEX No. 2 bytes remain Little Endian. Therefore, the function block in this example adds a byte swap.

6.1 Parameter Types

In IO-Map's setup mode, you can set the parameters of MOTIONGATE and the motor drive, and you can view information about the PT items on the motor drive. The types of parameters that can be set in the setting mode are shown in the table below.

6.1.1 MOTIONGATE parameter

Index No. (HEX)	Parameter number	Setting range	Unit	Default setting
Jog Move Parameters				
Pn#0100	Speed Step 0 for Jog Move	1 to 10,000,000	pps	100
Pn#0101	Speed Step 1 for Jog Move	1 to 10,000,000	pps	1000
Pn#0102	Speed Step 2 for Jog Move	1 to 10,000,000	pps	10000
Pn#0103	Speed Step 3 for Jog Move	1 to 10,000,000	pps	100000
Pn#0104	Use Jog Speed Ratio	0, 1		0
Pn#0105	Move Speed for Jog Move: Ratio	1 to 10,000,000	pps	100000
Step Move Parameters				
Pn#0200	Step Distance 0	0 to 99,999,999	pulse	1
Pn#0201	Step Distance 1	0 to 99,999,999	pulse	10
Pn#0202	Step Distance 2	0 to 99,999,999	pulse	100
Pn#0203	Step Distance 3	0 to 99,999,999	pulse	1000
Pn#0204	Move Speed for Step Move	1 to 10,000,000	pps	10,000
Position Move Parameters				
Pn#0400	Move Speed for positioning	1 to 10,000,000	pps	10,000
Coordination Parameters				
Pn#0900	Motor Lead	1 to 10,000		1
Pn#0901	Gear Ratio	1 to 10,000		1
Pn#0902	Decimal place (* 10 ⁿ)	0 to 5 (n)		0

6.1.2 Drive parameter

Number	Parameter number	Parameter name	Ezi-STEP (Including ALL, MINI)	Ezi-SERVO (Including ALL-INC, MINI)	[Ezi-SERVO2] [S-SERVO] [Ezi-SERVO2 ALL28]	ALL-ABS	BLDC	Motion Link
0	Pn#0A00	Pulse Per Revolution	O	O	O	O	-	-
1	Pn#0A01	Axis Max Speed	O	O	O	O	O	O
2	Pn#0A02	Axis Start Speed	O	O	O	O	O	O
3	Pn#0A03	Axis Acc Time	O	O	O	O	O	O
4	Pn#0A04	Axis Dec Time	O	O	O	O	O	O
5	Pn#0A05	Speed Override	O	O	O	O	O	O
6	Pn#0A06	Jog Speed	O	O	O	O	O	O
7	Pn#0A07	Jog Start Speed	O	O	O	O	O	O
8	Pn#0A08	Jog Acc Dec Time	O	O	O	O	O	O
9	Pn#0A09	Servo Alarm Logic	O	O	-	O	O	O
10	Pn#0A0A	Servo On Logic	-	O	-	O	O	-
11	Pn#0A0B	Servo Alarm Reset Logic	-	O	-	O	O	-
12	Pn#0A0C	Step Run/Stop Logic	O	-	-	-	-	O
13	Pn#0A0D	Step Alarm Reset Logic	O	-	-	-	-	O
14	Pn#0A0E	S/W Limit Plus Value	O	O	O	O	O	O
15	Pn#0A0F	S/W Limit Minus Value	O	O	O	O	O	O
16	Pn#0A10	S/W Limit Stop Method	O	O	O	O	O	O
17	Pn#0A11	H/W Limit Stop Method	O	O	O	O	O	O
18	Pn#0A12	Limit Sensor Logic	O	O	O	O	O	O
19	Pn#0A13	Org Speed	O	O	O	O	O	O
20	Pn#0A14	Org Search Speed	O	O	O	O	O	O
21	Pn#0A15	Org Acc Dec Time	O	O	O	O	O	O
22	Pn#0A16	Org Method	O	O	O	O	O	O
23	Pn#0A17	Org Dir	O	O	O	O	O	O
24	Pn#0A18	Org OffSet	O	O	O	O	O	O
25	Pn#0A19	Org Position Set	O	O	O	O	-	O
26	Pn#0A1A	Org Sensor Logic	-	O	O	O	-	O
27	Pn#0A1B	Position Loop Gain	-	O	O	O	O	-
28	Pn#0A1C	Stop Current	O	-	O	-	-	-
29	Pn#0A1D	Inpos Value	-	O	O	O	O	-
30	Pn#0A1E	Pos Tracking Limit	-	O	O	O	O	-
31	Pn#0A1F	Motion Dir	O	O	O	O	O	O
32	Pn#0A20	Limit Sensor Dir	O	O	O	O	O	O
33	Pn#0A21	Org Torque Ratio	-	O	O	O	O	-
34	Pn#0A22	Encoder Multiply Value	O	-	-	-	-	O
35	Pn#0A23	Pos. Error Overflow Limit	-	O	O	O	O	-
36	Pn#0A24	Motor Lead	-	-	-	O	-	-
37	Pn#0A25	Gear Ratio	-	-	-	O	-	-
38	Pn#0A26	Run Current	-	-	O	-	-	-
39	Pn#0A27	Boost Current	-	-	O	-	-	-
40	Pn#0A28	Break Delay Time	-	O	O	O	O	-
41	Pn#0A29	Brake Alarm Limit	-	-	-	-	O	-
42	Pn#0A2A	Brake Alarm Enable	-	-	-	-	O	-
43	Pn#0A2B	Machine Pos. Overflow Limit	-	-	-	-	O	-
44	Pn#0A2C	Machine Pos. Alarm Enable	-	-	-	-	O	-
45	Pn#0A2D	Pos. Value Counting Method	-	O	-	-	-	-
46	Pn#0A2E	Servo ON Method	-	O	-	-	-	-
47	Pn#0A2F	Servo In-position Logic	-	-	-	-	-	O

6.1.3 Position Table Item

Parameter number [n = PT No.]	Parameter name [n = PT No.]	Setting range	Unit
Pn#1000 + n	#n PT Command	0 to 9	
Pn#1200 + n	#n PT Position	-134,217,728 to 134,217,728	Pulse
Pn#1400 + n	#n PT Start Speed	1 to 500,000	pps
Pn#1600 + n	#n PT Move Speed	1 to 2,500,000	pps
Pn#1800 + n	#n PT Accel Time	1 to 9,999	msec
Pn#1A00 + n	#n PT Decel Time	1 to 9,999	msec
Pn#1C00 + n	#n PT Jump Table No.	0 to 255, 10000 to 10255	
Pn#1E00 + n	#n PT Jump PT0	0 to 255, 10000 to 10255	
Pn#2000 + n	#n PT Jump PT1	0 to 255, 10000 to 10255	
Pn#2200 + n	#n PT Jump PT2	0 to 255, 10000 to 10255	
Pn#2400 + n	#n PT Loop Count	0 to 100	
Pn#2600 + n	#n PT Loop Jump Table No.	0 to 255, 10000 to 10255	
Pn#2800 + n	#n PT PT Set	0 to 15	
Pn#2A00 + n	#n PT Loop count Clear	0 to 255	
Pn#2C00 + n	#n PT Wait Time	0 to 1	
Pn#2E00 + n	#n PT Check In-position	0 to 1	
Pn#3000 + n	#n PT Continuous Action	0 to 1	

6.2 Parameter check

The parameter information check is requested by inputting the number of the parameter whose verification is required in the INDEX_VALUE area.

6.2.1 Parameter check command bit

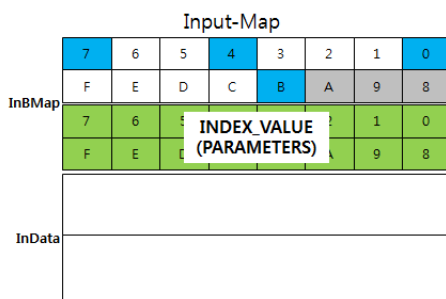
Parameter information check command is executed when CMD_CODE is '8' in setting mode.

Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name
0	0	H	CONNECT	0	0	H	CONNECTED
0	1	H	ESTOP	0	1	H	ENABLED
0	2	H	ENABLE	0	7	H	Motion /Setting
0	7	H	Motion /Setting	1	0	H->L	MOTIONING Status Flag
0	8	L	CMD_CODE 0	0	8	L	CMD_CODE RESP 0
0	9	L	CMD_CODE 1	0	9	L	CMD_CODE RESP 1
0	10(A)	L	CMD_CODE 2	0	10(A)	L	CMD_CODE RESP 2
0	11(B)	H	CMD_CODE 3	0	11(B)	H	CMD_CODE RESP 3
1	0-15	data	INDEX_NO.	0	0-15	data	INDEX_RESP_NO.
0	4	Rising Edge	CMD START	0	4	H	CMD START_RESP
				2-3	0-31	data	Parameter_Read_data

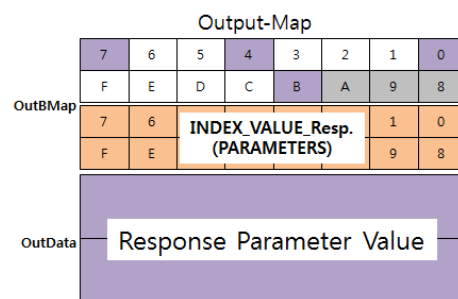
- Enter the number of the parameter you want to request in the index area.
- The setting value of SETTING_CMD_CODE is 1000b.
- The rising edge command of CMD_START is required to start the command.
- The value of the requested parameter is output to the data area of Output-Map.
- Out_Range bit is set to '1' when the parameter number has no value of the input INDEX_VALUE.

