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Technical Reference

- Modbus communication

and Block operation Specification -

Product Name : AC Servo Driver

Product Series Name : MINAS A6S series for Rotary motor/Linear motor/DD motor/VCM

Product Model Number : Position control type/General-purpose communication type/Multifunction type

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REVISIONS

Date	Page Points changed Dwg. No. changed	Sym	REVISION Reason for change/contents of change	Signed
Oct. 27, 2015	-	1.0	NEWLY ISSUED	
Aug.01, 2016	P1	2.0	Software version upgrade CPU1 Ver 1.03 → Ver 1.05 CPU2 Ver 1.03 → Ver 1.05	
	P34-36,59-64,66		1) Infinite revolution absolute function	
	-		2) External scale position information monitoring function under semi-closed control	
	-		3) Full-closed control support for load variance suppression function	
	-		4) Functional enhancement of quadrant projection suppression function	
	-		5) Position compare function	
	-		6) Serial absolute external scale Z-phase shift amount setting in pulse regeneration function	
	-		7) Slow stop function	
	-		8) Deterioration diagnosis warning function	
	P65 P8-9,65 P24,65		9) Modbus function enhancements - Strobe input operation automatic OFF - Request action specification switching - Mirror register setting	
	P3,30,33,66 P30,62-63 P44,47,51 P38,66		10) Block operation function enhancements - Input signal start-up - Full close control support - Infinite length operation - Absolute mode correspondence to origin offset	
	Cover		• Change Changed document title and issuing division	
	Cover		• Addition Added A6L to Product number	
	P1		• Addition Added function comparison table	
	P7-10		• Correction Corrected contents of communication timing	
	P11-16		• Correction Corrected contents of Modbus data construction	
	P17-19		• Addition Added contents to coil information	
	P20-29		• Addition Added contents to register information	
	P33		• Addition Added contents to input and output signal assignment	
	P34		• Correction Corrected listing of wrap around threshold value	
	P37		• Addition Added setting method	
	P39		• Correction Corrected listing of Note *4)	
	P39		• Addition Added Note *4)	
	P46		• Addition Added explanation of target absolute position	

(Note) Revised page numbers are those at the time of issue of the revised edition

REVISIONS

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			(Continued from previous page)	
	P48		• Addition Added explanation on drive prohibited input assignment	
	P48		• Correction Corrected contents of detection method	
	P50		• Addition Added explanation of command and Note *2).	
	P53		• Addition Added explanation on the contents of command argument	
	P55		• Addition Added remarks to comparison target "command velocity"	
	P57		• Addition Added start up method	
	P62		• Change Changed attribute of Err80.0	
	P62-63		• Addition Added Err97.0	
	P64		• Addition Added function and contents to Pr5.31	
Aug. 25, 2016	P2	2.1	Software version upgrade CPU1 Ver 1.05 → Ver 1.06 CPU2 Ver 1.05 → Ver 1.06	
	-		1) "Main power supply AC Off detection time" Expansion of the set range	
	-		2) "Hybrid vibration suppression filter" Expansion of the set range	
	-		3) "Allowable motor operating range setting" Expansion of the protection functions	
	P50		4) "Block operation function" Specification improvement of Decelerate stop command	
Jul. 10, 2017		2.2	Software version upgrade CPU1 Ver 1.06 → Ver 1.07 CPU2 Ver 1.06 → Ver 1.07	
	P23		1) Function change "Expansion in range of the manufacturing number indication function"	
Jul. 26, 2018	P2	2.3	Software version upgrade CPU1 Ver 1.07 → Ver 1.09 CPU2 Ver 1.07 → Ver 1.09	
	-		1) Specification extension of command pulse prohibition input (INH)	
	-		2) Setting range extension of analog input offset	
	-		3) Specification extension of deterioration diagnosis warning	
	P1,3		• Addition Added information of the MINAS-A6 series (spec. for DC24/48 V)	
	P34,35		• Addition Added symbols regarding the basic function to the Input/Output signal table	
	P29		• Correction Corrected the name of Register 4DC4h	
	P8		• Addition Added the reference value of command processing time	
	P24,28		• Addition Added notes for multi-rotation data	
	P31,39,50,53,59		• Correction Corrected description about Infinite length operation.	
Nov. 15, 2018	P1,2	2.4	Software version upgrade CPU1 Ver 1.09 → Ver 1.10 CPU2 Ver 1.09 → Ver 1.10	
	P3		1) Function addition "High response current control"	
	(No change in this document)		• Addition Added an explanation about G frame and H frame	

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Nov. 13, 2019	P1,2	2.5	Software version upgrade CPU1 Ver 1.10 → Ver 1.11 CPU2 Ver 1.10 → Ver 1.11	
	P2-3,37-39		1) Function addition "Extension of the range of absolute data"	
	P2,37		•Addition Compatible with the battery-less absolute encoder	
	Overall		•Change Company name	
Apr. 1, 2021	P1-3	2.6	• Software version upgrade CPU1 Ver1.11 → Ver1.12 CPU2 Ver1.11 → Ver1.12	
	P4,31-32,53,55 64,70,73		1) Function addition "Pulse train control when block operations are enabled"	
	P35		2) Function addition "Position compare function enhancement"	
	P17,28,29,38,61		• Corrected incorrect entries.	
	Overall		• Company name changed.	
Dec.1.2021	P1-3	3.0	• Software version upgrade CPU1 Ver1.12 → Ver1.13 CPU2 Ver1.12 → Ver1.13	
	P26,27,42-44, P50-52,74		1) Function added "Extension of the unit of acceleration/deceleration of Block operation"	
	Overall		• Corrected all incorrect entries	
	Overall		• Company name changed.	
Apr. 1, 2022	-	3.1	• Changed the company name	-
	-		• Changed the front cover format	
May. 17, 2023	P1-3	4.2	• Software version upgrade CPU1 Ver1.13 → Ver1.14 CPU2 Ver1.13 → Ver1.14	
	P3,48,92		1) Function addition "Backlash compensation function"	
	P3,88,93		2) Function addition "In case of 4(=Pr6.28) absolute mode corresponding"	
	P3,45		3) Function addition "In case of 0(=Pr6.28) 6000h order monitor corresponding"	
	P1,3		4) Function addition "Voice coil motor (VCM) support"	
	P52,53		5) Function addition "Stop judgment reference speed at immediate stop"	
	Overall		Changed wording. Corrected incorrect entries.	
Dec. 14, 2023	P1-3	5.0	• Software version upgrade CPU1 Ver1.14 → Ver1.15 CPU2 Ver1.14 → Ver1.15	
	P3,74,92,96		1)Function addition "Start of block operation when servo is turned on"	
	P3,62,74-77, 92,96,97		2) Function addition "Origin detection method 3(Z phase),4(Z phase(approximate))"	
	P96		• Addition Added the description of Pr6.98	
	Overall		• Corrected incorrect entries.	

(Note) Revised page numbers are those at the time of issue of the revised edition

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1. Introduction

This technical document concerns the Modbus communication function specification and the block operation function specifications for MINAS-A6/A6L series.

<MINAS-A6/A6L series Function comparison>

○:Usable ×:Not usable

Function \ Product		MINAS-A6 series (Standard (Rotating type) Motor controll type)		
		[A6SE] (Basic type) Product number ending with: E CPU1:Ver1.15 CPU2:Ver1.15	[A6SG] (RS485 Communication type) Product number ending with: G CPU1:Ver1.15 CPU2:Ver1.15	[A6SF] (Multifunction type) Product number ending with: F CPU1:Ver1.15 CPU2:Ver1.15
Block operation	Pr6.28=1 : By Modbus communication	×	○ (Position control)	○ (Position control, full-close control)
	Pr6.28=2, 4 : By input signal	○ (Position control)	○ (Position control)	○ (Position control, full-close control)

Function \ Product		MINAS-A6L series (Linea/DD motor/VCM control type)		
		-	[A6SL] (RS485 Communication type) Product number ending with: L CPU1:Ver1.15 CPU2:Ver1.15	[A6SM] (Multifunction type) Product number ending with: M CPU1:Ver1.15 CPU2:Ver1.15
		-		
Block operation	Pr6.28=1 : By Modbus communication	-	○ (Position control) *1)	○ (Position control) *1)
	Pr6.28=2, 4 : By input signal	-	○ (Position control) *1)	○ (Position control) *1)

Function \ Product		MINAS-A6 (DC24/48V type) series (Standard (Rotating type) Motor controll type)		
		-	[A6SG] (RS485 Communication type) Product number ending with: G CPU1:Ver1.15 CPU2:Ver1.15	[A6SF] (Multifunction type) Product number ending with: F CPU1:Ver1.15 CPU2:Ver1.15
		-		
Block operation	Pr6.28=1 : By Modbus communication	-	○ (Position control)	○ (Position control, full-close control)
	Pr6.28=2, 4 : By input signal	-	○ (Position control)	○ (Position control, full-close control)

*1) Block operation function cannot be used in case where the feedback scale is serial absolute rotary type.

<About Absolute Encoders>

Absolute encoders come in two types: a type that retains multi-turn data with a battery for absolute data (hereafter called the battery-powered absolute encoder), and a type that does not require a battery to retain multi-turn data (hereafter called the “battery-less absolute encoder”).

Functions common to both types of absolute encoders are shown unless specified otherwise.

<Software version>

These materials apply to the servo-amplifiers of the following software versions:

CPU1 Version: Ver.1.15

CPU2 Version: Ver.1.15

*Please confirm the software version from the set-up support software (PANATERM) or from the front panel.

Software version	Functional change contents		Corresponding PANATERM
CPU1 Ver 1.03 CPU2 Ver 1.03	Initial release		6.0.0.2 or later
CPU1 Ver 1.05 CPU2 Ver 1.05	Function enhancement version 1		6.0.0.9 or later
	Additional function	Related items	
	1) Infinite revolution absolute function	6-1	
	2) External scale position information monitoring function under semi-closed control	Technical reference (Functional Specification)	
	3) Full-closed control support for load variance suppression function		
	4) Functional enhancement of quadrant projection suppression function		
	5) Position compare function		
	6) Serial absolute external scale Z-phase shift amount setting in pulse regeneration function		
	7) Slow stop function		
	8) Deterioration diagnosis warning function		
	9) Modbus function enhancements - Strobe input operation automatic OFF - Request action specification switching - Mirror register setting	8 8 2-1-4, 8	
	10) Block operation function enhancements - Input signal start-up - Full close control support - Infinite length operation - Absolute mode correspondence to origin offset	2, 8 2-2 4-1, 4-4 3-1, 8	
CPU1 Ver 1.06 CPU2 Ver 1.06	Function enhancement version 2		
	Additional function	Related items	
	1) “Main power supply AC Off detection time” Expansion of the set range	Technical reference (Functional Specification)	
	2) “Hybrid vibration suppression filter” Expansion of the set range		
	3) “Allowable motor operating range setting” Expansion of the protection functions		
	4) “Block operation function” Specification improvement of Decelerate stop command - Eliminated the constraint in the case that positioning action is not being executed.	4-6	

Software version	Functional change contents		Corresponding PANATERM
CPU1 Ver 1.07 CPU2 Ver 1.07	Function enhancement version 3		6.0.1.6 or later
	Additional function	Related items	
	1) Expansion in range of the manufacturing number indication function	2-1-4-4 Technical reference (Functional Specification)	
CPU1 Ver1.09 CPU2 Ver1.09	Function enhancement version 4		6.0.1.12 or later
	Additional function	Related items	
	1) Specification extension of command pulse prohibition input (INH)	2-7-1 Technical reference (Functional Specification)	
	2) Setting range extension of analog input offset		
	3) Specification extension of deterioration diagnosis warning function		
4) Compatible with the battery-less absolute encoder			
CPU1 Ver 1.10 CPU2 Ver 1.10	Function enhancement version 5		6.0.1.13 or later
	Additional function	Related items	
	1) High response current control function • Extension of setting range in Pr6.11 (current response setup)	Technical reference (Functional Specification)	
CPU1 Ver 1.11 CPU2 Ver 1.11	Function enhancement version 6		6.0.1.13 or later
	Additional function	Related items	
	1) Compatible with the battery-less absolute encoder	2-7-1	
CPU1 Ver1.12 CPU2 Ver1.12	Function enhancement version 7		6.0.4.0 or later
	Additional function	Related items	
	1)Pulse train control when block operations are enabled	2,2-3,4-5,4-12-2,7-2,8 Technical reference (Functional Specification)	
	2) Position compare function enhancement	2-5 Technical reference (Functional Specification)	
	3) Origin detection method 15 (Actual position set)	4-5	
CPU1 Ver 1.13 CPU2 Ver 1.13	Function enhancement version 8		6.0.5.0 or later
	Additional function	Related items	
	1) Extension of the unit of acceleration/deceleration of Block operation	No change in this document 2-1-4,3-1,4-2,4-3,4-4,8	
CPU1 Ver1.14 CPU2 Ver1.14	Function enhancement version 9		6.0.8.2 or later
	Additional function	Related items	
	1) Backlash compensation function	2-1-4, 7-2 Technical reference (Modbus communication and Block operation Specification)	
	2) In case of 4(=Pr6.28) absolute mode corresponding	6-1, 7-2 Technical reference (Modbus communication and Block operation Specification)	
	3) In case of 0(=Pr6.28) 6000h order monitor corresponding	2-1-4-4	
	4) Voice coil motor (VCM) support	1 Technical reference (Modbus communication and Block operation Specification)	
	5) Stop judgment reference speed at immediate stop	2-4 Technical reference (Modbus communication and Block operation Specification)	
CPU1 Ver1.15 CPU2 Ver1.15	Function enhancement version 10		6.0.10.0 or later
	Additional function	Related items	
	1) Start of block operation when servo is turned on	4-5,7-2,8, Technical reference (Functional Specification)	
	2) Origin detection method 3(Z hase), 4(Z phase(approximate))	4-5,7-2, Technical reference (Functional Specification)	

- * A new software version is downward compatible with a old software version.
Parameters used in a old software version can be used in a new software version, as is.
The parameter settings added to a new software version are the default settings with additional capability invalidated and compatible with a old software version.
When using the additional capability, set parameters according to the description of each function in this document.

<Related materials>

- SX-DSV03031: MINAS-A6 series Technical reference (Functional Specification)
- SX-DSV03178: MINAS-A6L series Technical reference (Functional Specification)
- SX-DSV03283: MINAS-A6 (DC24V/48V type) series Technical reference (Functional Specification)

<Points to note>

- (1) Unauthorized copying or reproduction of all or a part of this document is strictly prohibited.
- (2) The contents of this document (specification, software version, etc.) are subject to change without notice for product improvement.

2. Summary

In block operation, block programming positioning action is possible by the combination of a maximum of 256 block commands.

In addition to the positioning commands, such as relative positioning, JOG, absolute positioning, infinite length operation, return to origin command, etc., the use of output signal operation, conditional branching and other commands is possible. Operation of output signals and action pattern changes corresponding to the current motor positions and motor velocity can be easily achieved by combining these commands.

The activation of these block operations can be selected either by Modbus communications or by an input signal from the I/F connector.

The setting of block operation (block parameter setting) can be made by either of the two following methods:

- Block operation editor of the Set-up support software (PANATERM).
- Via Modbus communication (write register).

Relevant parameters

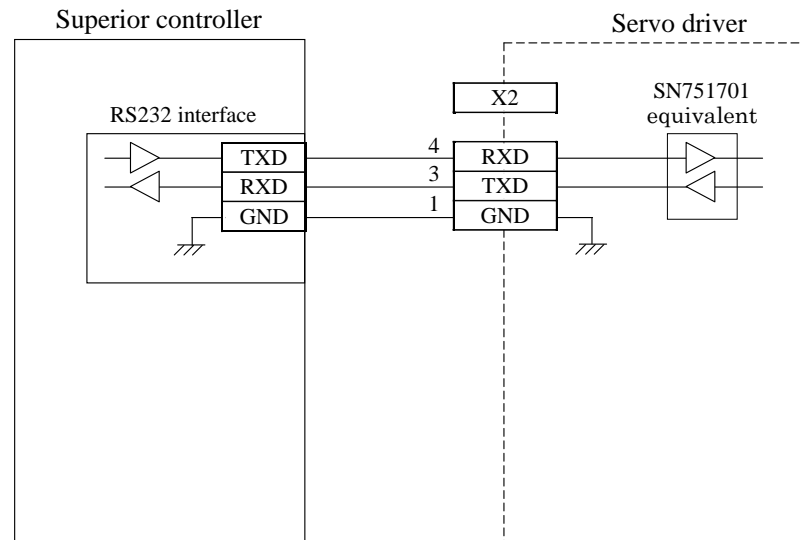
Class	No	Parameter title	Set range	Unit	Functions, contents
5	37	Modbus connection setting	0 to 2	-	Sets RS232/RS485 communications protocol. 0: MINAS standard protocol 1: Modbus-RTU (RS232 communications, 1:1 only) 2: Modbus-RTU (RS485 communications, 1:N compatible)
6	28	Special function select	0 to 4	-	Selects valid/invalid of block operation functions. 0: Block operations invalid(Pulse train enabled) 1: Block operations via Modbus communications valid(Pulse train disabled) 2: Block operations by input signal valid(Pulse train disabled) 3 : Use by manufacturer 4 : Block operations by input signal enabled (Pulse train enabled) *1)

*1) Software prior to function enhancement version 6 (Ver 1.11 or earlier) is not supported.