✓ IO-Map command and response

- When executing parameter check command

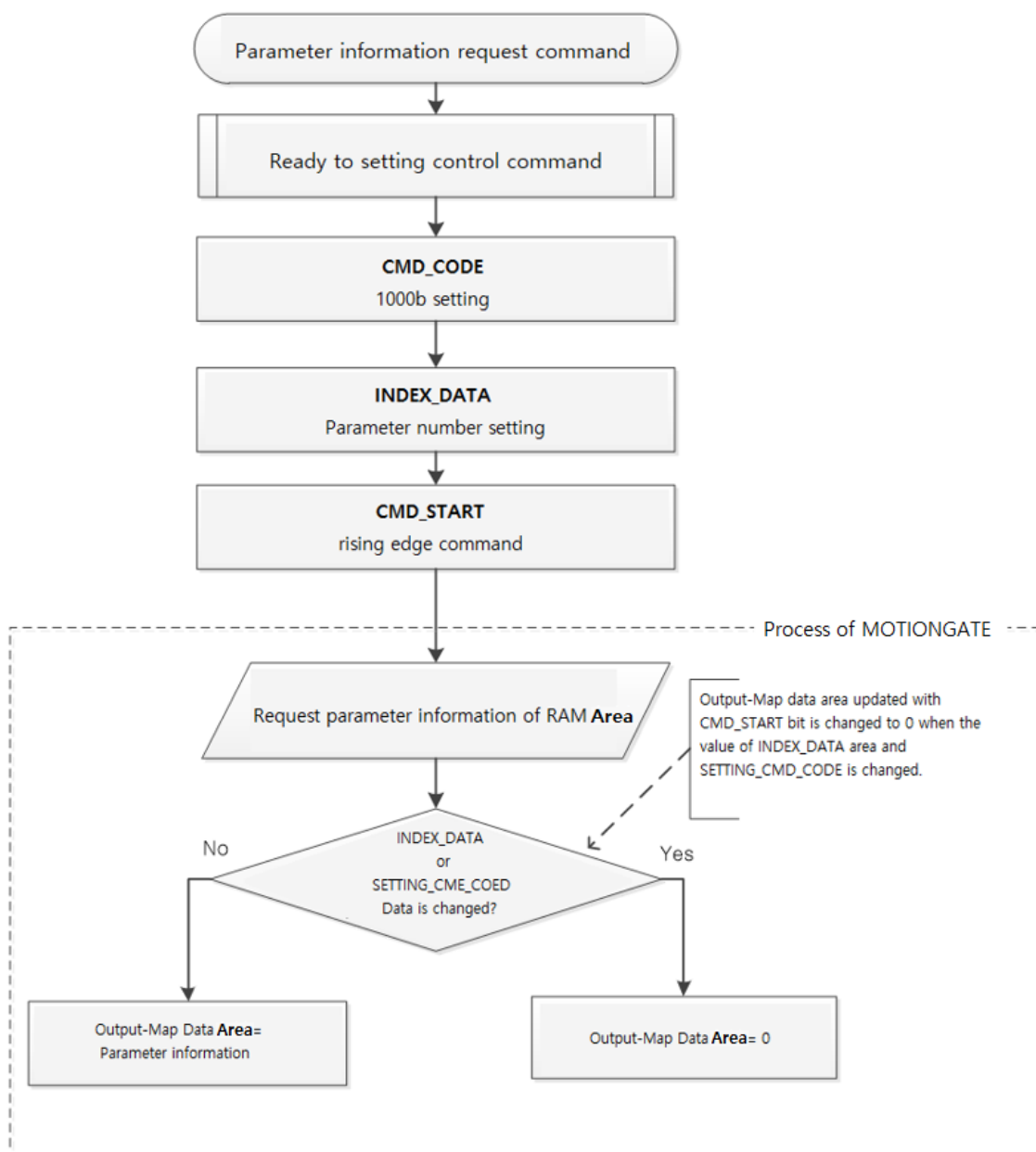


MOTION/SETTING bit = 1
 CMD_CODE = 1000b
 INDEX_VALUE = Index Value (Parameter No)
 CMD_START bit = 1



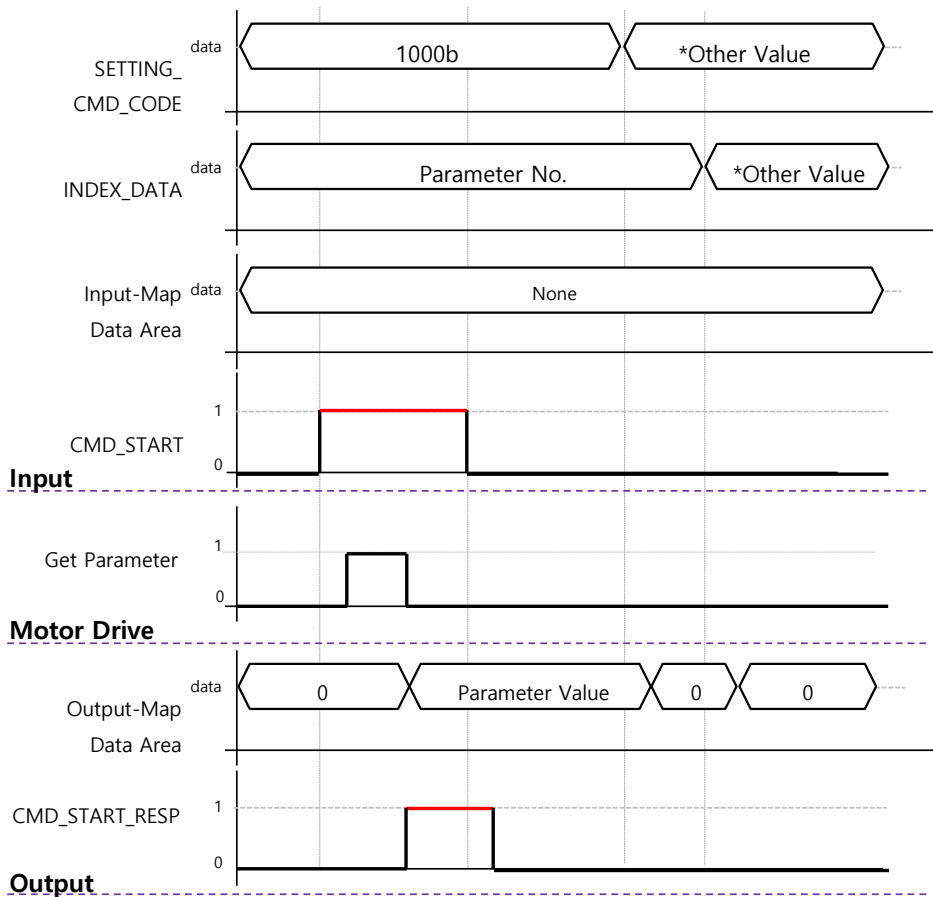
MOTION/SETTING_RESP bit = 1
 CMD_CODE_RESP = 1000b
 INDEX_VALUE_RESP = Index Value (Parameter No)
 CMD_RESP bit = 1

6.2.2 Parameter check processing order



6.2.3 Timing chart

To request parameter information, set SETTING_CMD_CODE to 1000b, which is the code of Read Parameter, and input the parameter value to request in the INDEX_DATA area. Then, the CMD_START bit's rising edge command starts the request command. At this time, the CMD_START bit must be kept '1' until the requested data is updated and the CMD_START_RESP bit is set to '1' and the parameter value requested in the data area of the Output-Map is updated.



6.3 Parameter change

To change the parameter information, enter the parameter number to be changed in the INDEX_VALUE area, select the parameter to be changed, and enter the data to be changed in the data area (32bit).

6.3.1 Parameter change command bit

The parameter information check command is executed when CMD_CODE is '9' in the setting mode.

Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name
0	0	H	CONNECT	0	0	H	CONNECTED
0	1	H	ESTOP	0	1	H	ENABLED
0	2	H	ENABLE	0	7	H	Motion /Setting
				0	6	H	Out_Range
0	7	H	Motion /Setting	1	0	H->L	MOTIONING Status Flag
0	8	H	CMD_CODE 0	0	8	H	CMD_CODE RESP 0
0	9	L	CMD_CODE 1	0	9	L	CMD_CODE RESP 1
0	10(A)	L	CMD_CODE 2	0	10(A)	L	CMD_CODE RESP 2
0	11(B)	H	CMD_CODE 3	0	11(B)	H	CMD_CODE RESP 3
1	0-15	data	INDEX_NO.	1	0-15	data	INDEX_RESP_NO.
0	4	Rising Edge	CMD START	0	4	H	CMD START_RESP
2-3	0-31	data	Parameter_Value	2-3	0-31	data	Parameter_Response_value

Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name

- Enter the parameter number to change in the index area.
 - The setting value of SETTING_CMD_CODE is 1001b.
 - The rising edge command of CMD_START is required to start the command.
 - The value of the changed parameter is output in the data area of the Output-Map (Parameter Response value).
 - The Out_Range bit is set to '1' when the input INDEX_VALUE is a parameter number that does not have a value or when the data field value is data that does not match the value range of the parameter value.

✓ **IO-Map command and response**

- **When executing parameter change**

Input-Map

7	6	5	4	3	2	1	0
F	E	D	C	B	A	9	8
7	6	5	INDEX VALUE (PARAMETERS)			1	0
F	E	D	C	B	A	9	8

InBMap

InData

Output-Map

7	6	5	4	3	2	1	0
F	E	D	C	B	A	9	8
7	6	5	INDEX VALUE Resp. (PARAMETERS)			1	0
F	E	D	C	B	A	9	8

OutBMap

OutData

MOTION/SETTING bit = 1

CMD_CODE = 1001b

INDEX_VALUE = Index Value (Parameter No)