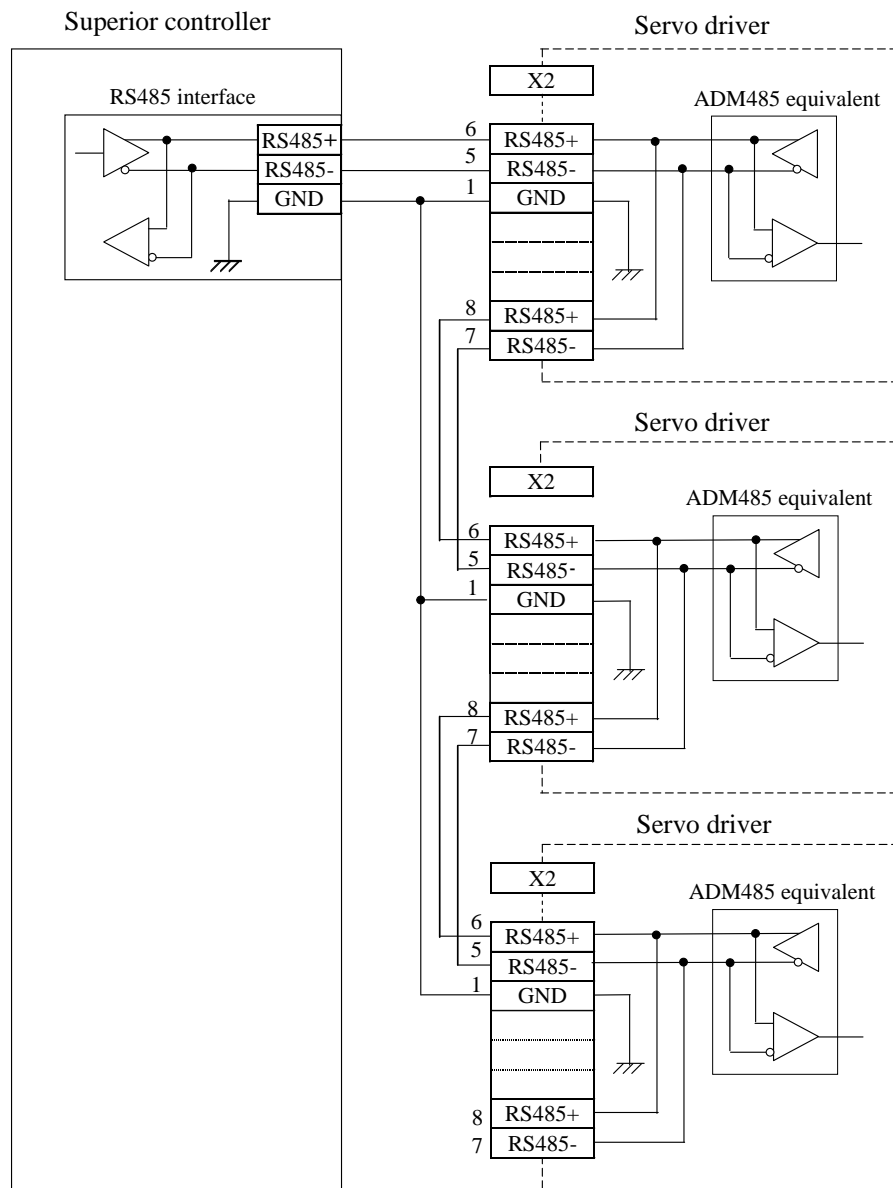
2-1 Modbus communication specifications

2-1-1 Connection to communication line

- (1) In case of using RS232 physical layer:
Setting Pr 5.37 “Modbus connection setting” to 1, 1:1 connection Modbus communications by RS232 communication can be used.



- (2) In case of using RS485 physical layer:
By setting Pr 5.37 "Modbus connection setting" to 2, 1: N connection Modbus communications by RS485 communication can be used.



2-1-2 Communication specifications

Protocol	MODBUS-RTU (binary mode only)
Physical layer	RS232 (1:1), RS485 (1:N, Max. 31 axis)
Baud rate *1	2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400 bps
Data	8 bit
Parity *2	None, even, odd (set to even at shipment)
Start bit	1 bit
Stop bit *2	1, 2 bit (set to 1 bit at shipment)

*1 Baud rate can be selected by Pr 5.29 “Set RS232 communication baud rate” when using RS232 and Pr 5.30 “Set RS485 communication baud rate” when using RS485.

*2 Parity and stop bit can be selected by Pr 5.38 “Set Modbus communications”.

Relevant parameters

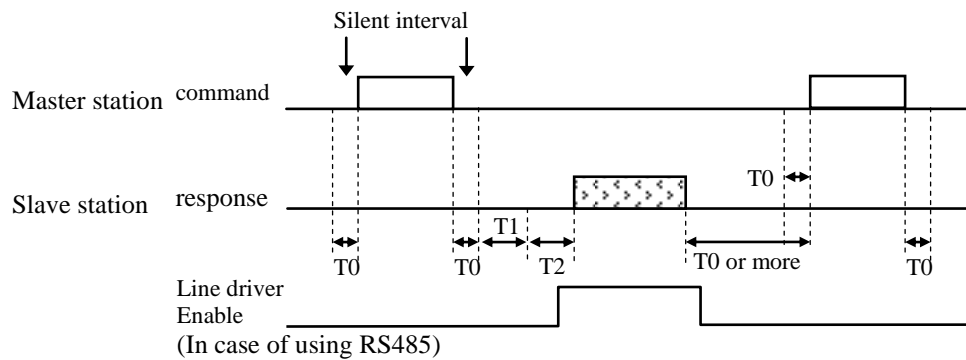
Class	No	Parameter title	Set range	Unit	Functions, contents
5	29	RS232 communications baud rate setting *1	0 to 7	-	Set baud rate for RS232 communications. 0: 2400, 1: 4800, 2: 9600 3: 19200, 4: 38400, 5: 57600, 6: 115200, 7: 230400 bps Note) In case it is not Modbus communications (Pr.5.37 = 0), when value is set to 7, it will be set internally to 9600 bps.
5	30	RS485 communications baud rate setting *1	0 to 7	-	Set baud rate for RS485 communications. 0: 2400, 1: 4800, 2: 9600 3: 19200, 4: 38400, 5: 57600, 6: 115200, 7: 230400 bps Note) In case it is not Modbus communications (Pr.5.37 = 0), when value is set to 7, it will be set internally to 9600 bps.
5	38	Modbus communication setting	0 to 5	-	Sets parity (Even, odd, none) and stop bit length (1 bit, 2 bits) for Modbus communications. 0: Even/1bit 1: Even/2bit 2: Odd/1bit 3: Odd/2bit 4: None/1bit 5: None/2bit

2-1-3 Communication timing

2-1-3-1 Normal communications

Relevant parameter

Class	No	Parameter title	Set range	Unit	Functions, contents
5	39	Modbus response waiting Time	0 to 10000	ms	Set waiting time to be added from the receipt of Modbus communications request until response data is transmitted. Note) Even if value is set to 0, delay will occur for generation of response data.



- T_0 : Silent interval time: (3.5 character lengths or 0.75ms, whichever is longer)
 T_1 : Command processing time (will change in accordance with the command *1)
 T_2 : Response waiting time (0 to 1000 ms)
 Can be set by Pr5.39 "Modbus response waiting time". Set to 0 ms at shipment.

*1 Reference value for command processing time

Ordinary command: About several ms

Writing the parameter in EEPROM (writing the 6173h in the Register 1020h "Save all parameters"): About 300 ms

2-1-3-2 Broadcast communications (In case of using RS485)

The master station can broadcast commands simultaneously to multiple slave stations by setting 00h to the slave address (broadcast command).

Slave stations receiving the broadcast command will operate as per the setting of Pr5.42 "Modbus broadcast setting."

(When Pr5.42 bit 1 =1, the slave station shall ignore the broadcast command and will not execute request processing nor return a response.)

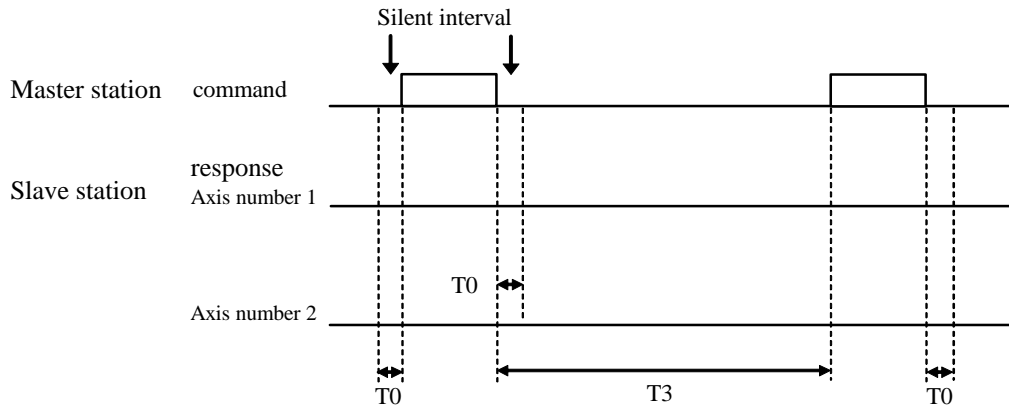
Relevant parameter

Class	No	Parameter title	Set range	Unit	Functions, contents
5	39	Modbus response waiting Time	0 to 10000	ms	Set waiting time to be added from the receipt of Modbus communications request until response data is transmitted. (Note) Even if value is set to 0, delay will occur for generation of response data.
5	40	Modbus communications Time out time	ms	0 to 10000	Sets time to detect Err 80.0 "Modbus communications time out protection", in case Modbus communications specifying own axis or broadcast could not be received within the set length of time from the last time received, during the state where Modbus execution rights are secured. Err 80.0 not detected when set value is 0.
5	42	Modbus broadcast Setting	-32768 to 32767	-	Sets request processing and response action, in case broadcast mode request has been received in Modbus communications. bit 0 response action 0: Invalid (No action) 1: Valid (Action) *1 bit 1: Request processing 0: Valid (Process) 1: Invalid (No processing) bit 2: Strobe input operation automatic off 0: invalid, 1: valid *2 bit 3: Request operation specification switch *1 0: use Pr5.40, 1: Use Pr5.39 bit 4 - 15: Not used Please set to 0 (zero). The lowermost bit is designated as bit 0. *1 In case bit 3 = 0, returns response after $Pr5.31 \times Pr5.40$ [ms]. In case bit 3 = 1, returns response after $Pr5.31 \times Pr5.39$ [ms]. Does not return response when bit 1 = 1. *2 After start-up of block operation, strobe input operation will be automatically turn OFF from the amplifier side. No need to write input OFF.

(1) When response operation is set to Invalid (Pr5.42 bit 0 = 0)

The slave station will not return a response.

- In case the number of slaves = 2:



T0: Silent interval time: (3.5 character lengths or 0.75ms, whichever is longer)

T1: Command processing time (will change in accordance with the command)

T3: Broadcast command processing time

$$T3 \geq T0 + T1$$

Master station to transmit the next command after lapse of T3 period.

(2) When response operation is set to Valid (Pr5.42 bit0=1)

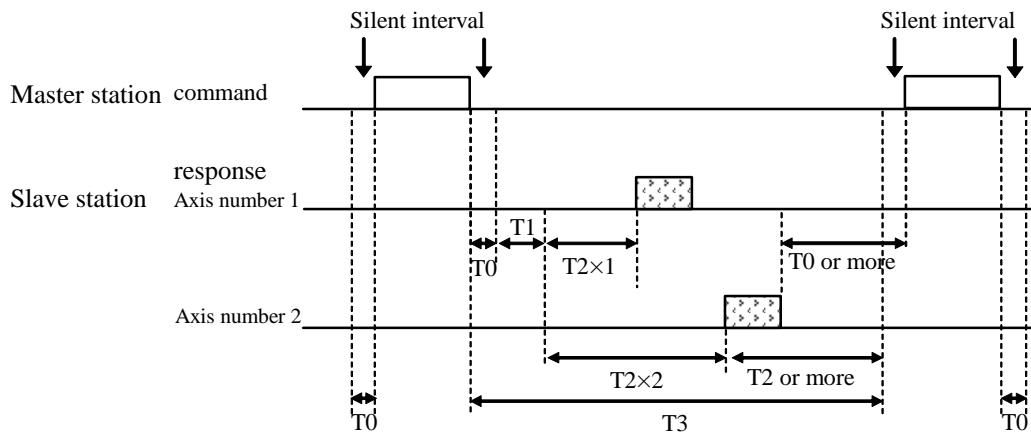
The slave station will not return a response.

When response operation is set to Valid

Each slave station will return a response in accordance with the timing indicated below, based on their individual parameter settings.

Note that this specification is different from the standard Modbus specifications.

- In case the number of slaves = 2:



T0: Silent interval time: (3.5 character lengths or 0.75ms, whichever is longer)

T1: Command processing time (will change in accordance with the command)

T2: Response waiting standard time (0 to 1000 ms)

Can be set by Pr5.40 "Modbus communications timeout time" when Pr5.42 bit 3 = 0.

Can be set by Pr5.39 "Modbus response wait time" when Pr5.42 bit 3 = 1.

Default setting is both set to 0 ms

Actual response wait time for each slave station shall be $T2 \times n$, (n: axis number (Pr5.31))

T3: Broadcast command processing time

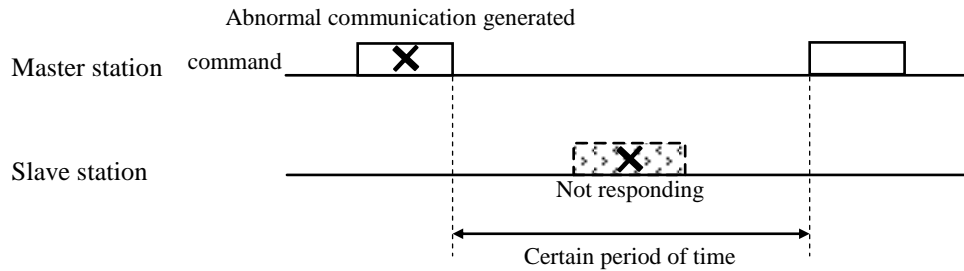
$$T3 \geq T0 + T1 + T2 \times (\text{largest slave axis number} + 1)$$

Master station to transmit the following command after lapse of T3

2-1-3-3 Abnormal communication

When the slave station fails to receive the command issued from the master station normally, it will ignore the command and will not return a response.

- When a communications error is detected:



Using the timing charts of paragraphs 2-1-3-1 and 2-1-3-2 as reference, the master station shall judge time out when response from the slave station is not received within a certain period of time.

Furthermore, the slave station can detect time out from the command receiving interval from the master station by setting Pr5.40 “Modbus communication time out time.”

Relevant parameter

Class	No	Parameter title	Set range	Unit	Functions, contents
5	40	Modbus communications Time out time	ms	0 to 10000	Sets time to detect Err 80.0 “Modbus communications time out protection”, in case Modbus communications specifying own axis or broadcast could not be received within the set length of time from the last time received, during the state where Modbus execution rights are secured. Err 80.0 not detected when set value is 0.

2-1-4 Modbus data configuration

2-1-4-1 Command issue (Master station → Slave station)

Slave address (1 byte)
Function code (1 byte)
Data (0 to 252 bytes)
CRC (2 bytes)

- Slave address

00h	Broadcast address
01h to 7Fh	Slave address

- Function code

Function code	Function	Contents
01h	Read coil	Read out coil information
03h	Read register	Read out registers for monitors, parameters, etc.
05h	Write coil	Write into the coil
06h	Write register	Write into the register
08h	Communication diagnosis	Loop back test
0Fh	Write multiple coils	Write into multiple coils
10h	Write multiple registers	Write into multiple registers

- Data

Will differ by function code.

▪ CRC

CRC (Cyclic Redundancy Check) will be used for error check of Modbus-RTU.

Generating polynomial, CRC1-16($X^{16}+X^{15}+X^2+1$) will be used to produce the CRC code.

1. CRC production procedure

- 1) Set FFFFh as initial value of CRC.
- 2) Calculate XOR of the first byte data of command (Slave address) and CRC, and set its result on CRC.
- 3) CRC to be shifted right by 1 bit.
- 4) In case the lowest digit bit overflow by the right shift in 3) is 0 (zero), go back to 3).
In case the lowest digit bit is 1, then calculate XOR of A001h and CRC, set the result on CRC and return to 3).
- 5) Repeat 3) and 4) until 8 shifts have been performed.
- 6) Likewise, Repeat the process from 2) through 5) for the next byte in the command.
- 7) The value of the last CRC after repeating the command for the number of data bytes shall be the CRC to be used for the error check.
- 8) When adding CRC to the end of the command, make sure that the lower bytes of the CRC comes before the upper bytes (little-endian format)

2. Layout of CRC in the command

16-bit CRC in the command will be little-endian transmitted, with the lower bytes being transmitted before the upper bytes.

An example where the value of CRC is 4321h is indicated as follows:

Slave address (1 byte)	
Function code (1 byte)	
Data (0 to 252 bytes)	
CRC (2 bytes) lower	21h
upper	43h

3. CRC error judgment

The value of CRC set by the host side is compared with the value of CRC recalculated from the command data received by the driver side. If they do not match, received data will be discarded as CRC error.

And preparation will be made to receive the next transmission. (Will not go into an alarm state)

2-1-4-2 Function code details

(1) Read coil (01h)

Transmission	
Slave address	
01h	
Coil start address	
Upper	Lower
Number of coils	
Upper	Lower
CRC	Lower
	Upper

Reply	
Slave address	
01h	
Number of data bytes (N)	
Data 1	
Data 2	
⋮	
Data N	
CRC	Lower
	Upper

Abnormal response	
Slave address	
81h	
Exception code	
CRC	Lower
	Upper

- Coil information for the number of coils set, counting from the address set as the coil start address, shall be sent as a reply.
- For the number of data bytes (N), the quotient itself is returned in case there is no remainder when the number of coils divided by 8, and “quotient + 1” in case there is a remainder.
- In case there is a remainder, the range off the specified coil number in the last data will be 0 (zero).
- Exception code

01h	Abnormal function codes
02h	Abnormal data address
03h	Abnormal data
04h	Abnormal response processing

(2) Read register (03h)

Transmission	
Slave address	
03h	
Register start address	
Upper	Lower
Number of register (N)	
Upper	Lower
CRC	Lower
	Upper

Reply	
Slave address	
03h	
Number of data bytes (N×2)	
Data 1	Upper
	Lower
Data 2	Upper
	Lower
⋮	
Data N	Upper
	Lower
CRC	Lower
	Upper

Abnormal response	
Slave address	
83h	
Exception code	
CRC	Lower
	Upper

- Returns register data for the number of registers specified, counting from the address set as the register start address.
- Please set the address to read parameters and monitors for the register start address.
- Data is latched for every 10 data, inside the servo driver.
In case more than 10 read register numbers are to be acquired, the combination of data requiring synchronization must be included within the same 10 data segment. (Example: Absolute 1 revolution data and multiple revolution data)
- Exception code

01h	Abnormal function codes
02h	Abnormal data address
03h	Abnormal data
04h	Abnormal response processing

(3) Write coil (05h)

Transmission		
Slave address		
05h		
Address	Upper	
	Lower	
Changed data	Upper	
	Lower	
CRC	Lower	
	Upper	

Reply		
Slave address		
05h		
Address	Upper	
	Lower	
Changed data N	Upper	
	Lower	
CRC	Lower	
	Upper	

Abnormal response		
Slave address		
85h		
Exception code		
CRC	Lower	
	Upper	

- Coil at the coil address specified is turned ON or OFF.
ON : Changed data upper FFh, lower 00h
OFF: Changed data upper 00h, lower 00h
- Exception code 01h Abnormal function codes
 02h Abnormal data address
 03h Abnormal data
 04h Abnormal response processing

(4) Write register (06h)

Transmission		
Slave address		
06h		
Address	Upper	
	Lower	
Changed data	Upper	
	Lower	
CRC	Lower	
	Upper	

Reply		
Slave address		
06h		
Address	Upper	
	Lower	
Changed data	Upper	
	Lower	
CRC	Lower	
	Upper	

Abnormal response		
Slave address		
86h		
Exception code		
CRC	Lower	
	Upper	

- Sets the value of changed data to the register specified as the address.
- Please set a valid address for the register start address.
- When writing servo parameters, use “Multiple register write (10h)” and not this function code.
- Exception code 01h Abnormal function codes
 02h Abnormal data address
 03h Abnormal data
 04h Abnormal response processing

(5) Communication diagnosis (08h)

Transmission		
Slave address		
08h		
Diagnosis sub-code	Upper	
	Lower	
Data	Upper	
	Lower	
CRC	Lower	
	Upper	

Reply		
Slave address		
08h		
Diagnosis sub-code	Upper	
	Lower	
Data	Upper	
	Lower	
CRC	Lower	
	Upper	

Abnormal response		
Slave address		
88h		
Exception code		
CRC	Lower	
	Upper	

- Diagnosis sub-code
 - upper 00h, lower 00h loop back test
 - Returns data transmitted from the host as is.
- Exception code

01h	Abnormal function codes
03h	Abnormal data
04h	Abnormal response processing

(6) Write multiple coils (0Fh)

Transmission		
Slave address		
0Fh		
Start address	Upper	
	Lower	
Number of coils	Upper	
	Lower	
Number of data bytes (N)		
Changed data 1		
Changed data 2		
⋮		
Changed data N	Upper	
	Lower	
CRC	Lower	
	Upper	

Reply		
Slave address		
0Fh		
Start address	Upper	
	Lower	
Number of coils	Upper	
	Lower	
CRC	Lower	
	Upper	

Abnormal response		
Slave address		
8Fh		
Exception code		
CRC	Lower	
	Upper	

- Writes data for the number of coils, starting from the coil specified as the start address.
- For the number of data bytes (N), set the quotient itself in case there is no remainder when the number of coils divided by 8, and “quotient + 1” in case there is a remainder.
- Changed data is set by the ON/OFF with 1-bit data (1/0) being assigned to each coil, starting from the coil designated as the start address.
- Exception code

01h	Abnormal function codes
02h	Abnormal data address
03h	Abnormal data
04h	Abnormal response processing

(7) Write multiple registers (10h)

Transmission	
Slave address	
10h	
Start address	Upper
	Lower
Number of registers (N)	Upper
	Lower
Number of data bytes (N×2)	
Changed data 1	Upper
	Lower
Changed data 2	Upper
	Lower
⋮	
Changed data N	Upper
	Lower
CRC	Lower
	Upper

Reply	
Slave address	
10h	
Start address	Upper
	Lower
Number of registers (N)	Upper
	Lower
CRC	Lower
	Upper

Abnormal response	
Slave address	
90h	
Exception code	
CRC	Lower
	Upper

- Writes data for the number of registers, starting from the register specified as the start address.
- Function enhancement version 1 and earlier versions, as the changed data 1 to N will be internally processed successively in the amplifier, the timing of the change is not simultaneous. Please take note of this when writing data (servo parameters, etc.) covering multiple registers.
- Exception code

01h	Abnormal function codes
02h	Abnormal data address
03h	Abnormal data
04h	Abnormal response processing

2-1-4-3 Coil information

Address	Coil name	Attribute	Contents
Physical input state monitor: Can monitor the physical input state of the input signal (SI1 to SI10)			
0000h	Input signal 1 (SI1)	ReadOnly	0: Input OFF, 1: Input ON
0001h	Input signal 2 (SI2)	ReadOnly	0: Input OFF, 1: Input ON
0002h	Input signal 3 (SI3)	ReadOnly	0: Input OFF, 1: Input ON
0003h	Input signal 4 (SI4)	ReadOnly	0: Input OFF, 1: Input ON
0004h	Input signal 5 (SI5)	ReadOnly	0: Input OFF, 1: Input ON
0005h	Input signal 6 (SI6)	ReadOnly	0: Input OFF, 1: Input ON
0006h	Input signal 7 (SI7)	ReadOnly	0: Input OFF, 1: Input ON
0007h	Input signal 8 (SI8)	ReadOnly	0: Input OFF, 1: Input ON
0008h	Input signal 9 (SI9)	ReadOnly	0: Input OFF, 1: Input ON
0009h	Input signal 10 (SI10)	ReadOnly	0: Input OFF, 1: Input ON
Logic input state monitor: Can monitor each input state.			
0020h	Servo ON input (SRV-ON)	ReadOnly	0: Input OFF, 1: Input ON
0021h	Alarm clear input (A-CLR)	ReadOnly	0: Input OFF, 1: Input ON
0022h	Negative direction drive prohibited input (NOT)	ReadOnly	0: Input OFF, 1: Input ON
0023h	Positive direction drive prohibited input (POT)	ReadOnly	0: Input OFF, 1: Input ON
0024h	Control mode switching input (C-MODE)	ReadOnly	0: Input OFF, 1: Input ON
0025h	Zero velocity clamp input (ZEROSPD)	ReadOnly	0: Input OFF, 1: Input ON
0026h	Command divider multiplier switching 1 input (DIV1)	ReadOnly	0: Input OFF, 1: Input ON
0027h	Forced alarm input (E-STOP)	ReadOnly	0: Input OFF, 1: Input ON
0028h	Command pulse prohibited input (INH)	ReadOnly	0: Input OFF, 1: Input ON
0029h	Gain switching input (GAIN)	ReadOnly	0: Input OFF, 1: Input ON
002Ah	Clear counter input (CL)	ReadOnly	0: Input OFF, 1: Input ON
002Bh	For manufacturer use	ReadOnly	-
002Ch	Inner velocity command select 1 input (INTSPD1)	ReadOnly	0: Input OFF, 1: Input ON
002Dh	Inner velocity command select 2 input (INTSPD2)	ReadOnly	0: Input OFF, 1: Input ON
002Eh	For manufacturer use	ReadOnly	-
002Fh	For manufacturer use	ReadOnly	-
0030h	For manufacturer use	ReadOnly	-
0031h	For manufacturer use	ReadOnly	-
0032h	Inertia ratio switching input (J-SEL)	ReadOnly	0: Input OFF, 1: Input ON
0033h	Vibration damping control switching 1 input (VS-SEL1)	ReadOnly	0: Input OFF, 1: Input ON
0034h	Inner velocity command select 3 input (INTSPD3)	ReadOnly	0: Input OFF, 1: Input ON
0035h	Torque limit switching input (TL-SEL)	ReadOnly	0: Input OFF, 1: Input ON
0036h	Vibration damping control switching 2 input (VS-SEL2)	ReadOnly	0: Input OFF, 1: Input ON
0037h	Command divider multiplier switching 2 input (DIV2)	ReadOnly	0: Input OFF, 1: Input ON
0038h	Velocity sign specifying input (VC-SIGN)	ReadOnly	0: Input OFF, 1: Input ON
0039h	Torque sign specifying input (TC-SIGN)	ReadOnly	0: Input OFF, 1: Input ON
003Ah	For manufacturer use	ReadOnly	-
003Bh	Safety input 1 (SF1)	ReadOnly	0: Input OFF, 1: Input ON
003Ch	Safety input 2 (SF2)	ReadOnly	0: Input OFF, 1: Input ON
003Dh	For manufacturer use	ReadOnly	-
003Eh	For manufacturer use	ReadOnly	-
003Fh	For manufacturer use	ReadOnly	-

Address	Coil name	Attribute	Contents
Logic input signal operation: ON, OFF of each input condition can be operated.			
In case same function is assigned to I/F connector input, it will function as an OR with the state. (Except for servo-on (SRV-ON) input).			
0060h	Servo ON input (SRV-ON) operation In case servo-on (SRV-ON) is assigned to the I/F connector input, it will function as AND with the state. Release the I/F connector input assignment to operate servo-on/off by this coil independently.	R/W	0000h: Input OFF, FF00h: Input ON
0061h	Alarm clear input (A-CLR) operation	R/W	0000h: Input OFF, FF00h: Input ON
0062h to 66h	For manufacturer use	R/W	-
0067h	Forced alarm input (E-STOP) operation	R/W	0000h: Input OFF, FF00h: Input ON
0068h	For manufacturer use	R/W	-
0069h	Gain switching input (GAIN) operation	R/W	0000h: Input OFF, FF00h: Input ON
006Ah to 71h	For manufacturer use	R/W	-
0072h	Inertia ratio switching input (J-SEL) operation	R/W	0000h: Input OFF, FF00h: Input ON
0073h	Vibration damping control switching 1 input (VS-SEL1) operation	R/W	0000h: Input OFF, FF00h: Input ON
0074h	For manufacturer use	R/W	-
0075h	Torque limit switching input (TL-SEL) operation	R/W	0000h: Input OFF, FF00h: Input ON
0076h	Vibration damping control switching 2 input (VS-SEL2) operation	R/W	0000h: Input OFF, FF00h: Input ON
0077h to 7Fh	For manufacturer use	R/W	-
Physical output state monitor: Can monitor the physical output state of the output signal (SO1 to SO6)			
0080h	Output signal 1 (SO1)	ReadOnly	0: Output OFF, 1: Output ON
0081h	Output signal 2 (SO2)	ReadOnly	0: Output OFF, 1: Output ON
0082h	Output signal 3 (SO3)	ReadOnly	0: Output OFF, 1: Output ON
0083h	Output signal 4 (SO4)	ReadOnly	0: Output OFF, 1: Output ON
0084h	Output signal 5 (SO5)	ReadOnly	0: Output OFF, 1: Output ON
0085h	Output signal 6 (SO6)	ReadOnly	0: Output OFF, 1: Output ON
Logic output state monitor: Can monitor each output state.			
00A0h	Servo ready state (S-RDY)	ReadOnly	0: Ready OFF, 1: Ready ON
00A1h	Alarm state (ALM)	ReadOnly	0: Alarm not generated, 1: Alarm generated
00A2h	Positioning complete state (INP)	ReadOnly	0: Incomplete, 1: Complete
00A3h	Mechanical brake release state (BRK-OFF)	ReadOnly	0: Brake activated, 1: Brake released
00A4h	Zero velocity detection state (ZSP)	ReadOnly	0: Undetected, 1: Detected
00A5h	Torque being limited state (TLC)	ReadOnly	0: Unlimited, 1: limited
00A6h	Velocity match detection state (V-COIN)	ReadOnly	0: Undetected, 1: Detected
00A7h	For manufacturer use	ReadOnly	-
00A8h	For manufacturer use	ReadOnly	-
00A9h	Reached velocity detection state (AT-SPEED)	ReadOnly	0: Undetected, 1: Detected
00AAh	For manufacturer use	ReadOnly	-
00ABh	For manufacturer use	ReadOnly	-
00ACh	For manufacturer use	ReadOnly	-
00ADh	Dynamic brake activation state (DBRK)	ReadOnly	0:DB OFF 1:DB ON
00AEh	For manufacturer use	ReadOnly	-
00AFh	Motor electrified state (FREE)	ReadOnly	0: Electrified, 1: Not electrified
00B0h	Warning output 1 state (WARN1)	ReadOnly	0: Warning 1 not generated state, 1: Warning 1 generated state
00B1h	Warning output 2 state (WARN2)	ReadOnly	0: Warning 2 not generated state, 1: Warning 2 generated state
00B2h	Positioning command with or without state (P-CMD)	ReadOnly	0: No positioning command, 1: With positioning command
00B3h	2nd positioning complete state (INP2)	ReadOnly	0: 2nd positioning incomplete, 1: 2nd positioning complete
00B4h	Velocity being limited state (V-LIMIT)	ReadOnly	0: No velocity limit, 1: Velocity being limited
00B5h	Alarm attribute state (ALM-ATB)	ReadOnly	0: Not clearable, 1: Clearable
00B6h	Velocity command with or without state (V-CMD)	ReadOnly	0: No velocity command, 1: With velocity command
00B7h	Safety EDM state (O-EDM)	ReadOnly	0:EDM OFF 1:EDM ON
00B8h to BFh	For manufacturer use	ReadOnly	-

Address	Coil name	Attribute	Contents
Motor activation state monitor: Able to monitor the activation state of the motor			
0100h	Torque being limited state	ReadOnly	0: Torque not limited, 1: Torque being limited
0101h	less than 30r/min detection state	ReadOnly	0: 30r/min or higher, 1: less than 30 r/min
0102h	In negative direction rotating state	ReadOnly	0: Not in negative direction rotation, 1: In negative direction rotation.
0103h	In positive direction rotating state	ReadOnly	0: Not in positive direction rotation, 1: In positive direction rotation.
0104h	For manufacturer use	ReadOnly	-
0105h	For manufacturer use	ReadOnly	-
0106h	For manufacturer use	ReadOnly	-
0107h	For manufacturer use	ReadOnly	-
Block operation control operation: Enables control flags related to block operations to be operated.			
In case the same functions are assigned to I/F connector input, it will function as an OR with the state.			
0120h	Strobe input (STB) operation	R/W	0000h: Input OFF, FF00h: Input ON
0121h	For manufacturer use	R/W	-
0122h	Vicinity of origin input (HOME) operation	R/W	0000h: Input OFF, FF00h: Input ON
0123h	Immediate stop input (H-STOP) operation	R/W	0000h: Input OFF, FF00h: Input ON
0124h	Decelerated stop input (S-STOP) operation	R/W	0000h: Input OFF, FF00h: Input ON
Block operation control monitor: Enables monitoring of control flags related to block operations.			
0130h	Strobe input (STB) state	ReadOnly	0: Input OFF, 1: Input ON
0131h	For manufacturer use	ReadOnly	-
0132h	Vicinity of origin sensor input (HOME) state	ReadOnly	0: Input OFF, 1: Input ON
0133h	Immediate stop input (H-STOP) state	ReadOnly	0: Input OFF, 1: Input ON
0134h	Decelerated stop input (S-STOP) state	ReadOnly	0: Input OFF, 1: Input ON
0138h	For manufacturer use	ReadOnly	-
0139h	For manufacturer use	ReadOnly	-
013Ah	For manufacturer use	ReadOnly	-
013Bh	For manufacturer use	ReadOnly	-
013Ch	For manufacturer use	ReadOnly	-
013Dh	For manufacturer use	ReadOnly	-
013Eh	For manufacturer use	ReadOnly	-
013Fh	For manufacturer use	ReadOnly	-
Block operation state monitor: Enables monitoring of block operation status.			
0140h	Action implementation state (BUSY)	ReadOnly	0: Not implemented, 1: Being implemented
0141h	Returned to origin completed state (HOME-CMP)	ReadOnly	0: Incomplete, 1: Complete
0142h	Block operation output 1 (B-CTRL1)	ReadOnly	0:OFF 1:ON
0143h	Block operation output 2 (B-CTRL2)	ReadOnly	0:OFF 1:ON
0144h	Block operation output 3 (B-CTRL3)	ReadOnly	0:OFF 1:ON
0145h	Block operation output 4 (B-CTRL4)	ReadOnly	0:OFF 1:ON
0146h	Block operation output 5 (B-CTRL5)	ReadOnly	0:OFF 1:ON
0147h	Block operation output 6 (B-CTRL6)	ReadOnly	0:OFF 1:ON