COMMAND_WORD_DATA = Write Parameter Value

CMD_START bit = 1

MOTION/SETTING_RESP bit = 1

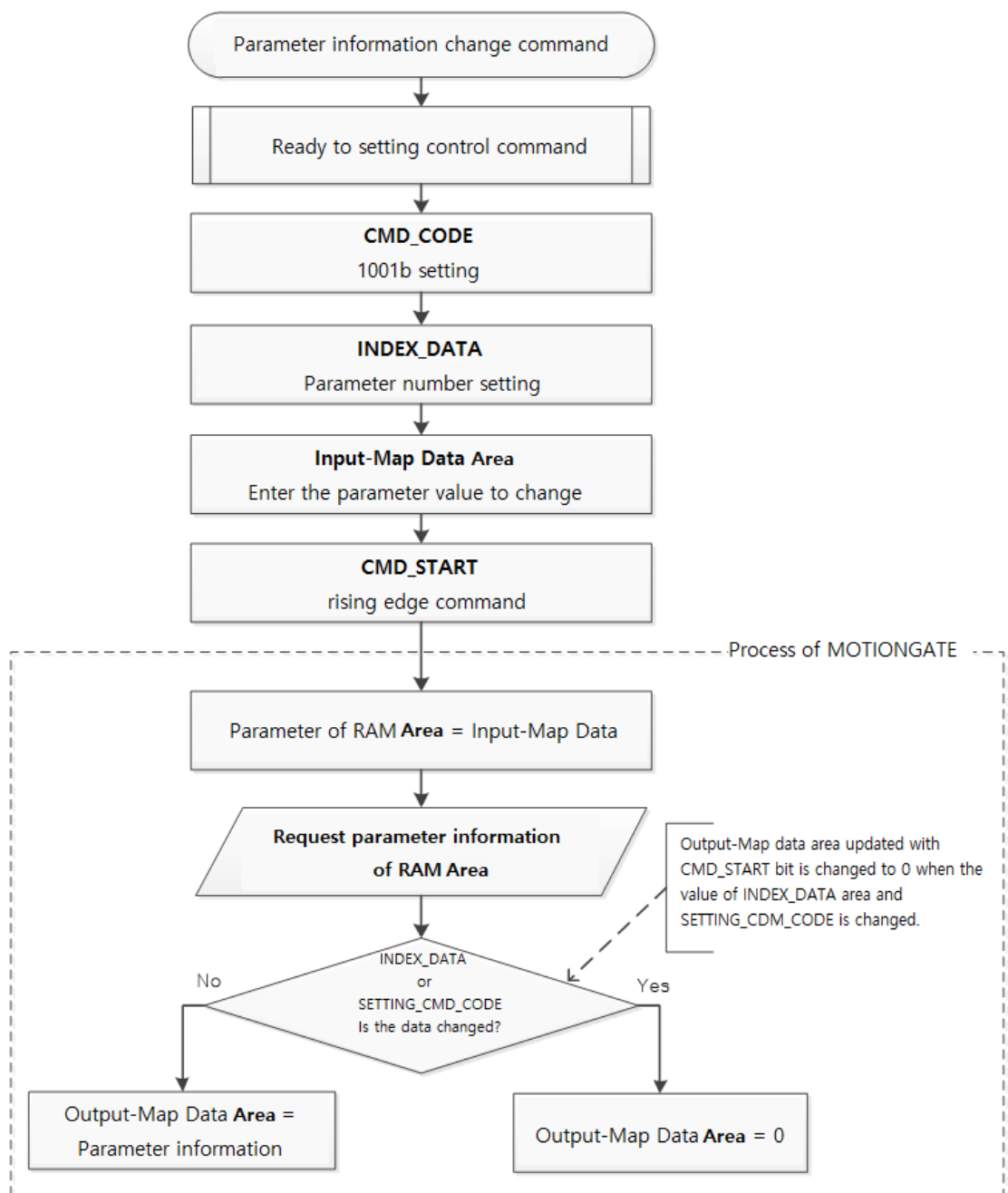
CMD_CODE_RESP = 1001b

INDEX_VALUE_RESP = Index Value (Parameter No)

RESPONSE_DATA = Response Parameter Value

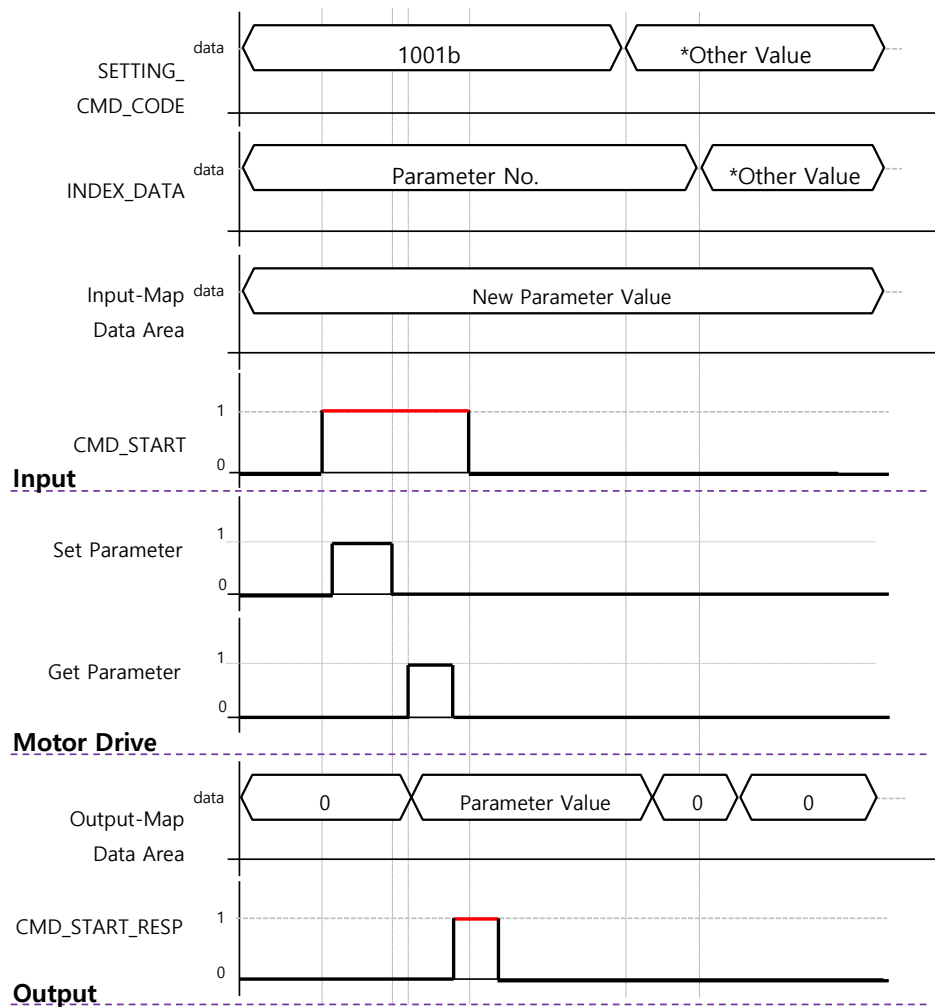
CMD_RESP bit = 1

6.3.2 Parameter change processing order



6.3.3 Timing chart

To change the parameter information, set SETTING_CMD_CODE to '1001b', the code of the Write Parameter, and input the parameter value to be changed in the INDEX_DATA area. Then, the CMD_START bit rising edge command starts the change command. At this time, the CMD_START bit must be kept at '1' until the changed data is updated and the CMD_START_RESP bit is set to '1' and the changed parameter data is confirmed to be updated to the data area of the Output-Map.



6.4 Parameter Save

Parameter saving is the command used to save the currently set parameter information to the ROM area.

6.4.1 Parameter save command bit

The parameter save command is executed when CMD_CODE is set to '14' in the setting mode.

Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name
0	0	H	CONNECT	0	0	H	CONNECTED
0	1	H	ESTOP	0	1	H	ENABLED
0	2	H	ENABLE	0	7	H	Motion /Setting
0	7	H	Motion /Setting				
0	8	L	CMD_CODE 0	0	8	L	CMD_CODE RESP 0
0	9	H	CMD_CODE 1	0	9	H	CMD_CODE RESP 1
0	10(A)	H	CMD_CODE 2	0	10(A)	H	CMD_CODE RESP 2
0	11(B)	H	CMD_CODE 3	0	11(B)	H	CMD_CODE RESP 3
1	0-15	data	INDEX_NO.	1	0-15	data	INDEX_RESP_NO.
0	4	Rising Edge	CMD START	0	4	H	CMD START_RESP

- The setting value of SETTING_CMD_CODE is 1110b.
- The parameter save command is started by the rising edge command of CMD_START.
- Parameter storage requires a longer response time than other commands, and the parameter storage completion status is when the READY bit is set to '1'.