2-1-4-4 Register information

[Address in the 1000h order]

Address	Register name	Units	Range	Number of register	Attribute	Contents
1000h	Manufacturer device name	(ASCII)	-	8	ReadOnly	Amplifier part number (16 characters) Example) In case of "MADLT15SF" Address 1000h = 414Dh ("AM") Address 1001h = 4C44h ("LD") Address 1002h = 3154h ("1T") Address 1003h = 5335h ("S5") Address 1004h = 0046h (NULL+"F") Address 1005h = 0000h (NULL+NULL) Address 1006h = 0000h (NULL+NULL) Address 1007h = 0000h (NULL+NULL) Note) The two characters inside one register are in reverse order.
1010h	Manufacturer software version	(ASCII)	-	8	ReadOnly	Amplifier software version (16 characters) Example) In case of "V105.001.105.001" Address 1010h = 3156h ("1V") Address 1011h = 3530h ("50") Address 1012h = 302Eh ("0.") Address 1013h = 3130h ("10") Address 1014h = 312Eh ("1.") Address 1015h = 3530h ("50") Address 1016h = 302Eh ("0.") Address 1017h = 3130h ("10") Note) The two characters inside one register are in reverse order.
1020h	Save all parameters	-	0 to 4294967295	2	R/W	Write parameter into EEPROM Write EEPROM will be executed when "6173h" is written,
1030h	Maximum messages	-	0 to 255	1	ReadOnly	0Eh fixed
1031h	Newest message	-	0 to 255	1	ReadOnly	Latest error history index Note) Clear error history does not clear values.
1032h	Newest acknowledged message	-	0 to 255	1	R/W	Clear error history Clear error history of PANATERM will be executed when "0000h" is written. Note) History from 1038h to 10A0h is not cleared.
1038h	Diagnosis message 1	-	-	8	ReadOnly	Error history 1, Time of occurrence Address 1038h = Time of error occurrence (lower 16 bit) [0.5h] Address 1039h = Time of error occurrence (upper 16 bit) [0.5h] Address 103Ah bit15 = For manufacturer use bit14-8 = Error number (main) bit7-0 = Error number (sub) Address 103Bh-103Fh = For manufacturer use
1040h	Diagnosis message 2	-	-	8	ReadOnly	Error history 2, Time of occurrence
1048h	Diagnosis message 3	-	-	8	ReadOnly	Error history 3, Time of occurrence
1050h	Diagnosis message 4	-	-	8	ReadOnly	Error history 4, Time of occurrence
1058h	Diagnosis message 5	-	-	8	ReadOnly	Error history 5, Time of occurrence
1060h	Diagnosis message 6	-	-	8	ReadOnly	Error history 6, Time of occurrence
1068h	Diagnosis message 7	-	-	8	ReadOnly	Error history 7, Time of occurrence
1070h	Diagnosis message 8	-	-	8	ReadOnly	Error history 8, Time of occurrence
1078h	Diagnosis message 9	-	-	8	ReadOnly	Error history 9, Time of occurrence
1080h	Diagnosis message 10	-	-	8	ReadOnly	Error history 10, Time of occurrence
1088h	Diagnosis message 11	-	-	8	ReadOnly	Error history 11, Time of occurrence
1090h	Diagnosis message 12	-	-	8	ReadOnly	Error history 12, Time of occurrence
1098h	Diagnosis message 13	-	-	8	ReadOnly	Error history 13, Time of occurrence
10A0h	Diagnosis message 14	-	-	8	ReadOnly	Error history 14, Time of occurrence

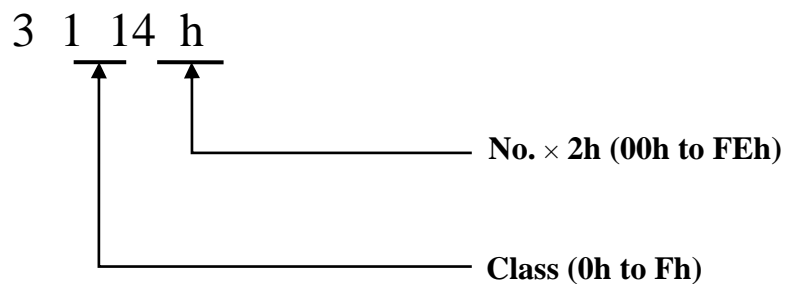
[Address in the 3000h order]

Addresses in the 3000h order are assigned to servo parameters (class 0 to 15).

Please refer to Technical Reference (Functional Specification) for details of servo parameters.

Address	$3000h + (Class \times 100h) + (No. \times 2h)$
Units	As per servo parameter
Range	As per servo parameter
Number of register	2
Attribute	R/W

Example) Parameter for “Velocity feed forward gain”, class 1, No. 10; 3114h



- The number of registers for each servo parameter shall be 2, regardless of its range.
Always specify the address indicated above for the start address, with the number of registers set to 2, for write or read. (Use “multiple register write (10h)” as the function code for write, not “register write (06h).”)
- Always execute read after write to confirm that the written data can be read.
- In the initial state, the contents to be read will be the parameter set value, but this can be changed by writing values to the following registers.
 Address 4210h “Servo parameter area output switching”
 - 0000h: Parameter set value
 - 0001h: Parameter minimum value
 - 0002h: Parameter maximum value
 - 0003h: Parameter attributes
- Write the value to the following register to save the set values of servo parameters to EEPROM.
 Address 1020h “Save all parameters”
 - 6173h: Execute writing EEPROM

[Address in the 4000h order]

Address	Register name	Units	Range	Number of register	Attribute	Contents
4000h	Statusword1	-	0 to 65535	1	ReadOnly	Amplifier state Note) fixed to 0
4001h	Error code	-	0 to 65535	1	ReadOnly	Error number main (1byte), sub (1byte) Example) In case of Err26.0 1A00h (main: 1Ah=26, sub: 00h=0)
4002h	Motor name	-	-	8	ReadOnly	Motor part number (16 characters) Example) In case of MSMF022L2CMT Address 4002h = 534Dh ("SM") Address 4003h = 464Dh ("MF") Address 4004h = 3230h ("20") Address 4005h = 4C32h ("L2") Address 4006h = 4332h ("C2") Address 4007h = 544Dh ("TM") Address 4008h = 2020h (" ") Address 4009h = 2020h (" ") Note) The two characters in one register will be in reverse order.
400Ah	Motor serial number	-	0 to 4294967295	2	ReadOnly	Motor serial number Production year (1 byte), Production month (1 byte), Production order(2 bytes) *1) Example) When serial number is 14120001: Address 400Ah = 0C0Eh (December, (20)14) Address 400Bh = 0001h (Production order = 0001)
400Ch	Warning flag	-	0 to 4294967295	2	ReadOnly	Warning flag
400Eh	Overload ratio	%	0 to 500	1	ReadOnly	Motor load rate
400Fh	Regenerative load factor	%	-32768 to 32767	1	ReadOnly	Regeneration load rate
4010h	Power supply on integrated time	0.5h	-2147483648 to 2147483647	2	ReadOnly	Aggregate power-on hours
4012h	Driver temperature	°C	-32768 to 32767	1	ReadOnly	Servo driver temperature
4013h	Number of times of irruptive resistance relay changing	Times	-2147483648 to 2147483647	2	ReadOnly	Number of rush resistor relay changing
4015h	Number of times of dynamic brake relay changing	Times	-2147483648 to 2147483647	2	ReadOnly	Number of dynamic brake relay changing
4017h	Fan operation time	0.5h	0 to 1000000	2	ReadOnly	Fan operating hours
4019h	Fan life time integrated value	0.1%	0 to 1000	1	ReadOnly	Fan life integrated value
401Ah	Condenser life time integrated value	0.1%	0 to 1000	1	ReadOnly	Capacitor life integrated value
401Bh	Encoder temperature	°C	-32768 to 32767	1	ReadOnly	Encoder temperature
401Ch	Velocity command value	Command unit/s	-2147483648 to 2147483647	2	ReadOnly	Pre-filter command velocity
401Eh	Velocity command value	rpm	-32768 to 32767	1	ReadOnly	Position command velocity
401Fh	Velocity command value	rpm	-32768 to 32767	1	ReadOnly	Internal position command velocity
4020h	Position command value	Command unit	-2147483648 to 2147483647	2	ReadOnly	Post-filter command position
4022h	Following error actual value	pulse	-2147483648 to 2147483647	2	ReadOnly	Encoder position deviation
4024h	Velocity command value	rpm	-32768 to 32767	1	ReadOnly	Velocity control command
4025h	Velocity actual value	rpm	-32768 to 32767	1	ReadOnly	Motor velocity
4026h	Velocity limit value	rpm	-32768 to 32767	1	ReadOnly	Velocity limit

(To be continued)

*1) "Production order" of serial number on the nameplate display may contain alphabetic characters, in which case the converted data is read out according to the following table.

"Production order" of serial number on the nameplate display	Read-out value of "Production order"(2 bytes)
0001	0001h (1)
9999	270Fh (9999)
A000	2710h (10000)
A999	2AF7h (10999)
B000	2AF8h (11000)

"Production order" of serial number on the nameplate display	Read-out value of "Production order"(2 bytes)
H999	464Fh (17999)
J000 ("T" is not used.)	4650h (18000)
N999	59D7h (22999)
P000 ("O" is not used.)	59D8h (23000)
Z999	84CFh (33999)

Address	Register name	Unit	Range	Number of register	Attribute	Contents
4027h	Full close position following error	pulse	-2147483648 to 2147483647	2	ReadOnly	Full close deviation
4029h	Hybrid following error	Command unit	-2147483648 to 2147483647	2	ReadOnly	Hybrid deviation
402Bh	Velocity command value	Command unit/s	-2147483648 to 2147483647	2	ReadOnly	Post filter command velocity
4100h	Absolute multiturn data clear function	-	0 to 65535	1	R/W	Absolute clear function Absolute clear will be executed when "6165h" is written,
4102h	Trip reset function	-	0 to 65535	1	R/W	Clear alarm and warning Alarm and warning clear will be executed when "7274h" is written,
4200h	Encoder ID-L	-	0 to 255	1	ReadOnly	Encoder ID-L
	Encoder ID-H	-	0 to 255		ReadOnly	Encoder ID-H
4201h	Encoder status-L	-	0 to 255	1	ReadOnly	Encoder status-L
	Encoder status-H	-	0 to 255		ReadOnly	Encoder status-H
4202h	Encoder single turn data-L	-	0 to 255	2	ReadOnly	Encoder 1 rotation data-L
	Encoder single turn data-M	-	0 to 255		ReadOnly	Encoder 1 rotation data-M
	Encoder single turn data-H	-	0 to 255		ReadOnly	Encoder 1 rotation data-H
4204h	Encoder multi turn data-L	-	0 to 255	1	ReadOnly	Encoder multi-rotation data-L *2
	Encoder multi turn data-H	-	0 to 255		ReadOnly	Encoder multi-rotation data-H *2
4208h	External scale ID-L	-	0 to 255	1	ReadOnly	External scale ID-L
	External scale ID-H	-	0 to 255		ReadOnly	External scale ID-H
4209h	External scale status-L	-	0 to 255	1	ReadOnly	External scale status-L
	External scale status-H	-	0 to 255		ReadOnly	External scale status-H
420Ah	External scale data (Lower 24bit)-L	-	0 to 255	2	ReadOnly	External scale data (lower 24 bit)-L *3)
	External scale data (Lower 24bit)-M	-	0 to 255		ReadOnly	External scale data (lower 24-bit)-M *3)
	External scale data (Lower 24bit)-H	-	0 to 255		ReadOnly	External scale data (lower 24-bit)-H *3)
420Ch	External scale data (Upper 24bit)-L	-	0 to 255	2	ReadOnly	External scale data (Upper 24 bit)-L *3)
	External scale data (Upper 24bit)-M	-	0 to 255		ReadOnly	External scale data (Upper 24 bit)-M *3)
	External scale data (Upper 24bit)-H	-	0 to 255		ReadOnly	External scale data (Upper 24 bit)-H *3)
4210h	Servo parameter area output switching	-	0 to 65535	1	R/W	Servo parameter area output switching 0000h: Parameter set value 0001h: Parameter minimum value 0002h: Parameter maximum value 0003h: Parameter attributes
4300h	mode	-	0 to 255	1	R/W	Set Modbus communication right *1 55h: Acquire communication rights AAh: Release communication rights

(To be continued)

- *1) The servo amp will enter the following condition when Modbus communication right is acquired:
- All front panel operations cannot be used except for monitor mode (exclusive function)
 - Err80.0 "Modbus communications time out protection" will be valid

Modbus communication right cannot be acquired if the front panel status is in "Execution indication," other than monitor mode.

(Refer to Technical Materials (Basic function specification edition) regarding the front panel.)

This register (4300h) cannot be set to Pr5.58 - 65, 79 - 86 "Modbus mirror register setting."

- *2) At the increment mode (Pr0.15=1), the multi-rotation data become undefined values.
- *3) Pr3.23 Only serial communication type can be monitored for "External scale type."

Address	Register name	Unit	Range	Number of register	Attribute	Contents
4400h	Physical input	–	0 to 4294967295	2	Read Only	Physical input state monitor (coil map) *1)
4402h	Logical input	–	0 to 4294967295	2	Read Only	Logic input state monitor (coil map) *1)
4406h	Virtual input	–	0 to 4294967295	2	R/W	Logic input signal operation (coil map) *1)
4408h	Physical output	–	0 to 4294967295	2	Read Only	Physical output state monitor (coil map) *1)
440Ah	Logical output	–	0 to 4294967295	2	Read Only	Logic output state monitor (coil map) *1)
4410h	Statusflag	–	0 to 255	1	Read Only	Motor activation state monitor (coil map) *1)
4411h	Block controlword	–	0 to 65535	1	R/W	Block operation control operation (coil map) *1)
4412h	Actual block controlword	–	0 to 65535	1	Read Only	Block operation control monitor (coil map) *1)
4413h	Block statusflag	–	0 to 65535	1	Read Only	Block operation state monitor (coil map) *1)
4414h	Block number	–	0 to 65535	1	R/W	Specify block number
4415h	Actual block number	–	0 to 65535	1	Read Only	Actual block number
4416h	Block number monitor	–	0 to 65535	1	Read Only	Currently valid block number

(To be continued)

- *1) For the coil map, refer to the corresponding classifications in 2-1-4-3 “Coil information.”
The address configuration based on the leading address of the classification shall be the coil map.
Example: Coil 0067h “Forced alarm input (E-STOP) operation” in “Logic input signal operation” will correspond to bit 7 of register 4406h “Logic input signal operation (coil map).”

Address	Register name	Unit	Range	Number of register	Attribute	Contents
4418h	Mirror register 1	-	*2)	1	*2)	Write to Modbus register address set in Pr5.58 "Modbus mirror register set 1" is enabled. *1)
4419h	Mirror register 2	-	*2)	1	*2)	Write to Modbus register address set in Pr5.59 "Modbus mirror register set 1" is enabled. *1)
441Ah	Mirror register 3	-	*2)	1	*2)	Write to Modbus register address set in Pr5.60 "Modbus mirror register set 1" is enabled. *1)
441Bh	Mirror register 4	-	*2)	1	*2)	Write to Modbus register address set in Pr5.61 "Modbus mirror register set 1" is enabled. *1)
441Ch	Mirror register 5	-	*2)	1	*2)	Write to Modbus register address set in Pr5.62 "Modbus mirror register set 1" is enabled. *1)
441Dh	Mirror register 6	-	*2)	1	*2)	Write to Modbus register address set in Pr5.63 "Modbus mirror register set 1" is enabled. *1)
441Eh	Mirror register 7	-	*2)	1	*2)	Write to Modbus register address set in Pr5.64 "Modbus mirror register set 1" is enabled. *1)
441Fh	Mirror register 8	-	*2)	1	*2)	Write to Modbus register address set in Pr5.65 "Modbus mirror register set 1" is enabled. *1)
4420h	Mirror register 9	-	*2)	1	*2)	Write to Modbus register address set in Pr5.79 "Modbus mirror register set 1" is enabled. *1)
4421h	Mirror register 10	-	*2)	1	*2)	Write to Modbus register address set in Pr5.80 "Modbus mirror register set 1" is enabled. *1)
4422h	Mirror register 11	-	*2)	1	*2)	Write to Modbus register address set in Pr5.81 "Modbus mirror register set 1" is enabled. *1)
4423h	Mirror register 12	-	*2)	1	*2)	Write to Modbus register address set in Pr5.82 "Modbus mirror register set 1" is enabled. *1)
4424h	Mirror register 13	-	*2)	1	*2)	Write to Modbus register address set in Pr5.83 "Modbus mirror register set 1" is enabled. *1)
4425h	Mirror register 14	-	*2)	1	*2)	Write to Modbus register address set in Pr5.84 "Modbus mirror register set 1" is enabled. *1)
4426h	Mirror register 15	-	*2)	1	*2)	Write to Modbus register address set in Pr5.85 "Modbus mirror register set 1" is enabled. *1)
4427h	Mirror register 16	-	*2)	1	*2)	Write to Modbus register address set in Pr5.86 "Modbus mirror register set 1" is enabled. *1)

(To be continued)

*1) By consecutively setting the scattered registers that need to be read and written in the mirror register, it is possible to read and write in a batch from the host controller.