✓ IO-Map command and response

- When executing parameter save command

Input-Map

7	6	5	4	3	2	1	0
F	E	D	C	B	A	9	8

InBMap

7	6	5	4	3	2	1	0
F	E	D	C	B	A	9	8

InData

MOTION/SETTING bit = 1
 CMD_CODE = 1110b
 CMD_START bit = 1

Output-Map

7	6	5	4	3	2	1	0
F	E	D	C	B	A	9	8

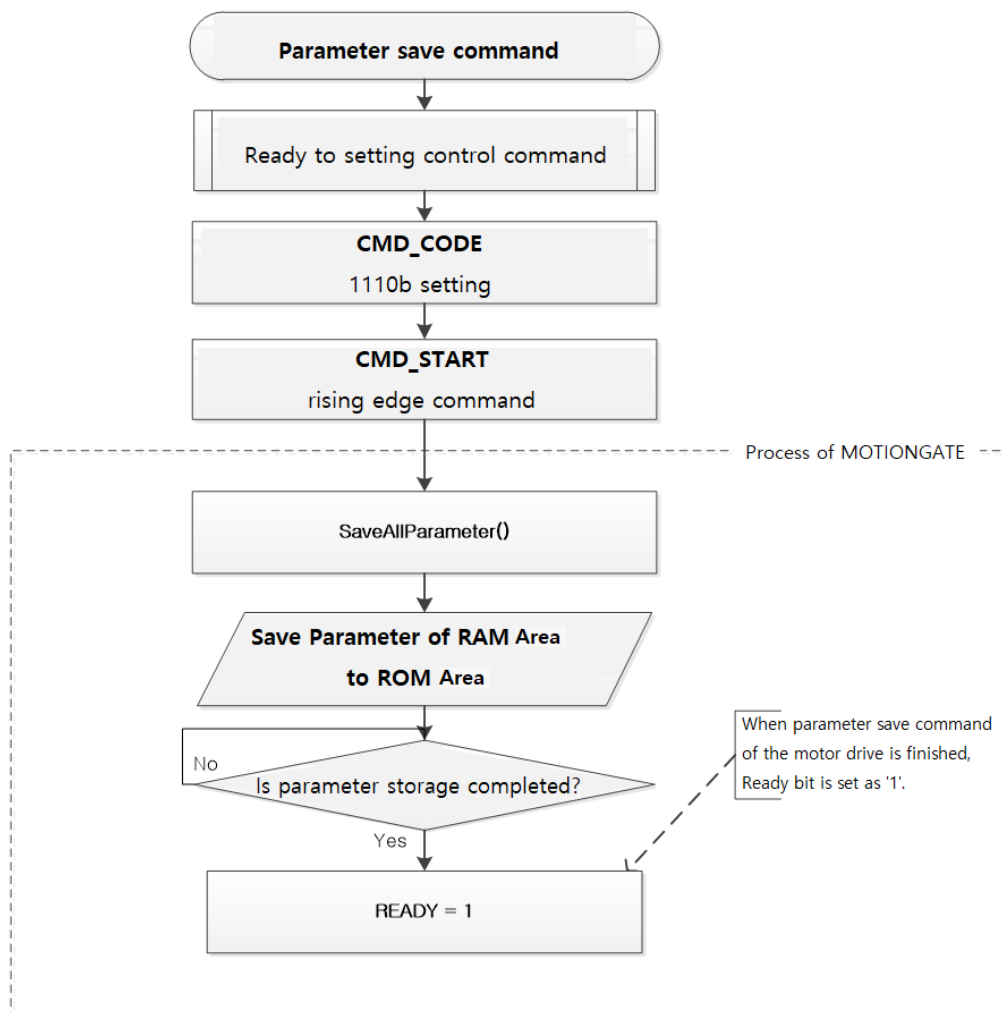
OutBMap

7	6	5	4	3	2	1	0
F	E	D	C	B	A	9	8

OutData

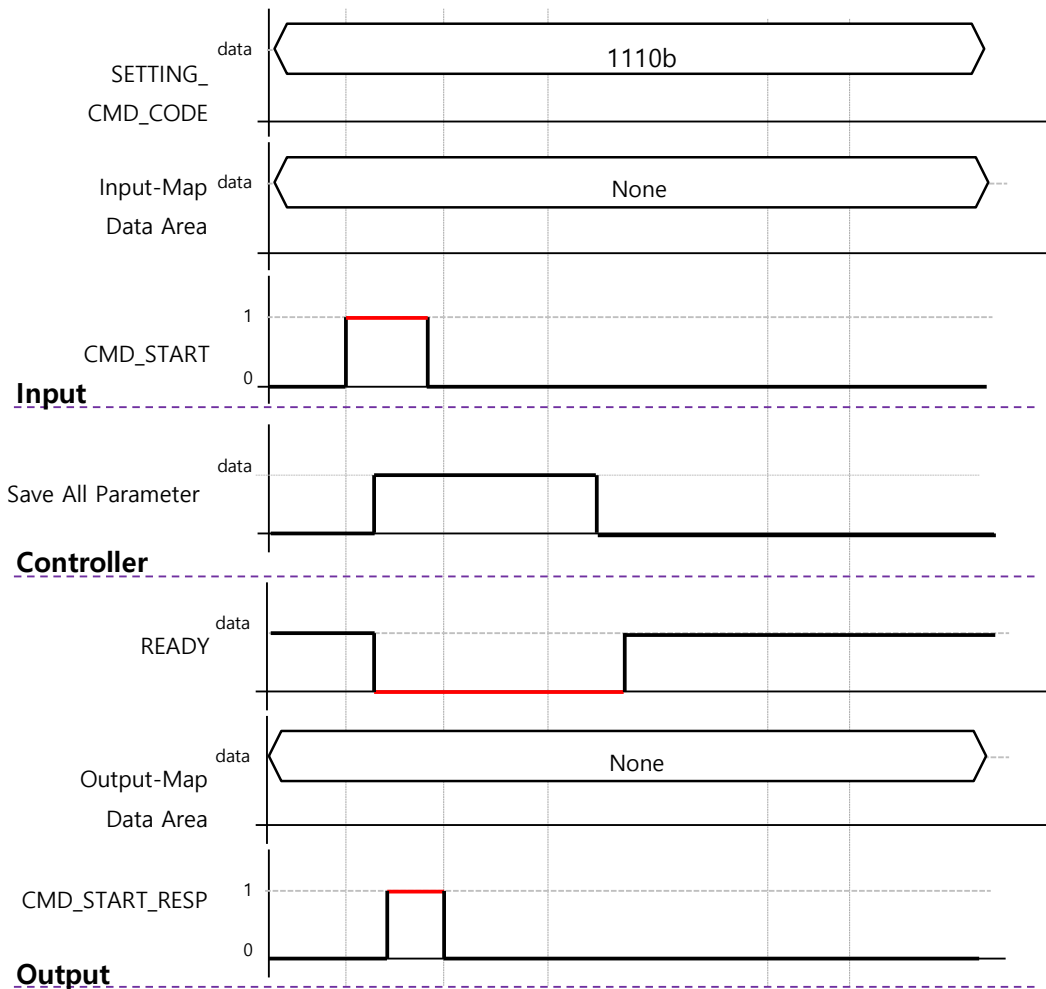
MOTION/SETTING_RESP bit = 1
 CMD_CODE_RESP = 1110b
 CMD_RESP bit = 1

6.4.2 Parameter save processing order



6.4.3 Timing chart

To save the parameter, set SETTING_CMD_CODE to '1110b' which is the code of Save Parameter. Then, the CMD_START bit rising edge command starts the change command. When the parameter save command is started, the READY bit becomes '0' and the system enters the command wait state. When parameter saving is completed, the READY bit becomes '1' and the command ready state is confirmed, so that it is confirmed that the parameter save command is completed.

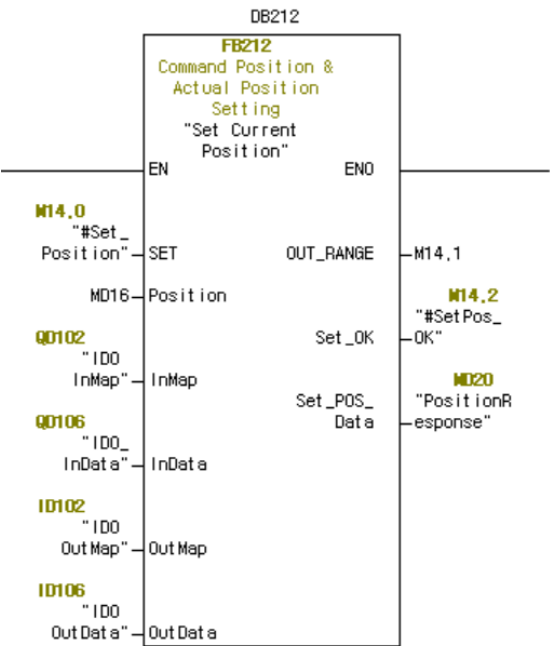


7. Additional Function

7.1 Set Current Position

Set current position command is a command that sets the current position to the position that you want.

Example 17 Set Current Position



Function block "Set Current Position" in example 17 changes command position information and encoder position information to inputted position value. This movement is different from the origin command. This command sets the current position to the value you want.



Attention

Due to this command, the movement of the Origin Return OK signal is irrelevant.

7.1.1 Set current position command bit

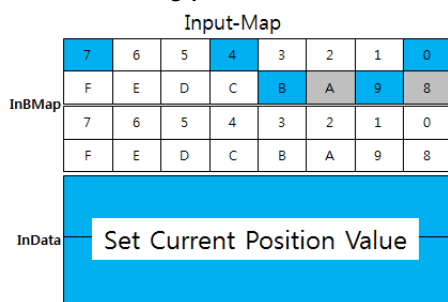
Set current position command changes the following command position by operating in command code (CMD_CODE) '10' in the setting mode (MOTIONION / SETTING = 1).

Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name
0	0	H	CONNECT	0	0	H	CONNECTED
0	1	H	ESTOP	0	1	H	ENABLED
0	2	H	ENABLE	0	7	H	Motion /Setting
0	7	H	Motion /Setting				
0	8	L	CMD_CODE 0	0	8	L	CMD_CODE RESP 0
0	9	H	CMD_CODE 1	0	9	H	CMD_CODE RESP 1
0	10(A)	L	CMD_CODE 2	0	10(A)	L	CMD_CODE RESP 2
0	11(B)	H	CMD_CODE 3	0	11(B)	H	CMD_CODE RESP 3
0	4	Rising Edge	CMD START	0	4	H	CMD START_RESP
2-3	0-31	data	Position_Value	2-3	0-31	data	Write_Position_Response_value

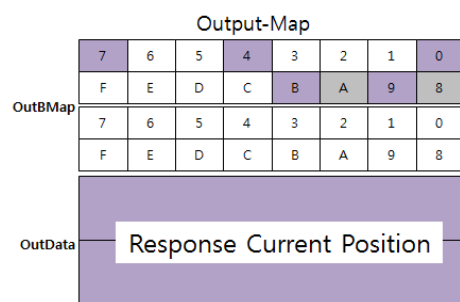
- The setting value of SETTING_CMD_CODE is 1010b.
- Input the position value to be changed into the data area of Input-Map.
- The rising edge command of CMD_START is required to start the command.
- The position value changed to the data area of Output-Map is output.