Address conversion of mirror register is effective only once. (Register address combining multiple mirror registers cannot be set).

When address has been set for a mirror register, processing will be conducted as if a read or writable register exists at the address. (Activity not affected)

Only register addresses between 1000h and in the 6000h range can be set with the mirror register (no coil information can be set).

Do not set the address of the 2byte register in the mirror register.

The following table shows eight configuration examples.

Parameter			Register			
Parameter No.	Parameter name	set value	Target register address	Target register name	Mirror register address	Mirror register name
Pr5.58	Modbus mirror register setting1	17430 (4416h)	4416h	Block number monitor	4418h	Mirror register1
Pr5.59	Modbus mirror register setting2	17418 (440Ah)	440Ah	Logical output	4419h	Mirror register2
Pr5.60	Modbus mirror register setting3	16411 (401Bh)	401Bh	Encoder temperature	441Ah	Mirror register3
Pr5.61	Modbus mirror register setting4	16421 (4025h)	4025h	Velocity actual value	441Bh	Mirror register4
Pr5.62	Modbus mirror register setting5	16398 (400Eh)	400Eh	Overload ratio	441Ch	Mirror register5
Pr5.63	Modbus mirror register setting6	17427 (4413h)	4413h	Block statusflag	441Dh	Mirror register6
Pr5.64	Modbus mirror register setting7	17920 (4600h)	4600h	Block velocity 0	441Eh	Mirror register7
Pr5.65	Modbus mirror register setting8	17921 (4601h)	4601h	Block velocity 1	441Fh	Mirror register8

When using the register of Register number 2 in mirror registers, set two mirror registers consecutively.

For example, if 4802h (Block data 0) is used in mirror registers, set Pr5.58 = 18434 (4802h) and Pr5.59 = 18435 (4803h).

*2) The range and attribute of the mirror register shall be similar to the destination register.

Address	Register name	Unit	Range	Number of register	Attribute	Contents
4600h	Block velocity 0	r/min	0 to 32767	1	R/W	Pr60.00 (velocity [0])
4601h	Block velocity 1	r/min	0 to 32767	1	R/W	Pr60.01 (velocity [1])
4602h	Block velocity 2	r/min	0 to 32767	1	R/W	Pr60.02 (velocity [2])
4603h	Block velocity 3	r/min	0 to 32767	1	R/W	Pr60.03 (velocity [3])
4604h	Block velocity 4	r/min	0 to 32767	1	R/W	Pr60.04 (velocity [4])
4605h	Block velocity 5	r/min	0 to 32767	1	R/W	Pr60.05 (velocity [5])
4606h	Block velocity 6	r/min	0 to 32767	1	R/W	Pr60.06 (velocity [6])
4607h	Block velocity 7	r/min	0 to 32767	1	R/W	Pr60.07 (velocity [7])
4608h	Block velocity 8	r/min	0 to 32767	1	R/W	Pr60.08 (velocity [8])
4609h	Block velocity 9	r/min	0 to 32767	1	R/W	Pr60.09 (velocity [9])
460Ah	Block velocity 10	r/min	0 to 32767	1	R/W	Pr60.10 (velocity [10])
460Bh	Block velocity 11	r/min	0 to 32767	1	R/W	Pr60.11 (velocity [11])
460Ch	Block velocity 12	r/min	0 to 32767	1	R/W	Pr60.12 (velocity [12])
460Dh	Block velocity 13	r/min	0 to 32767	1	R/W	Pr60.13 (velocity [13])
460Eh	Block velocity 14	r/min	0 to 32767	1	R/W	Pr60.14 (velocity [14])
460Fh	Block velocity 15	r/min	0 to 32767	1	R/W	Pr60.15 (velocity [15])
4610h	Block acceleration 0	ms/(3000 r/min) *1)	0 to 10000	1	R/W	Pr60.16 (acceleration [0])
4611h	Block acceleration 1	ms/(3000 r/min) *1)	0 to 10000	1	R/W	Pr60.17 (acceleration [1])
4612h	Block acceleration 2	ms/(3000 r/min) *1)	0 to 10000	1	R/W	Pr60.18 (acceleration [2])
4613h	Block acceleration 3	ms/(3000 r/min) *1)	0 to 10000	1	R/W	Pr60.19 (acceleration [3])
4614h	Block acceleration 4	ms/(3000 r/min) *1)	0 to 10000	1	R/W	Pr60.20 (acceleration [4])
4615h	Block acceleration 5	ms/(3000 r/min) *1)	0 to 10000	1	R/W	Pr60.21 (acceleration [5])
4616h	Block acceleration 6	ms/(3000 r/min) *1)	0 to 10000	1	R/W	Pr60.22 (acceleration [6])
4617h	Block acceleration 7	ms/(3000 r/min) *1)	0 to 10000	1	R/W	Pr60.23 (acceleration [7])
4618h	Block acceleration 8	ms/(3000 r/min) *1)	0 to 10000	1	R/W	Pr60.24 (acceleration [8])
4619h	Block acceleration 9	ms/(3000 r/min) *1)	0 to 10000	1	R/W	Pr60.25 (acceleration [9])
461Ah	Block acceleration 10	ms/(3000 r/min) *1)	0 to 10000	1	R/W	Pr60.26 (acceleration [10])
461Bh	Block acceleration 11	ms/(3000 r/min) *1)	0 to 10000	1	R/W	Pr60.27 (acceleration [11])
461Ch	Block acceleration 12	ms/(3000 r/min) *1)	0 to 10000	1	R/W	Pr60.28 (acceleration [12])
461Dh	Block acceleration 13	ms/(3000 r/min) *1)	0 to 10000	1	R/W	Pr60.29 (acceleration [13])
461Eh	Block acceleration 14	ms/(3000 r/min) *1)	0 to 10000	1	R/W	Pr60.30 (acceleration [14])
461Fh	Block acceleration 15	ms/(3000 r/min) *1)	0 to 10000	1	R/W	Pr60.31 (acceleration [15])
4620h	Block deceleration 0	ms/(3000 r/min) *1)	0 to 10000	1	R/W	Pr60.32 (deceleration [0])
4621h	Block deceleration 1	ms/(3000 r/min) *1)	0 to 10000	1	R/W	Pr60.33 (deceleration [1])
4622h	Block deceleration 2	ms/(3000 r/min) *1)	0 to 10000	1	R/W	Pr60.34 (deceleration [2])
4623h	Block deceleration 3	ms/(3000 r/min) *1)	0 to 10000	1	R/W	Pr60.35 (deceleration [3])
4624h	Block deceleration 4	ms/(3000 r/min) *1)	0 to 10000	1	R/W	Pr60.36 (deceleration [4])
4625h	Block deceleration 5	ms/(3000 r/min) *1)	0 to 10000	1	R/W	Pr60.37 (deceleration [5])
4626h	Block deceleration 6	ms/(3000 r/min) *1)	0 to 10000	1	R/W	Pr60.38 (deceleration [6])
4627h	Block deceleration 7	ms/(3000 r/min) *1)	0 to 10000	1	R/W	Pr60.39 (deceleration [7])
4628h	Block deceleration 8	ms/(3000 r/min) *1)	0 to 10000	1	R/W	Pr60.40 (deceleration [8])
4629h	Block deceleration 9	ms/(3000 r/min) *1)	0 to 10000	1	R/W	Pr60.41 (deceleration [9])
462Ah	Block deceleration 10	ms/(3000 r/min) *1)	0 to 10000	1	R/W	Pr60.42 (deceleration [10])
462Bh	Block deceleration 11	ms/(3000 r/min) *1)	0 to 10000	1	R/W	Pr60.43 (deceleration [11])
462Ch	Block deceleration 12	ms/(3000 r/min) *1)	0 to 10000	1	R/W	Pr60.44 (deceleration [12])
462Dh	Block deceleration 13	ms/(3000 r/min) *1)	0 to 10000	1	R/W	Pr60.45 (deceleration [13])
462Eh	Block deceleration 14	ms/(3000 r/min) *1)	0 to 10000	1	R/W	Pr60.46 (deceleration [14])
462Fh	Block deceleration 15	ms/(3000 r/min) *1)	0 to 10000	1	R/W	Pr60.47 (deceleration [15])
4630h	For manufacturer use	-	-32768 to 32767	1	R/W	Pr60.48 (Setting up block operation methods)
4631h	Block home offset	command unit	-2147483648 to 2147483647	2	R/W	Pr60.49 (origin offset)
4633h	Block max position limit	command unit	-2147483648 to 2147483647	2	R/W	Pr60.50 (positive direction software limit)
4635h	Block min position limit	command unit	-2147483648 to 2147483647	2	R/W	Pr60.51 (negative direction software limit)
4637h	Block homing speed (high)	r/min	0 to 20000	1	R/W	Pr60.52 (origin return velocity (high speed))

(To be continued)

*1) In Function enhancement version 8 and later, it is possible to change the unit of acceleration time with Pr60.56 and the unit of deceleration time with Pr60.57.

Address	Register name	Unit	Range	Number of register	Attribute	Contents
4638h	Block homing speed (low)	rpm	0 to 20000	1	R/W	Pr60.53 (origin return velocity (low speed))
4639h	Block homing acceleration	ms (/3000 r/min)	0 to 10000	1	R/W	Pr60.54 (origin return acceleration and deceleration)
463Ah	Block homingless	-	0 to 1	1	R/W	Pr60.55 (set invalid origin return)
463Bh	Block acceleration unit	-	0 to 1000	1	R/W	Pr60.56 (acceleration time unit)
463Ch	Block deceleration unit	-	0 to 1000	1	R/W	Pr60.57 (deceleration time unit)
4643h	For manufacturer's use	-	-	-	-	Pr60.64 (for manufacturer's use)
4800h	Block command 0	-	-2147483648 to 2147483647	2	R/W	Pr56.000 (Block command 0)
4802h	Block data 0	-	-2147483648 to 2147483647	2	R/W	Pr56.001 (Block data 0)
4804h	Block command 1	-	-2147483648 to 2147483647	2	R/W	Pr56.002 (Block command 1)
4806h	Block data 1	-	-2147483648 to 2147483647	2	R/W	Pr56.003 (Block data 1)
4808h	Block command 2	-	-2147483648 to 2147483647	2	R/W	Pr56.004 (Block command 2)
480Ah	Block data 2	-	-2147483648 to 2147483647	2	R/W	Pr56.005 (Block data 2)
480Ch	Block command 3	-	-2147483648 to 2147483647	2	R/W	Pr56.006 (Block command 3)
480Eh	Block data 3	-	-2147483648 to 2147483647	2	R/W	Pr56.007 (Block data 3)
4810h	Block command 4	-	-2147483648 to 2147483647	2	R/W	Pr56.008 (Block command 4)
4812h	Block data 4	-	-2147483648 to 2147483647	2	R/W	Pr56.009 (Block data 4)
4814h	Block command 5	-	-2147483648 to 2147483647	2	R/W	Pr56.010 (Block command 5)
4816h	Block data 5	-	-2147483648 to 2147483647	2	R/W	Pr56.011 (Block data 5)
4818h	Block command 6	-	-2147483648 to 2147483647	2	R/W	Pr56.012 (Block command 6)
481Ah	Block data 6	-	-2147483648 to 2147483647	2	R/W	Pr56.013 (Block data 6)
481Ch	Block command 7	-	-2147483648 to 2147483647	2	R/W	Pr56.014 (Block command 7)
481Eh	Block data 7	-	-2147483648 to 2147483647	2	R/W	Pr56.015 (Block data 7)
4820h	Block command 8	-	-2147483648 to 2147483647	2	R/W	Pr56.016 (Block command 8)
4822h	Block data 8	-	-2147483648 to 2147483647	2	R/W	Pr56.017 (Block data 8)
4824h	Block command 9	-	-2147483648 to 2147483647	2	R/W	Pr56.018 (Block command 9)
4826h	Block data 9	-	-2147483648 to 2147483647	2	R/W	Pr56.019 (Block data 9)
4828h	Block command 10	-	-2147483648 to 2147483647	2	R/W	Pr56.020 (Block command 10)
482Ah	Block data 10	-	-2147483648 to 2147483647	2	R/W	Pr56.021 (Block data 10)
482Ch	Block command 11	-	-2147483648 to 2147483647	2	R/W	Pr56.022 (Block command 11)
482Eh	Block data 11	-	-2147483648 to 2147483647	2	R/W	Pr56.023 (Block data 11)

(To be continued)

Address	レジスタ名称	単位	範囲	レジスタ数	属性	内容
4830h	Block command 12	-	-2147483648 to 2147483647	2	R/W	Pr56.024 (Block command 12)
4832h	Block data 12	-	-2147483648 to 2147483647	2	R/W	Pr56.025 (Block data 12)
4834h	Block command 13	-	-2147483648 to 2147483647	2	R/W	Pr56.026 (Block command 13)
4836h	Block data 13	-	-2147483648 to 2147483647	2	R/W	Pr56.027 (Block data 13)
4838h	Block command 14	-	-2147483648 to 2147483647	2	R/W	Pr56.028 (Block command 14)
483Ah	Block data 14	-	-2147483648 to 2147483647	2	R/W	Pr56.029 (Block data 14)
483Ch	Block command 15	-	-2147483648 to 2147483647	2	R/W	Pr56.030 (Block command 15)
483Eh	Block data 15	-	-2147483648 to 2147483647	2	R/W	Pr56.031 (Block data 15)
4840h	Block command 16	-	-2147483648 to 2147483647	2	R/W	Pr56.032 (Block command 16)
4842h	Block data 16	-	-2147483648 to 2147483647	2	R/W	Pr56.033 (Block data 16)
4844h	Block command 17	-	-2147483648 to 2147483647	2	R/W	Pr56.034 (Block command 17)
4846h	Block data 17	-	-2147483648 to 2147483647	2	R/W	Pr56.035 (Block data 17)
4848h	Block command 18	-	-2147483648 to 2147483647	2	R/W	Pr56.036 (Block command 18)
484Ah	Block data 18	-	-2147483648 to 2147483647	2	R/W	Pr56.037 (Block data 18)
484Ch	Block command 19	-	-2147483648 to 2147483647	2	R/W	Pr56.038 (Block command 19)
484Eh	Block data 19	-	-2147483648 to 2147483647	2	R/W	Pr56.039 (Block data 19)
4850h	Block command 20	-	-2147483648 to 2147483647	2	R/W	Pr56.040 (Block command 20)
4852h	Block data 20	-	-2147483648 to 2147483647	2	R/W	Pr56.041 (Block data 20)
4854h	Block command 21	-	-2147483648 to 2147483647	2	R/W	Pr56.042 (Block command 21)
4856h	Block data 21	-	-2147483648 to 2147483647	2	R/W	Pr56.043 (Block data 21)
4858h	Block command 22	-	-2147483648 to 2147483647	2	R/W	Pr56.044 (Block command 22)
485Ah	Block data 22	-	-2147483648 to 2147483647	2	R/W	Pr56.045 (Block data 22)
485Ch	Block command 23	-	-2147483648 to 2147483647	2	R/W	Pr56.046 (Block command 23)
485Eh	Block data 23	-	-2147483648 to 2147483647	2	R/W	Pr56.047 (Block data 23)
4860h	Block command 24	-	-2147483648 to 2147483647	2	R/W	Pr56.048 (Block command 24)
4862h	Block data 24	-	-2147483648 to 2147483647	2	R/W	Pr56.049 (Block data 24)
4864h	Block command 25	-	-2147483648 to 2147483647	2	R/W	Pr56.050 (Block command 25)
4866h	Block data 25	-	-2147483648 to 2147483647	2	R/W	Pr56.051 (Block data 25)
4868h	Block command 26	-	-2147483648 to 2147483647	2	R/W	Pr56.052 (Block command 26)
486Ah	Block data 26	-	-2147483648 to 2147483647	2	R/W	Pr56.053 (Block data 26)

(To be continued)