✓ IO-Map command and response

- When executing parameter save command

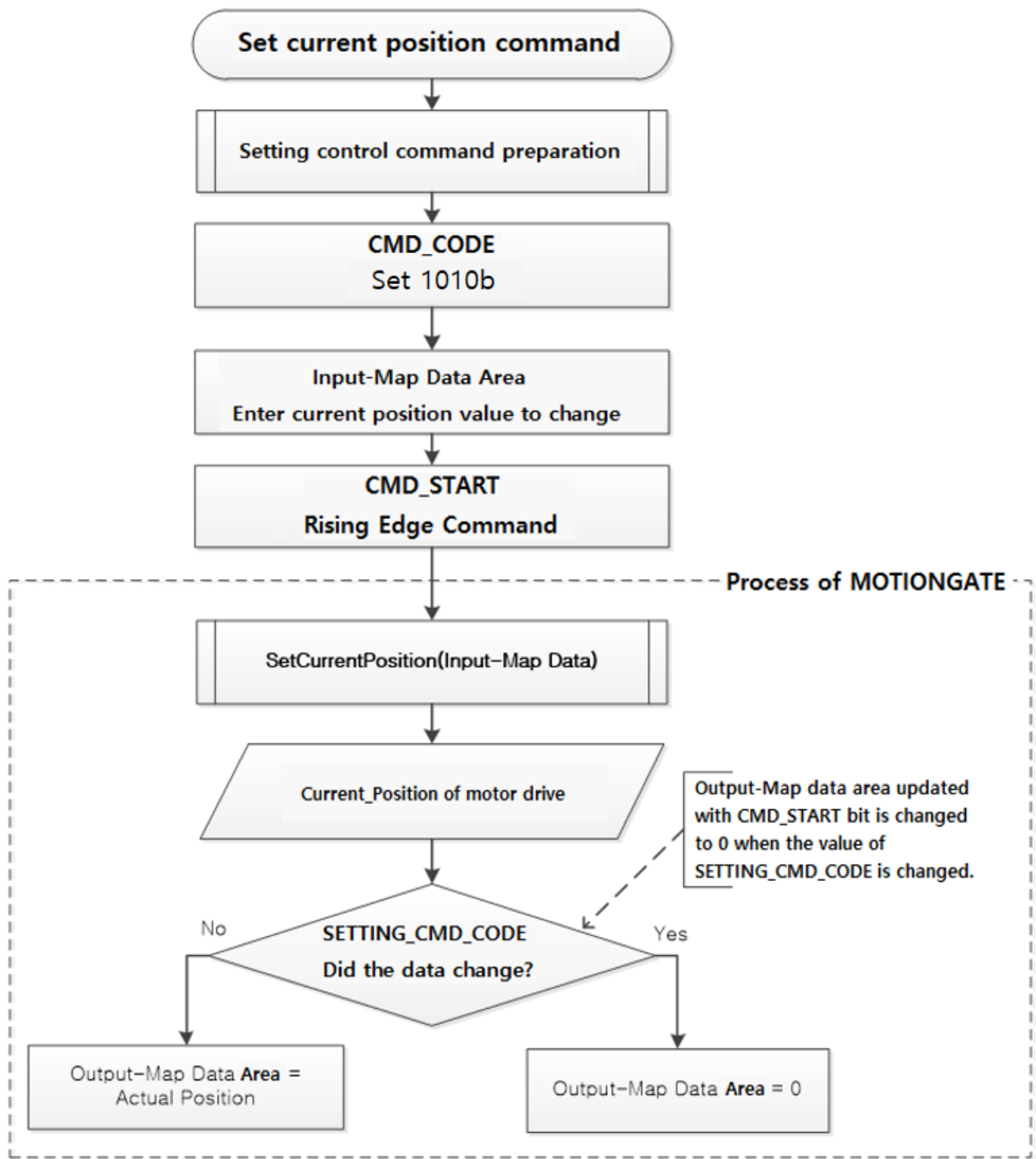


MOTION/SETTING bit = 1
 CMD_CODE = 1010b
 COMMAND_WORD_DATA = Set Current Position
 CMD_START bit = 1



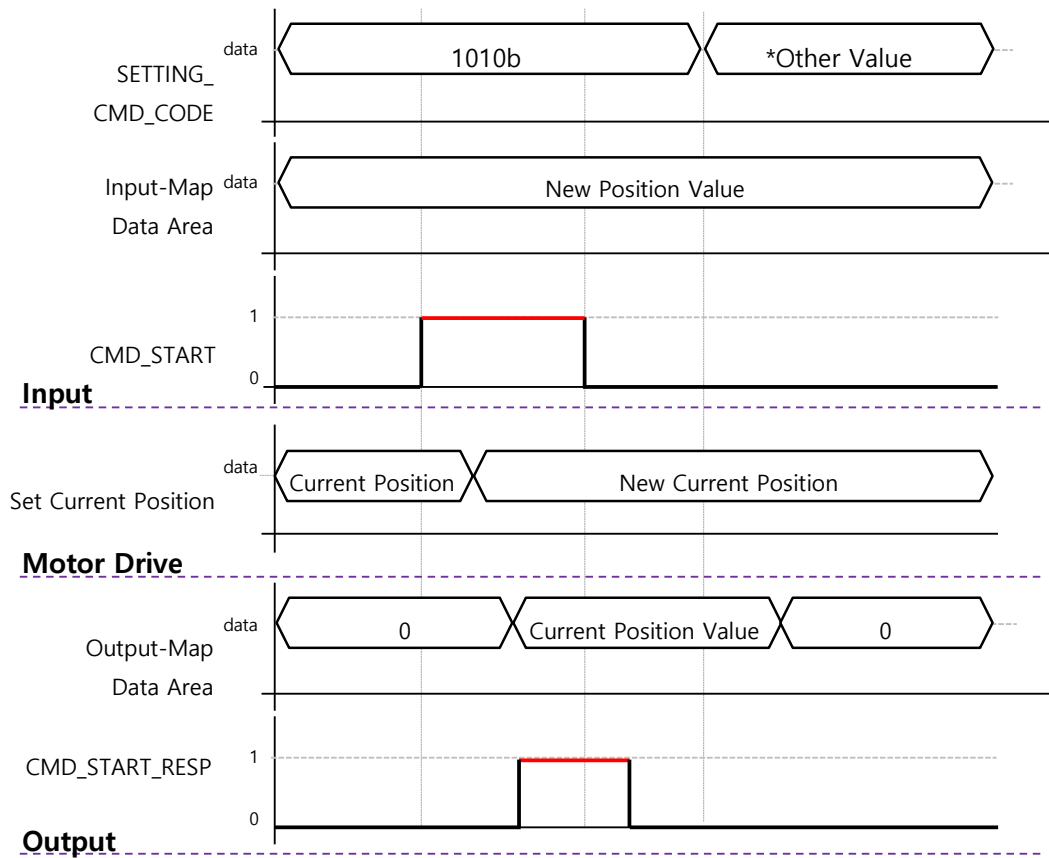
MOTION/SETTING_RESP bit = 1
 CMD_CODE_RESP = 1010b
 RESPONSE_DATA = Response Current Position
 CMD_RESP bit = 1

7.1.2 Set current position processing order



7.1.3 Timing chart

The command to change the current position is to set SETTING_CMD_CODE to 1010b, the code of Set Current Position, and start the change command by the rising edge command of CMD_START bit. At this time, the CMD_START bit must be kept at '1' until the changed actual position value is updated and the CMD_START_RESP bit is set to '1' and the changed parameter data is confirmed to be updated to the output-map data area.



7.2 Alarm History

Alarm history is a function where the MOTIONGATE remembers up to four alarms generated by the drive. The stored alarm history is recorded in volatile memory that is cleared when the MOTIONGATE re-boots, but you can clear the alarm history recorded by the reset command.

7.2.1 Alarm types

Alarms generated from the MOTIONGATE or motor drive can be confirmed by data output to the Output-Map by inputting the response code into the RESPONSE_TYPE in the response data setting. In addition, when you want to check the history of alarm occurrence, you can check by alarm request command.

The types of alarms are the status alarm of the motor drive and the communication alarm between the MOTIONGATE and the motor drive.

When a drive alarm occurs, the red LED1 (ALARM) of the MOTIONGATE blinks to indicate that one or more connected drives are in an alarmed state. Motor drive status alarms are different from each other in allowable values for each model.

Alarm codes for motor drive

Alarm codes		Types	Meaning
HEX	DEC		
0x00	0	No Alarm	No alarm.
0x01	1	Over Current	When excessive current flows in the motor drive element
0x02	2	Over Speed	Alarm occurs when motor speed exceeds 3000 [rpm]
0x03	3	Position Tracking	Alarm occurs when motor does not follow pulse input normally
0x04	4	Over Load	When a load exceeding the maximum torque of the motor is applied for 5 seconds or more
0x05	5	Over Temperature	The internal temperature of the drive being used exceeds the allowable temperature value * 1)
0x06	6	Back EMF	The motor's back-EMF exceeds the allowable voltage of the drive being used * 2)
0x07	7	Motor Connect	When there is a problem with the connection between the drive and the motor

Alarm codes		Types	Meaning
HEX	DEC		
0x08	8	Encoder Connect	When there is a problem with the connection between the drive and the encoder
0x09	9	Motor Power	When motor supply power is lower than the lower limit of the drive being used *3)
0x0A	10	Inposition	When position error value occurs after operation completion
0x0B	11	System Halt	When an error occurs in the drive system (Watch Dog Timer)
0x0C	12	ROM device	When an error occurs in the parameter storage device (ROM)
0x0E	14	OverInput Voltage	When the input voltage exceeds the set value of the drive being used *4)
0x0F	15	Position Overflow	Position error value is larger than given value after completion of position command

Allowable limit value per motor drive

Model name	*1) Internal temperat ure	*2) Back EMP Limit value			*3) Lower power supply value		*4) Allowable value of input voltage	
		50V	70V	90V	20V	40V	20V~28V	36V~70V
EzS-NDR-MI-20-□□	55°C	○			○		○	
EzS-NDR-MI-28-□□		○			○		○	
EzS-NDR-MI-42-□□		○			○		○	
EzS-NDR-20-□□			○		○		○	
EzS-NDR-28-□□			○		○		○	
EzS-NDR-42-□□			○		○		○	
EzS-NDR-56-□□			○		○		○	
EzS-NDR-60-□□			○		○		○	
EzS-NDR-86-□□				○		○		○

The communication error occurs when the data transmission / reception status is not smooth or when the response request command cannot be executed. Therefore, the operation status cannot be confirmed by IO-Map. This alarm is indicated by the red LED2 (ERROR) of the MOTIONGATE.