Address	レジスタ名称	単位	範囲	ビット数	属性	内容
486Ch	Block command 27	-	-2147483648 to 2147483647	2	R/W	Pr56.054 (Block command 27)
486Eh	Block data 27	-	-2147483648 to 2147483647	2	R/W	Pr56.055 (Block data 27)
4870h	Block command 28	-	-2147483648 to 2147483647	2	R/W	Pr56.056 (Block command 28)
4872h	Block data 28	-	-2147483648 to 2147483647	2	R/W	Pr56.057 (Block data 28)
4874h	Block command 29	-	-2147483648 to 2147483647	2	R/W	Pr56.058 (Block command 29)
4876h	Block data 29	-	-2147483648 to 2147483647	2	R/W	Pr56.059 (Block data 29)
4878h	Block command 30	-	-2147483648 to 2147483647	2	R/W	Pr56.060 (Block command 30)
487Ah	Block data 30	-	-2147483648 to 2147483647	2	R/W	Pr56.061 (Block data 30)
487Ch	Block command 31	-	-2147483648 to 2147483647	2	R/W	Pr56.062 (Block command 31)
487Eh	Block data 31	-	-2147483648 to 2147483647	2	R/W	Pr56.063 (Block data 31)
4880h	Block command 32	-	-2147483648 to 2147483647	2	R/W	Pr56.064 (Block command 32)
4882h	Block data 32	-	-2147483648 to 2147483647	2	R/W	Pr56.065 (Block data 32)
4884h	Block command 33	-	-2147483648 to 2147483647	2	R/W	Pr56.066 (Block command 33)
4886h	Block data 33	-	-2147483648 to 2147483647	2	R/W	Pr56.067 (Block data 33)
4888h	Block command 34	-	-2147483648 to 2147483647	2	R/W	Pr56.068 (Block command 34)
488Ah	Block data 34	-	-2147483648 to 2147483647	2	R/W	Pr56.069 (Block data 34)
488Ch	Block command 35	-	-2147483648 to 2147483647	2	R/W	Pr56.070 (Block command 35)
488Eh	Block data 35	-	-2147483648 to 2147483647	2	R/W	Pr56.071 (Block data 35)
4890h	Block command 36	-	-2147483648 to 2147483647	2	R/W	Pr56.072 (Block command 36)
4892h	Block data 36	-	-2147483648 to 2147483647	2	R/W	Pr56.073 (Block data 36)
4894h	Block command 37	-	-2147483648 to 2147483647	2	R/W	Pr56.074 (Block command 37)
4896h	Block data 37	-	-2147483648 to 2147483647	2	R/W	Pr56.075 (Block data 37)
4898h	Block command 38	-	-2147483648 to 2147483647	2	R/W	Pr56.076 (Block command 38)
489Ah	Block data 38	-	-2147483648 to 2147483647	2	R/W	Pr56.077 (Block data 38)
489Ch	Block command 39	-	-2147483648 to 2147483647	2	R/W	Pr56.078 (Block command 39)
489Eh	Block data 39	-	-2147483648 to 2147483647	2	R/W	Pr56.079 (Block data 39)
48A0h	Block command 40	-	-2147483648 to 2147483647	2	R/W	Pr56.080 (Block command 40)
48A2h	Block data 40	-	-2147483648 to 2147483647	2	R/W	Pr56.081 (Block data 40)
48A4h	Block command 41	-	-2147483648 to 2147483647	2	R/W	Pr56.082 (Block command 41)
48A6h	Block data 41	-	-2147483648 to 2147483647	2	R/W	Pr56.083 (Block data 41)

(To be continued)

Address	レジスタ名称	単位	範囲	ビット数	属性	内容
48A8h	Block command 42	-	-2147483648 to 2147483647	2	R/W	Pr56.084 (Block command 42)
48AAh	Block data 42	-	-2147483648 to 2147483647	2	R/W	Pr56.085 (Block data 42)
48ACh	Block command 43	-	-2147483648 to 2147483647	2	R/W	Pr56.086 (Block command 43)
48AEh	Block data 43	-	-2147483648 to 2147483647	2	R/W	Pr56.087 (Block data 43)
48B0h	Block command 44	-	-2147483648 to 2147483647	2	R/W	Pr56.088 (Block command 44)
48B2h	Block data 44	-	-2147483648 to 2147483647	2	R/W	Pr56.089 (Block data 44)
48B4h	Block command 45	-	-2147483648 to 2147483647	2	R/W	Pr56.090 (Block command 45)
48B6h	Block data 45	-	-2147483648 to 2147483647	2	R/W	Pr56.091 (Block data 45)
48B8h	Block command 46	-	-2147483648 to 2147483647	2	R/W	Pr56.092 (Block command 46)
48BAh	Block data 46	-	-2147483648 to 2147483647	2	R/W	Pr56.093 (Block data 46)
48BCh	Block command 47	-	-2147483648 to 2147483647	2	R/W	Pr56.094 (Block command 47)
48BEh	Block data 47	-	-2147483648 to 2147483647	2	R/W	Pr56.095 (Block data 47)
48C0h	Block command 48	-	-2147483648 to 2147483647	2	R/W	Pr56.096 (Block command 48)
48C2h	Block data 48	-	-2147483648 to 2147483647	2	R/W	Pr56.097 (Block data 48)
48C4h	Block command 49	-	-2147483648 to 2147483647	2	R/W	Pr56.098 (Block command 49)
48C6h	Block data 49	-	-2147483648 to 2147483647	2	R/W	Pr56.099 (Block data 49)
48C8h	Block command 50	-	-2147483648 to 2147483647	2	R/W	Pr56.100 (Block command 50)
48CAh	Block data 50	-	-2147483648 to 2147483647	2	R/W	Pr56.101 (Block data 50)
48CCh	Block command 51	-	-2147483648 to 2147483647	2	R/W	Pr56.102 (Block command 51)
48CEh	Block data 51	-	-2147483648 to 2147483647	2	R/W	Pr56.103 (Block data 51)
48D0h	Block command 52	-	-2147483648 to 2147483647	2	R/W	Pr56.104 (Block command 52)
48D2h	Block data 52	-	-2147483648 to 2147483647	2	R/W	Pr56.105 (Block data 52)
48D4h	Block command 53	-	-2147483648 to 2147483647	2	R/W	Pr56.106 (Block command 53)
48D6h	Block data 53	-	-2147483648 to 2147483647	2	R/W	Pr56.107 (Block data 53)
48D8h	Block command 54	-	-2147483648 to 2147483647	2	R/W	Pr56.108 (Block command 54)
48DAh	Block data 54	-	-2147483648 to 2147483647	2	R/W	Pr56.109 (Block data 54)
48DCh	Block command 55	-	-2147483648 to 2147483647	2	R/W	Pr56.110 (Block command 55)
48DEh	Block data 55	-	-2147483648 to 2147483647	2	R/W	Pr56.111 (Block data 55)
48E0h	Block command 56	-	-2147483648 to 2147483647	2	R/W	Pr56.112 (Block command 56)
48E2h	Block data 56	-	-2147483648 to 2147483647	2	R/W	Pr56.113 (Block data 56)

(To be continued)

Address	レジスタ名称	単位	範囲	ビット数	属性	内容
48E4h	Block command 57	-	-2147483648 to 2147483647	2	R/W	Pr56.114 (Block command 57)
48E6h	Block data 57	-	-2147483648 to 2147483647	2	R/W	Pr56.115 (Block data 57)
48E8h	Block command 58	-	-2147483648 to 2147483647	2	R/W	Pr56.116 (Block command 58)
48EAh	Block data 58	-	-2147483648 to 2147483647	2	R/W	Pr56.117 (Block data 58)
48ECh	Block command 59	-	-2147483648 to 2147483647	2	R/W	Pr56.118 (Block command 59)
48EEh	Block data 59	-	-2147483648 to 2147483647	2	R/W	Pr56.119 (Block data 59)
48F0h	Block command 60	-	-2147483648 to 2147483647	2	R/W	Pr56.120 (Block command 60)
48F2h	Block data 60	-	-2147483648 to 2147483647	2	R/W	Pr56.121 (Block data 60)
48F4h	Block command 61	-	-2147483648 to 2147483647	2	R/W	Pr56.122 (Block command 61)
48F6h	Block data 61	-	-2147483648 to 2147483647	2	R/W	Pr56.123 (Block data 61)
48F8h	Block command 62	-	-2147483648 to 2147483647	2	R/W	Pr56.124 (Block command 62)
48FAh	Block data 62	-	-2147483648 to 2147483647	2	R/W	Pr56.125 (Block data 62)
48FCh	Block command 63	-	-2147483648 to 2147483647	2	R/W	Pr56.126 (Block command 63)
48Feh	Block data 63	-	-2147483648 to 2147483647	2	R/W	Pr56.127 (Block data 63)
4900h	Block command 64	-	-2147483648 to 2147483647	2	R/W	Pr57.000 (Block command 64)
4902h	Block data 64	-	-2147483648 to 2147483647	2	R/W	Pr57.001 (Block data 64)
4904h	Block command 65	-	-2147483648 to 2147483647	2	R/W	Pr57.002 (Block command 65)
4906h	Block data 65	-	-2147483648 to 2147483647	2	R/W	Pr57.003 (Block data 65)
4908h	Block command 66	-	-2147483648 to 2147483647	2	R/W	Pr57.004 (Block command 66)
490Ah	Block data 66	-	-2147483648 to 2147483647	2	R/W	Pr57.005 (Block data 66)
490Ch	Block command 67	-	-2147483648 to 2147483647	2	R/W	Pr57.006 (Block command 67)
490Eh	Block data 67	-	-2147483648 to 2147483647	2	R/W	Pr57.007 (Block data 67)
4910h	Block command 68	-	-2147483648 to 2147483647	2	R/W	Pr57.008 (Block command 68)
4912h	Block data 68	-	-2147483648 to 2147483647	2	R/W	Pr57.009 (Block data 68)
4914h	Block command 69	-	-2147483648 to 2147483647	2	R/W	Pr57.010 (Block command 69)
4916h	Block data 69	-	-2147483648 to 2147483647	2	R/W	Pr57.011 (Block data 69)
4918h	Block command 70	-	-2147483648 to 2147483647	2	R/W	Pr57.012 (Block command 70)
491Ah	Block data 70	-	-2147483648 to 2147483647	2	R/W	Pr57.013 (Block data 70)
491Ch	Block command 71	-	-2147483648 to 2147483647	2	R/W	Pr57.014 (Block command 71)
491Eh	Block data 71	-	-2147483648 to 2147483647	2	R/W	Pr57.015 (Block data 71)

(To be continued)

Address	レジスタ名称	単位	範囲	レジスタ数	属性	内容
4920h	Block command 72	-	-2147483648 to 2147483647	2	R/W	Pr57.016 (Block command 72)
4922h	Block data 72	-	-2147483648 to 2147483647	2	R/W	Pr57.017 (Block data 72)
4924h	Block command 73	-	-2147483648 to 2147483647	2	R/W	Pr57.018 (Block command 73)
4926h	Block data 73	-	-2147483648 to 2147483647	2	R/W	Pr57.019 (Block data 73)
4928h	Block command 74	-	-2147483648 to 2147483647	2	R/W	Pr57.020 (Block command 74)
492Ah	Block data 74	-	-2147483648 to 2147483647	2	R/W	Pr57.021 (Block data 74)
492Ch	Block command 75	-	-2147483648 to 2147483647	2	R/W	Pr57.022 (Block command 75)
492Eh	Block data 75	-	-2147483648 to 2147483647	2	R/W	Pr57.023 (Block data 75)
4930h	Block command 76	-	-2147483648 to 2147483647	2	R/W	Pr57.024 (Block command 76)
4932h	Block data 76	-	-2147483648 to 2147483647	2	R/W	Pr57.025 (Block data 76)
4934h	Block command 77	-	-2147483648 to 2147483647	2	R/W	Pr57.026 (Block command 77)
4936h	Block data 77	-	-2147483648 to 2147483647	2	R/W	Pr57.027 (Block data 77)
4938h	Block command 78	-	-2147483648 to 2147483647	2	R/W	Pr57.028 (Block command 78)
493Ah	Block data 78	-	-2147483648 to 2147483647	2	R/W	Pr57.029 (Block data 78)
493Ch	Block command 79	-	-2147483648 to 2147483647	2	R/W	Pr57.030 (Block command 79)
493Eh	Block data 79	-	-2147483648 to 2147483647	2	R/W	Pr57.031 (Block data 79)
4940h	Block command 80	-	-2147483648 to 2147483647	2	R/W	Pr57.032 (Block command 80)
4942h	Block data 80	-	-2147483648 to 2147483647	2	R/W	Pr57.033 (Block data 80)
4944h	Block command 81	-	-2147483648 to 2147483647	2	R/W	Pr57.034 (Block command 81)
4946h	Block data 81	-	-2147483648 to 2147483647	2	R/W	Pr57.035 (Block data 81)
4948h	Block command 82	-	-2147483648 to 2147483647	2	R/W	Pr57.036 (Block command 82)
494Ah	Block data 82	-	-2147483648 to 2147483647	2	R/W	Pr57.037 (Block data 82)
494Ch	Block command 83	-	-2147483648 to 2147483647	2	R/W	Pr57.038 (Block command 83)
494Eh	Block data 83	-	-2147483648 to 2147483647	2	R/W	Pr57.039 (Block data 83)
4950h	Block command 84	-	-2147483648 to 2147483647	2	R/W	Pr57.040 (Block command 84)
4952h	Block data 84	-	-2147483648 to 2147483647	2	R/W	Pr57.041 (Block data 84)
4954h	Block command 85	-	-2147483648 to 2147483647	2	R/W	Pr57.042 (Block command 85)
4956h	Block data 85	-	-2147483648 to 2147483647	2	R/W	Pr57.043 (Block data 85)
4958h	Block command 86	-	-2147483648 to 2147483647	2	R/W	Pr57.044 (Block command 86)
495Ah	Block data 86	-	-2147483648 to 2147483647	2	R/W	Pr57.045 (Block data 86)

(To be continued)

Address	レジスタ名称	単位	範囲	レジスタ数	属性	内容
495Ch	Block command 87	-	-2147483648 to 2147483647	2	R/W	Pr57.046 (Block command 87)
495Eh	Block data 87	-	-2147483648 to 2147483647	2	R/W	Pr57.047 (Block data 87)
4960h	Block command 88	-	-2147483648 to 2147483647	2	R/W	Pr57.048 (Block command 88)
4962h	Block data 88	-	-2147483648 to 2147483647	2	R/W	Pr57.049 (Block data 88)
4964h	Block command 89	-	-2147483648 to 2147483647	2	R/W	Pr57.050 (Block command 89)
4966h	Block data 89	-	-2147483648 to 2147483647	2	R/W	Pr57.051 (Block data 89)
4968h	Block command 90	-	-2147483648 to 2147483647	2	R/W	Pr57.052 (Block command 90)
496Ah	Block data 90	-	-2147483648 to 2147483647	2	R/W	Pr57.053 (Block data 90)
496Ch	Block command 91	-	-2147483648 to 2147483647	2	R/W	Pr57.054 (Block command 91)
496Eh	Block data 91	-	-2147483648 to 2147483647	2	R/W	Pr57.055 (Block data 91)
4970h	Block command 92	-	-2147483648 to 2147483647	2	R/W	Pr57.056 (Block command 92)
4972h	Block data 92	-	-2147483648 to 2147483647	2	R/W	Pr57.057 (Block data 92)
4974h	Block command 93	-	-2147483648 to 2147483647	2	R/W	Pr57.058 (Block command 93)
4976h	Block data 93	-	-2147483648 to 2147483647	2	R/W	Pr57.059 (Block data 93)
4978h	Block command 94	-	-2147483648 to 2147483647	2	R/W	Pr57.060 (Block command 94)
497Ah	Block data 94	-	-2147483648 to 2147483647	2	R/W	Pr57.061 (Block data 94)
497Ch	Block command 95	-	-2147483648 to 2147483647	2	R/W	Pr57.062 (Block command 95)
497Eh	Block data 95	-	-2147483648 to 2147483647	2	R/W	Pr57.063 (Block data 95)
4980h	Block command 96	-	-2147483648 to 2147483647	2	R/W	Pr57.064 (Block command 96)
4982h	Block data 96	-	-2147483648 to 2147483647	2	R/W	Pr57.065 (Block data 96)
4984h	Block command 97	-	-2147483648 to 2147483647	2	R/W	Pr57.066 (Block command 97)
4986h	Block data 97	-	-2147483648 to 2147483647	2	R/W	Pr57.067 (Block data 97)
4988h	Block command 98	-	-2147483648 to 2147483647	2	R/W	Pr57.068 (Block command 98)
498Ah	Block data 98	-	-2147483648 to 2147483647	2	R/W	Pr57.069 (Block data 98)
498Ch	Block command 99	-	-2147483648 to 2147483647	2	R/W	Pr57.070 (Block command 99)
498Eh	Block data 99	-	-2147483648 to 2147483647	2	R/W	Pr57.071 (Block data 99)
4990h	Block command 100	-	-2147483648 to 2147483647	2	R/W	Pr57.072 (Block command 100)
4992h	Block data 100	-	-2147483648 to 2147483647	2	R/W	Pr57.073 (Block data 100)
4994h	Block command 101	-	-2147483648 to 2147483647	2	R/W	Pr57.074 (Block command 101)
4996h	Block data 101	-	-2147483648 to 2147483647	2	R/W	Pr57.075 (Block data 101)

(To be continued)

Address	レジスタ名称	単位	範囲	レジスタ数	属性	内容
4998h	Block command 102	-	-2147483648 to 2147483647	2	R/W	Pr57.076 (Block command 102)
499Ah	Block data 102	-	-2147483648 to 2147483647	2	R/W	Pr57.077 (Block data 102)
499Ch	Block command 103	-	-2147483648 to 2147483647	2	R/W	Pr57.078 (Block command 103)
499Eh	Block data 103	-	-2147483648 to 2147483647	2	R/W	Pr57.079 (Block data 103)
49A0h	Block command 104	-	-2147483648 to 2147483647	2	R/W	Pr57.080 (Block command 104)
49A2h	Block data 104	-	-2147483648 to 2147483647	2	R/W	Pr57.081 (Block data 104)
49A4h	Block command 105	-	-2147483648 to 2147483647	2	R/W	Pr57.082 (Block command 105)
49A6h	Block data 105	-	-2147483648 to 2147483647	2	R/W	Pr57.083 (Block data 105)
49A8h	Block command 106	-	-2147483648 to 2147483647	2	R/W	Pr57.084 (Block command 106)
49AAh	Block data 106	-	-2147483648 to 2147483647	2	R/W	Pr57.085 (Block data 106)
49ACh	Block command 107	-	-2147483648 to 2147483647	2	R/W	Pr57.086 (Block command 107)
49AEh	Block data 107	-	-2147483648 to 2147483647	2	R/W	Pr57.087 (Block data 107)
49B0h	Block command 108	-	-2147483648 to 2147483647	2	R/W	Pr57.088 (Block command 108)
49B2h	Block data 108	-	-2147483648 to 2147483647	2	R/W	Pr57.089 (Block data 108)
49B4h	Block command 109	-	-2147483648 to 2147483647	2	R/W	Pr57.090 (Block command 109)
49B6h	Block data 109	-	-2147483648 to 2147483647	2	R/W	Pr57.091 (Block data 109)
49B8h	Block command 110	-	-2147483648 to 2147483647	2	R/W	Pr57.092 (Block command 110)
49BAh	Block data 110	-	-2147483648 to 2147483647	2	R/W	Pr57.093 (Block data 110)
49BCh	Block command 111	-	-2147483648 to 2147483647	2	R/W	Pr57.094 (Block command 111)
49BEh	Block data 111	-	-2147483648 to 2147483647	2	R/W	Pr57.095 (Block data 111)
49C0h	Block command 112	-	-2147483648 to 2147483647	2	R/W	Pr57.096 (Block command 112)
49C2h	Block data 112	-	-2147483648 to 2147483647	2	R/W	Pr57.097 (Block data 112)
49C4h	Block command 113	-	-2147483648 to 2147483647	2	R/W	Pr57.098 (Block command 113)
49C6h	Block data 113	-	-2147483648 to 2147483647	2	R/W	Pr57.099 (Block data 113)
49C8h	Block command 114	-	-2147483648 to 2147483647	2	R/W	Pr57.100 (Block command 114)
49CAh	Block data 114	-	-2147483648 to 2147483647	2	R/W	Pr57.101 (Block data 114)
49CCh	Block command 115	-	-2147483648 to 2147483647	2	R/W	Pr57.102 (Block command 115)
49CEh	Block data 115	-	-2147483648 to 2147483647	2	R/W	Pr57.103 (Block data 115)
49D0h	Block command 116	-	-2147483648 to 2147483647	2	R/W	Pr57.104 (Block command 116)
49D2h	Block data 116	-	-2147483648 to 2147483647	2	R/W	Pr57.105 (Block data 116)

(To be continued)

Address	レジスタ名称	単位	範囲	レジスタ数	属性	内容
49D4h	Block command 117	-	-2147483648 to 2147483647	2	R/W	Pr57.106 (Block command 117)
49D6h	Block data 117	-	-2147483648 to 2147483647	2	R/W	Pr57.107 (Block data 117)
49D8h	Block command 118	-	-2147483648 to 2147483647	2	R/W	Pr57.108 (Block command 118)
49DAh	Block data 118	-	-2147483648 to 2147483647	2	R/W	Pr57.109 (Block data 118)
49DCh	Block command 119	-	-2147483648 to 2147483647	2	R/W	Pr57.110 (Block command 119)
49DEh	Block data 119	-	-2147483648 to 2147483647	2	R/W	Pr57.111 (Block data 119)
49E0h	Block command 120	-	-2147483648 to 2147483647	2	R/W	Pr57.112 (Block command 1120)
49E2h	Block data 120	-	-2147483648 to 2147483647	2	R/W	Pr57.113 (Block data 120)
49E4h	Block command 121	-	-2147483648 to 2147483647	2	R/W	Pr57.114 (Block command 121)
49E6h	Block data 121	-	-2147483648 to 2147483647	2	R/W	Pr57.115 (Block data 121)
49E8h	Block command 122	-	-2147483648 to 2147483647	2	R/W	Pr57.116 (Block command 122)
49EAh	Block data 122	-	-2147483648 to 2147483647	2	R/W	Pr57.117 (Block data 122)
49ECh	Block command 123	-	-2147483648 to 2147483647	2	R/W	Pr57.118 (Block command 123)
49EEh	Block data 123	-	-2147483648 to 2147483647	2	R/W	Pr57.119 (Block data 123)
49F0h	Block command 124	-	-2147483648 to 2147483647	2	R/W	Pr57.120 (Block command 124)
49F2h	Block data 124	-	-2147483648 to 2147483647	2	R/W	Pr57.121 (Block data 124)
49F4h	Block command 125	-	-2147483648 to 2147483647	2	R/W	Pr57.122 (Block command 125)
49F6h	Block data 125	-	-2147483648 to 2147483647	2	R/W	Pr57.123 (Block data 125)
49F8h	Block command 126	-	-2147483648 to 2147483647	2	R/W	Pr57.124 (Block command 126)
49FAh	Block data 126	-	-2147483648 to 2147483647	2	R/W	Pr57.125 (Block data 126)
49FCh	Block command 127	-	-2147483648 to 2147483647	2	R/W	Pr57.126 (Block command 127)
49FEh	Block data 127	-	-2147483648 to 2147483647	2	R/W	Pr57.127 (Block data 127)
4A00h	Block command 128	-	-2147483648 to 2147483647	2	R/W	Pr58.000 (Block command 128)
4A02h	Block data 128	-	-2147483648 to 2147483647	2	R/W	Pr58.001 (Block data 128)
4A04h	Block command 129	-	-2147483648 to 2147483647	2	R/W	Pr58.002 (Block command 129)
4A06h	Block data 129	-	-2147483648 to 2147483647	2	R/W	Pr58.003 (Block data 129)
4A08h	Block command 130	-	-2147483648 to 2147483647	2	R/W	Pr58.004 (Block command 130)
4A0Ah	Block data 130	-	-2147483648 to 2147483647	2	R/W	Pr57.005 (Block data 130)
4A0Ch	Block command 131	-	-2147483648 to 2147483647	2	R/W	Pr57.006 (Block command 131)
4A0Eh	Block data 131	-	-2147483648 to 2147483647	2	R/W	Pr57.007 (Block data 131)

(To be continued)

Address	レジスタ名称	単位	範囲	レジスタ数	属性	内容
4A10h	Block command 132	-	-2147483648 to 2147483647	2	R/W	Pr58.008 (Block command 132)
4A12h	Block data 132	-	-2147483648 to 2147483647	2	R/W	Pr58.009 (Block data 132)
4A14h	Block command 133	-	-2147483648 to 2147483647	2	R/W	Pr58.010 (Block command 133)
4A16h	Block data 133	-	-2147483648 to 2147483647	2	R/W	Pr58.011 (Block data 133)
4A18h	Block command 134	-	-2147483648 to 2147483647	2	R/W	Pr58.012 (Block command 134)
4A1Ah	Block data 134	-	-2147483648 to 2147483647	2	R/W	Pr57.013 (Block data 134)
4A1Ch	Block command 135	-	-2147483648 to 2147483647	2	R/W	Pr57.014 (Block command 135)
4A1Eh	Block data 135	-	-2147483648 to 2147483647	2	R/W	Pr57.015 (Block data 135)
4A20h	Block command 136	-	-2147483648 to 2147483647	2	R/W	Pr58.016 (Block command 136)
4A22h	Block data 136	-	-2147483648 to 2147483647	2	R/W	Pr58.017 (Block data 136)
4A24h	Block command 137	-	-2147483648 to 2147483647	2	R/W	Pr58.018 (Block command 137)
4A26h	Block data 137	-	-2147483648 to 2147483647	2	R/W	Pr58.019 (Block data 137)
4A28h	Block command 138	-	-2147483648 to 2147483647	2	R/W	Pr58.020 (Block command 138)
4A2Ah	Block data 138	-	-2147483648 to 2147483647	2	R/W	Pr57.021 (Block data 138)
4A2Ch	Block command 139	-	-2147483648 to 2147483647	2	R/W	Pr57.022 (Block command 139)
4A2Eh	Block data 139	-	-2147483648 to 2147483647	2	R/W	Pr57.023 (Block data 139)
4A30h	Block command 140	-	-2147483648 to 2147483647	2	R/W	Pr58.024 (Block command 140)
4A32h	Block data 140	-	-2147483648 to 2147483647	2	R/W	Pr58.025 (Block data 140)
4A34h	Block command 141	-	-2147483648 to 2147483647	2	R/W	Pr58.026 (Block command 141)
4A36h	Block data 141	-	-2147483648 to 2147483647	2	R/W	Pr58.027 (Block data 141)
4A38h	Block command 142	-	-2147483648 to 2147483647	2	R/W	Pr58.028 (Block command 142)
4A3Ah	Block data 142	-	-2147483648 to 2147483647	2	R/W	Pr57.029 (Block data 142)
4A3Ch	Block command 143	-	-2147483648 to 2147483647	2	R/W	Pr57.030 (Block command 143)
4A3Eh	Block data 143	-	-2147483648 to 2147483647	2	R/W	Pr57.031 (Block data 143)
4A40h	Block command 144	-	-2147483648 to 2147483647	2	R/W	Pr58.032 (Block command 144)
4A42h	Block data 144	-	-2147483648 to 2147483647	2	R/W	Pr58.033 (Block data 144)
4A44h	Block command 145	-	-2147483648 to 2147483647	2	R/W	Pr58.034 (Block command 145)
4A46h	Block data 145	-	-2147483648 to 2147483647	2	R/W	Pr58.035 (Block data 145)
4A48h	Block command 146	-	-2147483648 to 2147483647	2	R/W	Pr58.036 (Block command 146)
4A4Ah	Block data 146	-	-2147483648 to 2147483647	2	R/W	Pr57.037 (Block data 146)

(To be continued)

Address	レジスタ名称	単位	範囲	レジスタ数	属性	内容
4A4Ch	Block command 147	-	-2147483648 to 2147483647	2	R/W	Pr57.038 (Block command 147)
4A4Eh	Block data 147	-	-2147483648 to 2147483647	2	R/W	Pr57.039 (Block data 147)
4A50h	Block command 148	-	-2147483648 to 2147483647	2	R/W	Pr58.040 (Block command 148)
4A52h	Block data 148	-	-2147483648 to 2147483647	2	R/W	Pr58.041 (Block data 148)
4A54h	Block command 149	-	-2147483648 to 2147483647	2	R/W	Pr58.042 (Block command 149)
4A56h	Block data 149	-	-2147483648 to 2147483647	2	R/W	Pr58.043 (Block data 149)
4A58h	Block command 150	-	-2147483648 to 2147483647	2	R/W	Pr58.044 (Block command 150)
4A5Ah	Block data 150	-	-2147483648 to 2147483647	2	R/W	Pr57.045 (Block data 150)
4A5Ch	Block command 151	-	-2147483648 to 2147483647	2	R/W	Pr57.046 (Block command 151)
4A5Eh	Block data 151	-	-2147483648 to 2147483647	2	R/W	Pr57.047 (Block data 151)
4A60h	Block command 152	-	-2147483648 to 2147483647	2	R/W	Pr58.048 (Block command 152)
4A62h	Block data 152	-	-2147483648 to 2147483647	2	R/W	Pr58.049 (Block data 152)
4A64h	Block command 153	-	-2147483648 to 2147483647	2	R/W	Pr58.050 (Block command 153)
4A66h	Block data 153	-	-2147483648 to 2147483647	2	R/W	Pr58.051 (Block data 153)
4A68h	Block command 154	-	-2147483648 to 2147483647	2	R/W	Pr58.052 (Block command 154)
4A6Ah	Block data 154	-	-2147483648 to 2147483647	2	R/W	Pr57.053 (Block data 154)
4A6Ch	Block command 155	-	-2147483648 to 2147483647	2	R/W	Pr57.054 (Block command 155)
4A6Eh	Block data 155	-	-2147483648 to 2147483647	2	R/W	Pr57.055 (Block data 155)
4A70h	Block command 156	-	-2147483648 to 2147483647	2	R/W	Pr58.056 (Block command 156)
4A72h	Block data 156	-	-2147483648 to 2147483647	2	R/W	Pr58.057 (Block data 156)
4A74h	Block command 157	-	-2147483648 to 2147483647	2	R/W	Pr58.058 (Block command 157)
4A76h	Block data 157	-	-2147483648 to 2147483647	2	R/W	Pr58.059 (Block data 157)
4A78h	Block command 158	-	-2147483648 to 2147483647	2	R/W	Pr58.060 (Block command 158)
4A7Ah	Block data 158	-	-2147483648 to 2147483647	2	R/W	Pr57.061 (Block data 158)
4A7Ch	Block command 159	-	-2147483648 to 2147483647	2	R/W	Pr57.062 (Block command 159)
4A7Eh	Block data 159	-	-2147483648 to 2147483647	2	R/W	Pr57.063 (Block data 159)
4A80h	Block command 160	-	-2147483648 to 2147483647	2	R/W	Pr58.064 (Block command 160)
4A82h	Block data 160	-	-2147483648 to 2147483647	2	R/W	Pr58.065 (Block data 160)
4A84h	Block command 161	-	-2147483648 to 2147483647	2	R/W	Pr58.066 (Block command 161)
4A86h	Block data 161	-	-2147483648 to 2147483647	2	R/W	Pr58.067 (Block data 161)

(To be continued)

Address	レジスタ名称	単位	範囲	レジスタ数	属性	内容
4A88h	Block command 162	-	-2147483648 to 2147483647	2	R/W	Pr58.068 (Block command 162)
4A8Ah	Block data 162	-	-2147483648 to 2147483647	2	R/W	Pr57.069 (Block data 162)
4A8Ch	Block command 163	-	-2147483648 to 2147483647	2	R/W	Pr57.070 (Block command 163)
4A8Eh	Block data 163	-	-2147483648 to 2147483647	2	R/W	Pr57.071 (Block data 163)
4A90h	Block command 164	-	-2147483648 to 2147483647	2	R/W	Pr58.072 (Block command 164)
4A92h	Block data 164	-	-2147483648 to 2147483647	2	R/W	Pr58.073 (Block data 164)
4A94h	Block command 165	-	-2147483648 to 2147483647	2	R/W	Pr58.074 (Block command 165)
4A96h	Block data 165	-	-2147483648 to 2147483647	2	R/W	Pr58.075 (Block data 165)
4A98h	Block command 166	-	-2147483648 to 2147483647	2	R/W	Pr58.076 (Block command 166)
4A9Ah	Block data 166	-	-2147483648 to 2147483647	2	R/W	Pr57.077 (Block data 166)
4A9Ch	Block command 167	-	-2147483648 to 2147483647	2	R/W	Pr57.078 (Block command 167)
4A9Eh	Block data 167	-	-2147483648 to 2147483647	2	R/W	Pr57.079 (Block data 167)
4AA0h	Block command 168	-	-2147483648 to 2147483647	2	R/W	Pr58.080 (Block command 168)
4AA2h	Block data 168	-	-2147483648 to 2147483647	2	R/W	Pr58.081 (Block data 168)
4AA4h	Block command 169	-	-2147483648 to 2147483647	2	R/W	Pr58.082 (Block command 169)
4AA6h	Block data 169	-	-2147483648 to 2147483647	2	R/W	Pr58.083 (Block data 169)
4AA8h	Block command 170	-	-2147483648 to 2147483647	2	R/W	Pr58.084 (Block command 170)
4AAAh	Block data 170	-	-2147483648 to 2147483647	2	R/W	Pr57.085 (Block data 170)
4AACh	Block command 171	-	-2147483648 to 2147483647	2	R/W	Pr57.086 (Block command 171)
4AAEh	Block data 171	-	-2147483648 to 2147483647	2	R/W	Pr57.087 (Block data 171)
4AB0h	Block command 172	-	-2147483648 to 2147483647	2	R/W	Pr58.088 (Block command 172)
4AB2h	Block data 172	-	-2147483648 to 2147483647	2	R/W	Pr58.089 (Block data 172)
4AB4h	Block command 173	-	-2147483648 to 2147483647	2	R/W	Pr58.090 (Block command 173)
4AB6h	Block data 173	-	-2147483648 to 2147483647	2	R/W	Pr58.091 (Block data 173)
4AB8h	Block command 174	-	-2147483648 to 2147483647	2	R/W	Pr58.092 (Block command 174)
4ABAh	Block data 174	-	-2147483648 to 2147483647	2	R/W	Pr57.093 (Block data 174)
4ABCh	Block command 175	-	-2147483648 to 2147483647	2	R/W	Pr57.094 (Block command 175)
4ABEh	Block data 175	-	-2147483648 to 2147483647	2	R/W	Pr57.095 (Block data 175)
4AC0h	Block command 176	-	-2147483648 to 2147483647	2	R/W	Pr58.096 (Block command 176)
4AC2h	Block data 176	-	-2147483648 to 2147483647	2	R/W	Pr58.097 (Block data 176)

(To be continued)