Transmission / reception error between MOTIONGATE and motor drive

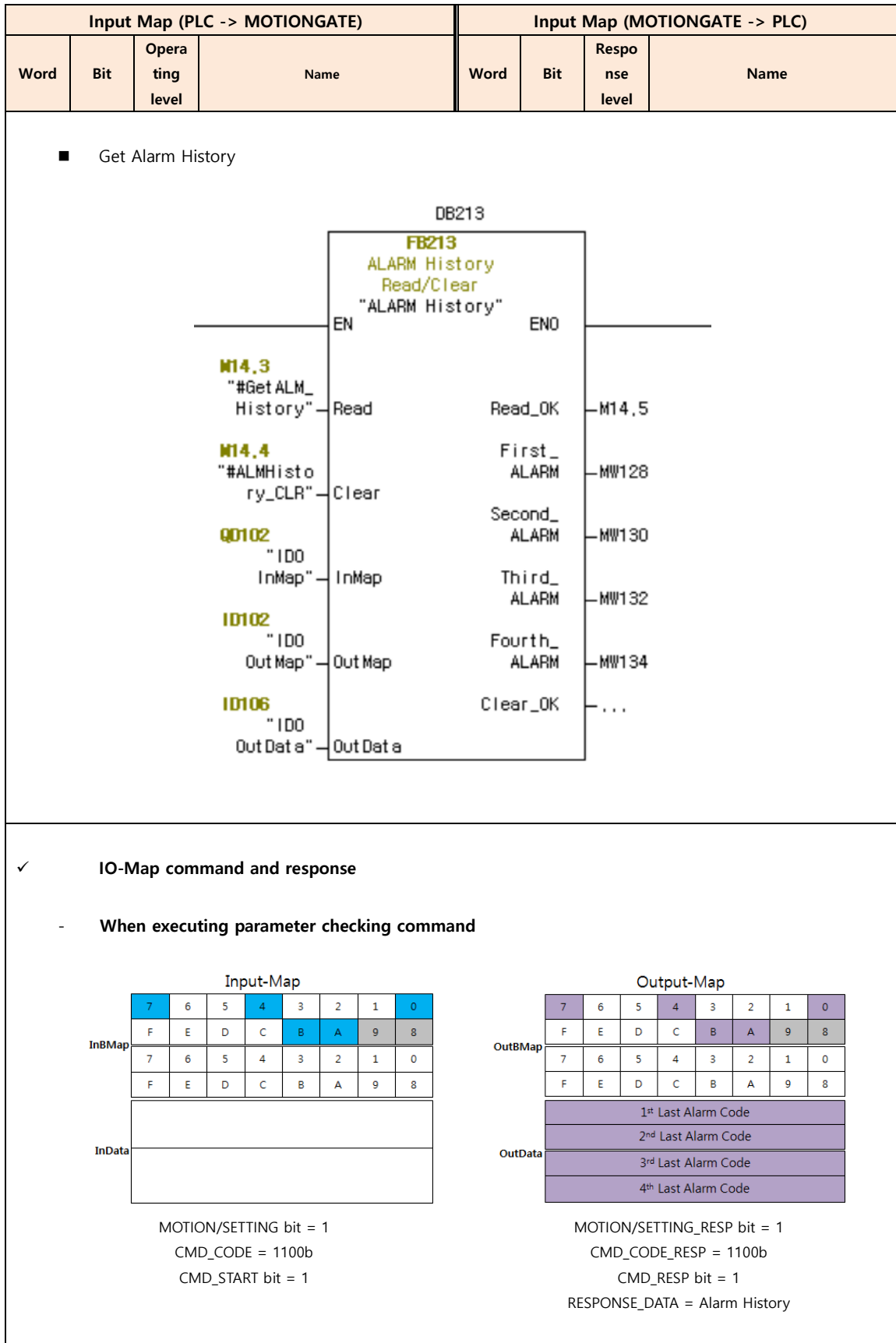
Types	Meaning
No Alarm	No alarm.
Frame type error	The received Frame type command cannot be recognized
Data error, ROM data read / write error	The value of the received data is out of the specified range.
Receive frame error	The received frame is data that does not conform to the specification
RUN command failure	You attempted to run a new drive under the following conditions: 1) Current motor is running 2) Stop command 3) Servo OFF status 4) Try Z-pulse Origin without external encoder
RESET failed	You attempted to perform a reset under the following conditions: 1) Servo ON status 2) Reset state by external input signal
Servo ON failure ①	An attempt was made to execute a Servo ON command while an alarm occurred.
Servo ON failure ②	An attempt was made to execute a Servo ON command during an emergency stop.
Servo ON failure ③	'Servo ON' is set for the external input signal. Servo ON / OFF can be executed only with this input signal.
CRC error	A CRC error has occurred due to the influence of ambient noise etc. on the received frame data. In this case, MOTIONGATE automatically tries one more communication

7.2.2 Alarm history check command bit

MOTIONGATE memorizes four alarm codes when an alarm occurs. Four alarm codes are memorized in 4byte structure. When requesting alarm detail, four alarm details are output to data area of Output-Map.

Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name
0	0	H	CONNECT	0	0	H	CONNECTED
0	1	H	ESTOP	0	1	H	ENABLED
0	2	H	ENABLE	0	7	H	Motion /Setting
0	7	H	Motion /Setting	1	0	H->L	MOTIONING Status Flag
0	8	L	CMD_CODE 0	0	8	L	CMD_CODE RESP 0
0	9	L	CMD_CODE 1	0	9	L	CMD_CODE RESP 1
0	10(A)	H	CMD_CODE 2	0	10(A)	H	CMD_CODE RESP 2
0	11(B)	H	CMD_CODE 3	0	11(B)	H	CMD_CODE RESP 3
1	0-15	data	INDEX_NO.	0	0-15	data	INDEX_RESP_NO.
0	4	Rising Edge	CMD START	0	4	H	CMD START_RESP
				2-3	0-31	data	Parameter_Read_data

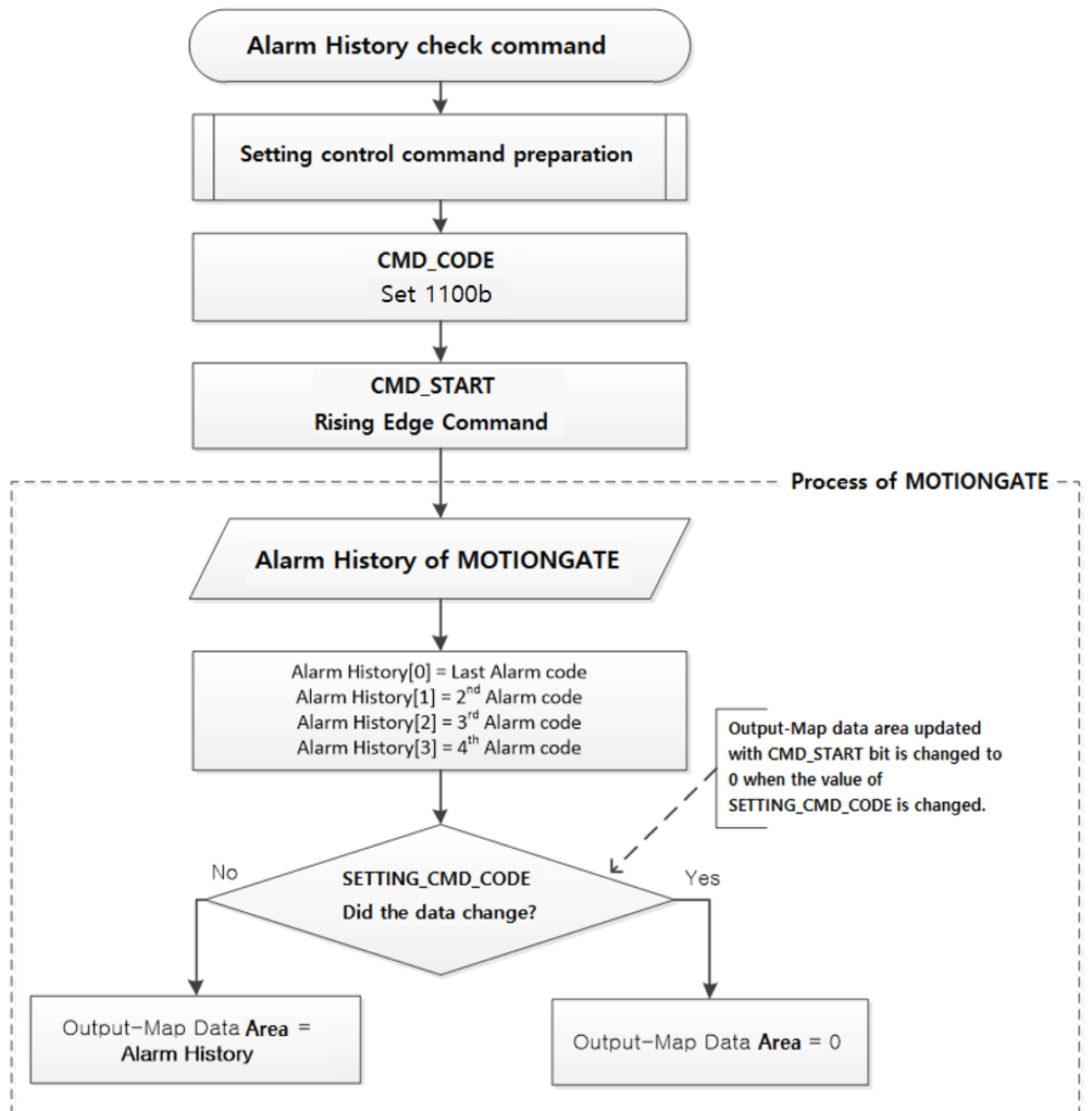
- The setting value of SETTING_CMD_CODE is 1100b.
- The rising edge command of CMD_START is required to start the command.
- The requested alarm history is output to the data area of Output-Map.
- The alarm history output to the Output-Map is checked differently depending on the data access method of the host controller used.
 - Big-Endian stores the alarm history that occurred last in the 7th byte area of the Output-Map. In the 4th byte area, it records the oldest alarm history from the last to the fourth.
 - Little-Endian records the last alarm occurrence in the 4th byte area of the Output-Map, and the 7th byte area is the oldest alarm history from the last.
- This information is reset when the alarm initialization command or MOTIONGATE is re-booted.



**Attention**

The response form in this example is when the address mapped to Little-Endian is monitored. When mapped to Big-Endian, the data is checked in reverse order.

7.2.3 Alarm history check processing order

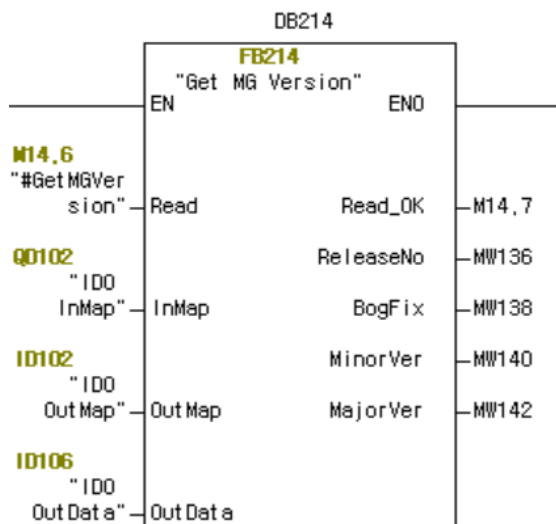


7.2.4 Alarm history initialize command bit

Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name
0	0	H	CONNECT	0	0	H	CONNECTED
0	1	H	ESTOP	0	1	H	ENABLED
0	2	H	ENABLE	0	7	H	Motion /Setting
0	7	H	Motion /Setting	1	0	H->L	MOTIONING Status Flag
0	8	H	CMD_CODE 0	0	8	H	CMD_CODE RESP 0
0	9	L	CMD_CODE 1	0	9	L	CMD_CODE RESP 1
0	10(A)	H	CMD_CODE 2	0	10(A)	H	CMD_CODE RESP 2
0	11(B)	H	CMD_CODE 3	0	11(B)	H	CMD_CODE RESP 3
1	0-15	data	INDEX_NO.	0	0-15	data	INDEX_RESP_NO.
0	4	Rising Edge	CMD START	0	4	H	CMD START_RESP

- The setting value of SETTING_CMD_CODE is 1101b.
- The rising edge command of CMD_START is required to start the command.
- The initialization command sets all alarm history to '0x00' and '0' to the data area of Output-Map.
- The alarm history can be reset by restarting MOTIONGATE.

■ Alarm History Clear



Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name

✓

IO-Map command response

- When executing parameter checking command

Input-Map

7	6	5	4	3	2	1	0
F	E	D	C	B	A	9	8

InBMap

7	6	5	4	3	2	1	0
F	E	D	C	B	A	9	8

InData

MOTION/SETTING bit = 1
CMD_CODE = 1110b
CMD_START bit = 1

Output-Map

7	6	5	4	3	2	1	0
F	E	D	C	B	A	9	8

OutBMap

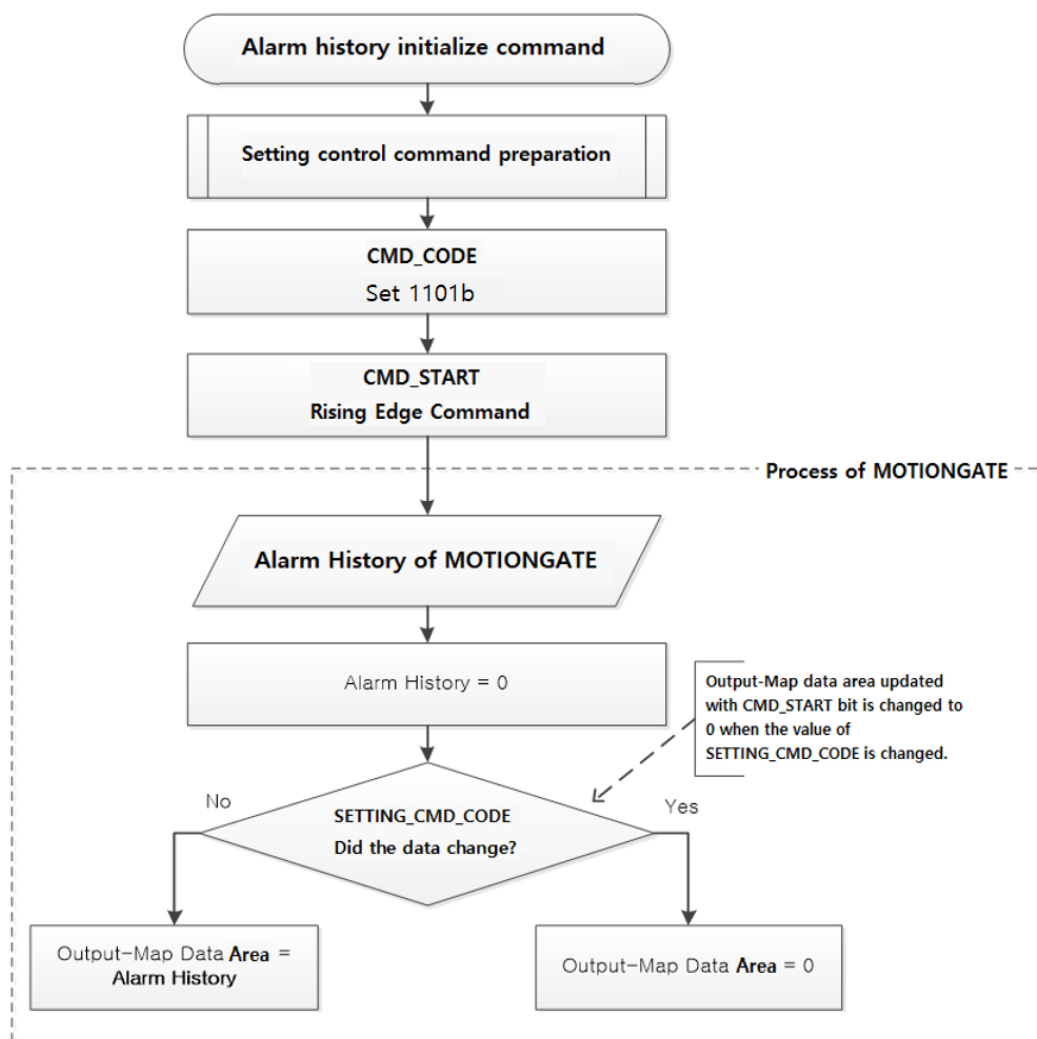
7	6	5	4	3	2	1	0
F	E	D	C	B	A	9	8

OutData

1 st Last Alarm Code							
2 nd Last Alarm Code							
3 rd Last Alarm Code							
4 th Last Alarm Code							

MOTION/SETTING_RESP bit = 1
CMD_CODE_RESP = 1110b
CMD_RESP bit = 1

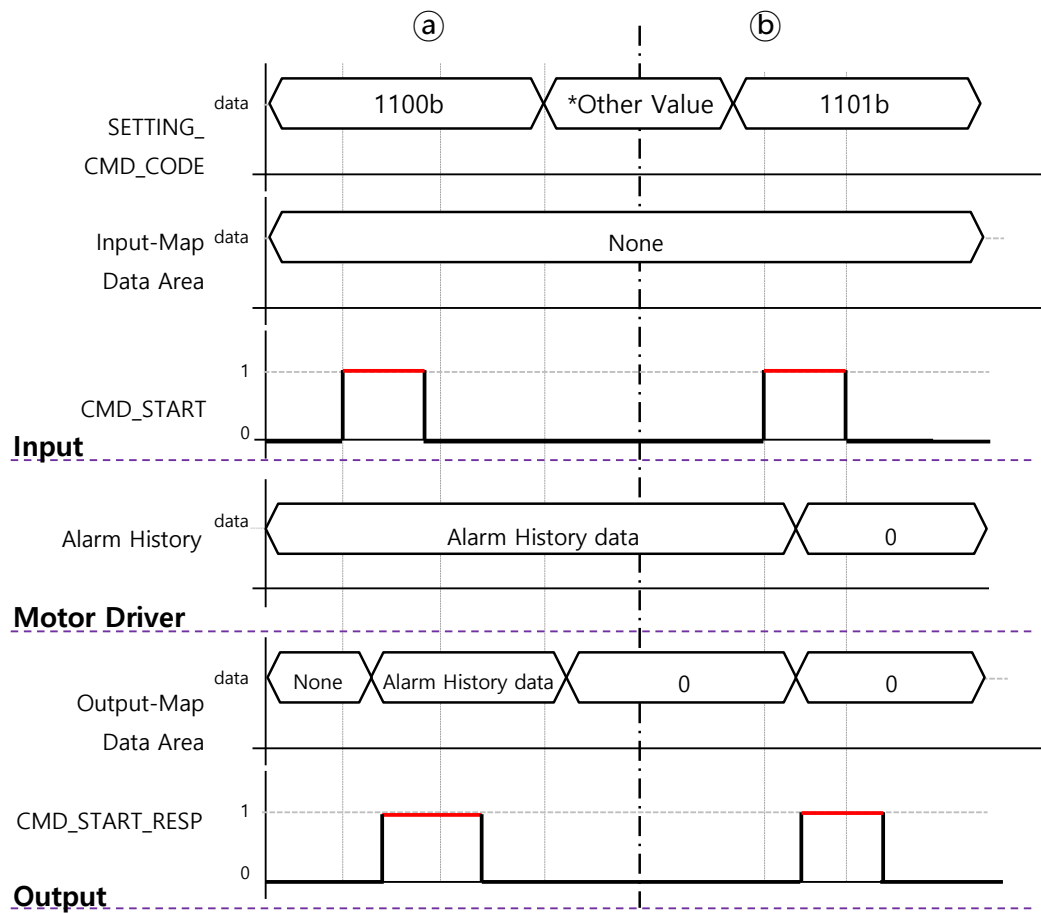
7.2.5 Alarm history initialize processing order



7.2.6 Timing chart

To request the confirmation of the alarm history, set SETTING_CMD_CODE to 1100b, which is the code of Read Alarm History as in the section ①, and execute with the rising edge command of CMD_START bit. When the command is executed, the alarm history is output to the data area of the Output-Map. When the data of SETTING_CMD_CODE is changed, the alarm history is output as '0'.

The alarm history initialization command is set by setting the SETTING_CMD_CODE to 1101b, which is the code of Reset Alarm History, as in the section ②, and executing the rising edge command of the CMD_START bit. When this command is executed, the alarm history of the MOTIONGATE is initialized to '0', and the data area of the Output-Map is also output as '0'.



8. Special Function

8.1 MOTIONGATE Version Confirmation

8.1.1 MOTIONGATE version confirmation command bit

MOTIONGATE version confirmation command can obtain the version information of the MOTIONGATE by executing the command on any axis. This command can be confirmed by operating the command code (CMD_CODE) '5' in the setting mode (MOTIONION / SETTING = 1).

Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name
0	0	H	CONNECT	0	0	H	CONNECTED
0	1	H	ESTOP	0	1	H	ENABLED
0	2	H	ENABLE	0	7	H	Motion /Setting
0	7	H	Motion /Setting	1	0	H->L	MOTIONING Status Flag
0	8	H	CMD_CODE 0	0	8	H	CMD_CODE RESP 0
0	9	L	CMD_CODE 1	0	9	L	CMD_CODE RESP 1
0	10(A)	H	CMD_CODE 2	0	10(A)	H	CMD_CODE RESP 2
0	11(B)	L	CMD_CODE 3	0	11(B)	L	CMD_CODE RESP 3
1	0-15	data	INDEX_NO.	0	0-15	data	INDEX_RESP_NO.
0	4	Rising Edge	CMD START	0	4	H	CMD START_RESP
				2-3	0-31	data	Version_Read_data

- The setting value of SETTING_CMD_CODE is 0101b.
- The rising edge command of CMD_START is required to start the command.
- The data received by the version check command is 4 types in 8-bit units and responds with a decimal data value.

(* Not an ASCII code)

Example) 1. 0. 2. 3

- Release No. : 3
- Bug Fix. : 2
- Minor Version : 0
- Major Version : 1

Input Map (PLC -> MOTIONGATE)				Input Map (MOTIONGATE -> PLC)			
Word	Bit	Operating level	Name	Word	Bit	Response level	Name

■ Get Version

✓ IO-Map command and response

- When executing parameter checking command

Input-Map

7	6	5	4	3	2	1	0
F	E	D	C	B	A	9	8

InBMap

7	6	5	4	3	2	1	0
F	E	D	C	B	A	9	8

InData

Output-Map

7	6	5	4	3	2	1	0
F	E	D	C	B	A	9	8

OutBMap

Release No.							
Bug Fix							
Minor Version							
Major Version							

OutData

MOTION/SETTING bit = 1

CMD_CODE = 0101b

CMD_START bit = 1

MOTION/SETTING_RESP bit = 1

CMD_CODE_RESP = 0101b

CMD_RESP bit = 1

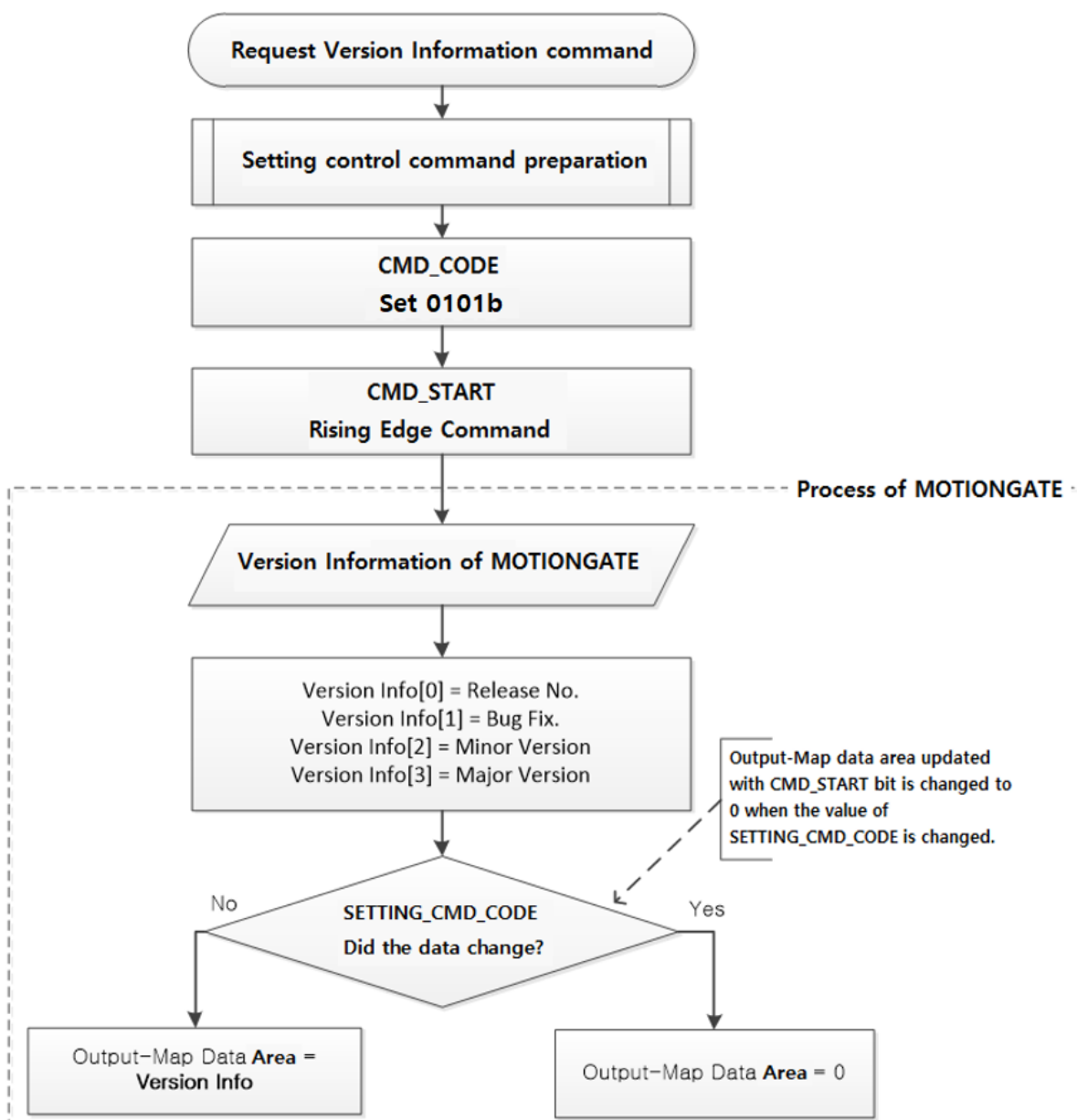
RESPONSE_DATA = Version Information



Attention

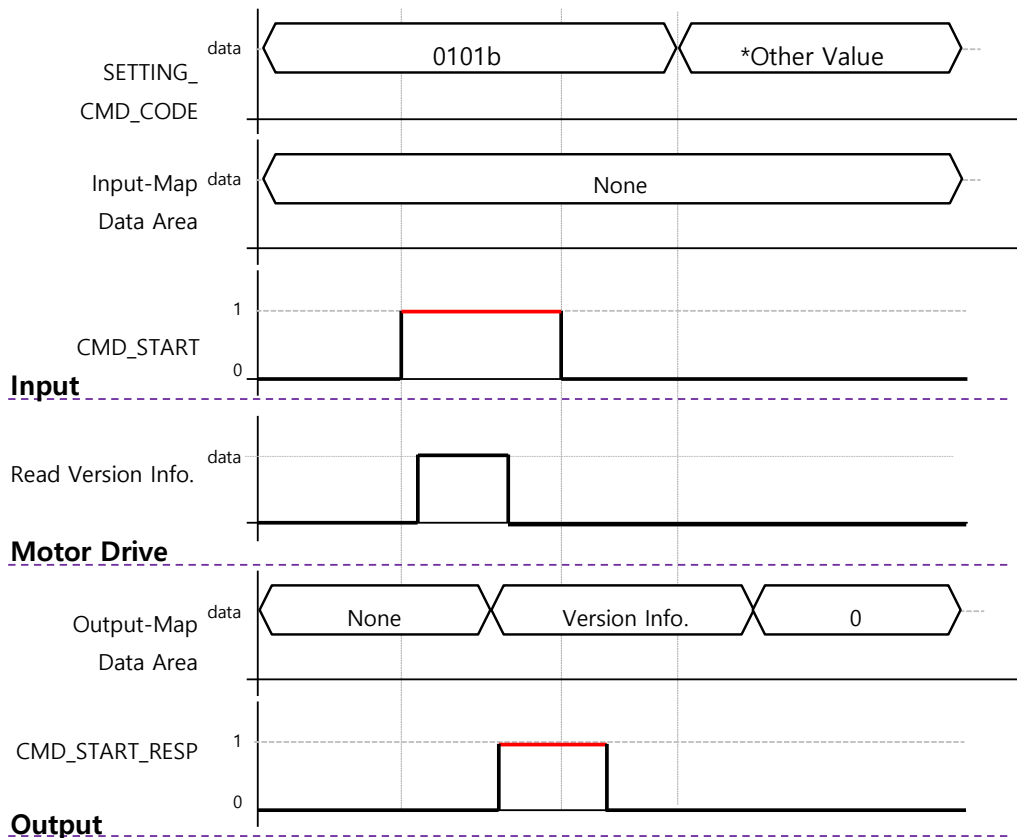
The response form in this example is when the address mapped to Little-Endian is monitored. When mapped to Big-Endian, the data is checked in reverse order.

8.1.2 MOTIONGATE version confirmation processing order



8.1.3 Timing chart

The command to check the version information of the MOTIONGATE sets SETTING_CMD_CODE to 0101b, which is the command code of Read Version Information, and starts the change command by the rising edge command of the CMD_START bit. At this time, the CMD_START bit must be kept at '1' until the CMD_START_RESP bit is set to '1' and it is confirmed that the version information of the MOTIONGATE is updated to the data area of the Output-Map.



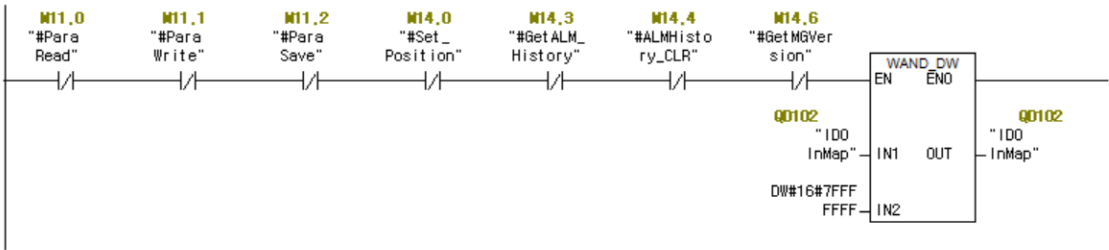
9. Additional Example Function

9.1 Processing of MOTION/SETTING Mode bit

After executing the control command of the setting mode, the Motion / Setting bit is sometimes kept on. At this time, no stop command or motion command is executed. Therefore, if the instruction in the setting mode is not executed, the Motion / Setting bit is always reset like the following ladder.

▣ **Network 18** : The basic control mode is set to the motion control mode.

If you add a command to enter the Setting mode, you must add a B contact to the ladder.



Attention

If a function block such as parameter access command or position designation is added, the execution bit of the added function block should be added as B contact (Normal-Closed).

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