Address	レジスタ名称	単位	範囲	レジスタ数	属性	内容
4AC4h	Block command 177	-	-2147483648 to 2147483647	2	R/W	Pr58.098 (Block command 177)
4AC6h	Block data 177	-	-2147483648 to 2147483647	2	R/W	Pr58.099 (Block data 177)
4AC8h	Block command 178	-	-2147483648 to 2147483647	2	R/W	Pr58.100 (Block command 178)
4ACAh	Block data 178	-	-2147483648 to 2147483647	2	R/W	Pr57.101 (Block data 178)
4ACCh	Block command 179	-	-2147483648 to 2147483647	2	R/W	Pr57.102 (Block command 179)
4ACEh	Block data 179	-	-2147483648 to 2147483647	2	R/W	Pr57.103 (Block data 179)
4AD0h	Block command 180	-	-2147483648 to 2147483647	2	R/W	Pr58.104 (Block command 180)
4AD2h	Block data 180	-	-2147483648 to 2147483647	2	R/W	Pr58.105 (Block data 180)
4AD4h	Block command 181	-	-2147483648 to 2147483647	2	R/W	Pr58.106 (Block command 181)
4AD6h	Block data 181	-	-2147483648 to 2147483647	2	R/W	Pr58.107 (Block data 181)
4AD8h	Block command 182	-	-2147483648 to 2147483647	2	R/W	Pr58.108 (Block command 182)
4ADAh	Block data 182	-	-2147483648 to 2147483647	2	R/W	Pr57.109 (Block data 182)
4ADCh	Block command 183	-	-2147483648 to 2147483647	2	R/W	Pr57.110 (Block command 183)
4ADEh	Block data 183	-	-2147483648 to 2147483647	2	R/W	Pr57.111 (Block data 183)
4AE0h	Block command 184	-	-2147483648 to 2147483647	2	R/W	Pr58.112 (Block command 184)
4AE2h	Block data 184	-	-2147483648 to 2147483647	2	R/W	Pr58.113 (Block data 184)
4AE4h	Block command 185	-	-2147483648 to 2147483647	2	R/W	Pr58.114 (Block command 185)
4AE6h	Block data 185	-	-2147483648 to 2147483647	2	R/W	Pr58.115 (Block data 185)
4AE8h	Block command 186	-	-2147483648 to 2147483647	2	R/W	Pr58.116 (Block command 186)
4AEAh	Block data 186	-	-2147483648 to 2147483647	2	R/W	Pr57.117 (Block data 186)
4AECh	Block command 187	-	-2147483648 to 2147483647	2	R/W	Pr57.118 (Block command 187)
4AEEh	Block data 187	-	-2147483648 to 2147483647	2	R/W	Pr57.119 (Block data 187)
4AF0h	Block command 188	-	-2147483648 to 2147483647	2	R/W	Pr58.120 (Block command 188)
4AF2h	Block data 188	-	-2147483648 to 2147483647	2	R/W	Pr58.121 (Block data 188)
4AF4h	Block command 189	-	-2147483648 to 2147483647	2	R/W	Pr58.122 (Block command 189)
4AF6h	Block data 189	-	-2147483648 to 2147483647	2	R/W	Pr58.123 (Block data 189)
4AF8h	Block command 190	-	-2147483648 to 2147483647	2	R/W	Pr58.124 (Block command 190)
4AFAh	Block data 190	-	-2147483648 to 2147483647	2	R/W	Pr57.125 (Block data 190)
4AFCh	Block command 191	-	-2147483648 to 2147483647	2	R/W	Pr58.126 (Block command 191)
4AFEh	Block data 191	-	-2147483648 to 2147483647	2	R/W	Pr58.127 (Block data 191)

(To be continued)

Address	レジスタ名称	単位	範囲	レジスタ数	属性	内容
4B00h	Block command 192	-	-2147483648 to 2147483647	2	R/W	Pr59.000 (Block command 192)
4B02h	Block data 192	-	-2147483648 to 2147483647	2	R/W	Pr59.001 (Block data 192)
4B04h	Block command 193	-	-2147483648 to 2147483647	2	R/W	Pr59.002 (Block command 193)
4B06h	Block data 193	-	-2147483648 to 2147483647	2	R/W	Pr59.003 (Block data 193)
4B08h	Block command 194	-	-2147483648 to 2147483647	2	R/W	Pr59.004 (Block command 194)
4B0Ah	Block data 194	-	-2147483648 to 2147483647	2	R/W	Pr59.005 (Block data 194)
4B0Ch	Block command 195	-	-2147483648 to 2147483647	2	R/W	Pr59.006 (Block command 195)
4B0Eh	Block data 195	-	-2147483648 to 2147483647	2	R/W	Pr59.007 (Block data 195)
4B10h	Block command 196	-	-2147483648 to 2147483647	2	R/W	Pr59.008 (Block command 196)
4B12h	Block data 196	-	-2147483648 to 2147483647	2	R/W	Pr59.009 (Block data 196)
4B14h	Block command 197	-	-2147483648 to 2147483647	2	R/W	Pr59.010 (Block command 197)
4B16h	Block data 197	-	-2147483648 to 2147483647	2	R/W	Pr59.011 (Block data 197)
4B18h	Block command 198	-	-2147483648 to 2147483647	2	R/W	Pr59.012 (Block command 198)
4B1Ah	Block data 198	-	-2147483648 to 2147483647	2	R/W	Pr59.013 (Block data 198)
4B1Ch	Block command 199	-	-2147483648 to 2147483647	2	R/W	Pr59.014 (Block command 199)
4B1Eh	Block data 199	-	-2147483648 to 2147483647	2	R/W	Pr59.015 (Block data 199)
4B20h	Block command 200	-	-2147483648 to 2147483647	2	R/W	Pr59.016 (Block command 200)
4B22h	Block data 200	-	-2147483648 to 2147483647	2	R/W	Pr59.017 (Block data 200)
4B24h	Block command 201	-	-2147483648 to 2147483647	2	R/W	Pr59.018 (Block command 201)
4B26h	Block data 201	-	-2147483648 to 2147483647	2	R/W	Pr59.019 (Block data 201)
4B28h	Block command 202	-	-2147483648 to 2147483647	2	R/W	Pr59.020 (Block command 202)
4B2Ah	Block data 202	-	-2147483648 to 2147483647	2	R/W	Pr59.021 (Block data 202)
4B2Ch	Block command 203	-	-2147483648 to 2147483647	2	R/W	Pr59.022 (Block command 203)
4B2Eh	Block data 203	-	-2147483648 to 2147483647	2	R/W	Pr59.023 (Block data 203)
4B30h	Block command 204	-	-2147483648 to 2147483647	2	R/W	Pr59.024 (Block command 204)
4B32h	Block data 204	-	-2147483648 to 2147483647	2	R/W	Pr59.025 (Block data 204)
4B34h	Block command 205	-	-2147483648 to 2147483647	2	R/W	Pr59.026 (Block command 205)
4B36h	Block data 205	-	-2147483648 to 2147483647	2	R/W	Pr59.027 (Block data 205)
4B38h	Block command 206	-	-2147483648 to 2147483647	2	R/W	Pr59.028 (Block command 206)
4B3Ah	Block data 206	-	-2147483648 to 2147483647	2	R/W	Pr59.029 (Block data 206)

(To be continued)

Address	レジスタ名称	単位	範囲	レジスタ数	属性	内容
4B3Ch	Block command 207	-	-2147483648 to 2147483647	2	R/W	Pr59.030 (Block command 207)
4B3Eh	Block data 207	-	-2147483648 to 2147483647	2	R/W	Pr59.031 (Block data 207)
4B40h	Block command 208	-	-2147483648 to 2147483647	2	R/W	Pr59.032 (Block command 208)
4B42h	Block data 208	-	-2147483648 to 2147483647	2	R/W	Pr59.033 (Block data 208)
4B44h	Block command 209	-	-2147483648 to 2147483647	2	R/W	Pr59.034 (Block command 209)
4B46h	Block data 209	-	-2147483648 to 2147483647	2	R/W	Pr59.035 (Block data 209)
4B48h	Block command 210	-	-2147483648 to 2147483647	2	R/W	Pr59.036 (Block command 210)
4B4Ah	Block data 210	-	-2147483648 to 2147483647	2	R/W	Pr59.037 (Block data 210)
4B4Ch	Block command 211	-	-2147483648 to 2147483647	2	R/W	Pr59.038 (Block command 211)
4B4Eh	Block data 211	-	-2147483648 to 2147483647	2	R/W	Pr59.039 (Block data 211)
4B50h	Block command 212	-	-2147483648 to 2147483647	2	R/W	Pr59.040 (Block command 212)
4B52h	Block data 212	-	-2147483648 to 2147483647	2	R/W	Pr59.041 (Block data 212)
4B54h	Block command 213	-	-2147483648 to 2147483647	2	R/W	Pr59.042 (Block command 213)
4B56h	Block data 213	-	-2147483648 to 2147483647	2	R/W	Pr59.043 (Block data 213)
4B58h	Block command 213	-	-2147483648 to 2147483647	2	R/W	Pr59.044 (Block command 214)
4B5Ah	Block data 214	-	-2147483648 to 2147483647	2	R/W	Pr59.045 (Block data 214)
4B5Ch	Block command 215	-	-2147483648 to 2147483647	2	R/W	Pr59.046 (Block command 215)
4B5Eh	Block data 215	-	-2147483648 to 2147483647	2	R/W	Pr59.047 (Block data 215)
4B60h	Block command 216	-	-2147483648 to 2147483647	2	R/W	Pr59.048 (Block command 216)
4B62h	Block data 216	-	-2147483648 to 2147483647	2	R/W	Pr59.049 (Block data 216)
4B64h	Block command 217	-	-2147483648 to 2147483647	2	R/W	Pr59.050 (Block command 217)
4B66h	Block data 217	-	-2147483648 to 2147483647	2	R/W	Pr59.051 (Block data 217)
4B68h	Block command 218	-	-2147483648 to 2147483647	2	R/W	Pr59.052 (Block command 218)
4B6Ah	Block data 218	-	-2147483648 to 2147483647	2	R/W	Pr59.053 (Block data 218)
4B6Ch	Block command 219	-	-2147483648 to 2147483647	2	R/W	Pr59.054 (Block command 219)
4B6Eh	Block data 219	-	-2147483648 to 2147483647	2	R/W	Pr59.055 (Block data 219)
4B70h	Block command 220	-	-2147483648 to 2147483647	2	R/W	Pr59.056 (Block command 220)
4B72h	Block data 220	-	-2147483648 to 2147483647	2	R/W	Pr59.057 (Block data 220)
4B74h	Block command 221	-	-2147483648 to 2147483647	2	R/W	Pr59.058 (Block command 221)
4B76h	Block data 221	-	-2147483648 to 2147483647	2	R/W	Pr59.059 (Block data 221)

(To be continued)

Address	レジスタ名称	単位	範囲	レジスタ数	属性	内容
4B78h	Block command 222	-	-2147483648 to 2147483647	2	R/W	Pr59.060 (Block command 222)
4B7Ah	Block data 222	-	-2147483648 to 2147483647	2	R/W	Pr59.061 (Block data 222)
4B7Ch	Block command 223	-	-2147483648 to 2147483647	2	R/W	Pr59.062 (Block command 223)
4B7Eh	Block data 223	-	-2147483648 to 2147483647	2	R/W	Pr59.063 (Block data 223)
4B80h	Block command 224	-	-2147483648 to 2147483647	2	R/W	Pr59.064 (Block command 224)
4B82h	Block data 224	-	-2147483648 to 2147483647	2	R/W	Pr59.065 (Block data 224)
4B84h	Block command 225	-	-2147483648 to 2147483647	2	R/W	Pr59.066 (Block command 225)
4B86h	Block data 225	-	-2147483648 to 2147483647	2	R/W	Pr59.067 (Block data 225)
4B88h	Block command 226	-	-2147483648 to 2147483647	2	R/W	Pr59.068 (Block command 226)
4B8Ah	Block data 226	-	-2147483648 to 2147483647	2	R/W	Pr59.069 (Block data 226)
4B8Ch	Block command 227	-	-2147483648 to 2147483647	2	R/W	Pr59.070 (Block command 227)
4B8Eh	Block data 227	-	-2147483648 to 2147483647	2	R/W	Pr59.071 (Block data 227)
4B90h	Block command 228	-	-2147483648 to 2147483647	2	R/W	Pr59.072 (Block command 228)
4B92h	Block data 228	-	-2147483648 to 2147483647	2	R/W	Pr59.073 (Block data 228)
4B94h	Block command 229	-	-2147483648 to 2147483647	2	R/W	Pr59.074 (Block command 229)
4B96h	Block data 229	-	-2147483648 to 2147483647	2	R/W	Pr59.075 (Block data 229)
4B98h	Block command 230	-	-2147483648 to 2147483647	2	R/W	Pr59.076 (Block command 230)
4B9Ah	Block data 230	-	-2147483648 to 2147483647	2	R/W	Pr59.077 (Block data 230)
4B9Ch	Block command 231	-	-2147483648 to 2147483647	2	R/W	Pr59.078 (Block command 231)
4B9Eh	Block data 231	-	-2147483648 to 2147483647	2	R/W	Pr59.079 (Block data 231)
4BA0h	Block command 232	-	-2147483648 to 2147483647	2	R/W	Pr59.080 (Block command 232)
4BA2h	Block data 232	-	-2147483648 to 2147483647	2	R/W	Pr59.081 (Block data 232)
4BA4h	Block command 233	-	-2147483648 to 2147483647	2	R/W	Pr59.082 (Block command 233)
4BA6h	Block data 233	-	-2147483648 to 2147483647	2	R/W	Pr59.083 (Block data 233)
4BA8h	Block command 234	-	-2147483648 to 2147483647	2	R/W	Pr59.084 (Block command 234)
4BAAh	Block data 234	-	-2147483648 to 2147483647	2	R/W	Pr59.085 (Block data 234)
4BACH	Block command 235	-	-2147483648 to 2147483647	2	R/W	Pr59.086 (Block command 235)
4BAEh	Block data 235	-	-2147483648 to 2147483647	2	R/W	Pr59.087 (Block data 235)

(To be continued)

Address	レジスタ名称	単位	範囲	レジスタ数	属性	内容
4BB0h	Block command 236	-	-2147483648 to 2147483647	2	R/W	Pr59.088 (Block command 236)
4BB2h	Block data 236	-	-2147483648 to 2147483647	2	R/W	Pr59.089 (Block data 236)
4BB4h	Block command 237	-	-2147483648 to 2147483647	2	R/W	Pr59.090 (Block command 237)
4BB6h	Block data 237	-	-2147483648 to 2147483647	2	R/W	Pr59.091 (Block data 237)
4BB8h	Block command 238	-	-2147483648 to 2147483647	2	R/W	Pr59.092 (Block command 238)
4BBAh	Block data 238	-	-2147483648 to 2147483647	2	R/W	Pr59.093 (Block data 238)
4BBCh	Block command 239	-	-2147483648 to 2147483647	2	R/W	Pr59.094 (Block command 239)
4BBEh	Block data 239	-	-2147483648 to 2147483647	2	R/W	Pr59.095 (Block data 239)
4BC0h	Block command 240	-	-2147483648 to 2147483647	2	R/W	Pr59.096 (Block command 240)
4BC2h	Block data 240	-	-2147483648 to 2147483647	2	R/W	Pr59.097 (Block data 240)
4BC4h	Block command 241	-	-2147483648 to 2147483647	2	R/W	Pr59.098 (Block command 241)
4BC6h	Block data 241	-	-2147483648 to 2147483647	2	R/W	Pr59.099 (Block data 241)
4BC8h	Block command 242	-	-2147483648 to 2147483647	2	R/W	Pr59.100 (Block command 242)
4BCAh	Block data 242	-	-2147483648 to 2147483647	2	R/W	Pr59.101 (Block data 242)
4BCCh	Block command 243	-	-2147483648 to 2147483647	2	R/W	Pr59.102 (Block command 243)
4BCEh	Block data 243	-	-2147483648 to 2147483647	2	R/W	Pr59.103 (Block data 243)
4BD0h	Block command 244	-	-2147483648 to 2147483647	2	R/W	Pr59.104 (Block command 244)
4BD2h	Block data 244	-	-2147483648 to 2147483647	2	R/W	Pr59.105 (Block data 244)
4BD4h	Block command 245	-	-2147483648 to 2147483647	2	R/W	Pr59.106 (Block command 245)
4BD6h	Block data 245	-	-2147483648 to 2147483647	2	R/W	Pr59.107 (Block data 245)
4BD8h	Block command 246	-	-2147483648 to 2147483647	2	R/W	Pr59.108 (Block command 246)
4BDAh	Block data 246	-	-2147483648 to 2147483647	2	R/W	Pr59.109 (Block data 246)
4BDCh	Block command 247	-	-2147483648 to 2147483647	2	R/W	Pr59.110 (Block command 247)
4BDEh	Block data 247	-	-2147483648 to 2147483647	2	R/W	Pr59.111 (Block data 247)
4BE0h	Block command 248	-	-2147483648 to 2147483647	2	R/W	Pr59.112 (Block command 248)
4BE2h	Block data 248	-	-2147483648 to 2147483647	2	R/W	Pr59.113 (Block data 248)
4BE4h	Block command 249	-	-2147483648 to 2147483647	2	R/W	Pr59.114 (Block command 249)
4BE6h	Block data 249	-	-2147483648 to 2147483647	2	R/W	Pr59.115 (Block data 249)
4BE8h	Block command 250	-	-2147483648 to 2147483647	2	R/W	Pr59.116 (Block command 250)
4BEAh	Block data 250	-	-2147483648 to 2147483647	2	R/W	Pr59.117 (Block data 250)

(To be continued)

Address	レジスタ名称	単位	範囲	レジスタ数	属性	内容
4BECh	Block command 251	-	-2147483648 to 2147483647	2	R/W	Pr59.118 (Block command 251)
4BEEh	Block data 251	-	-2147483648 to 2147483647	2	R/W	Pr59.119 (Block data 251)
4BF0h	Block command 252	-	-2147483648 to 2147483647	2	R/W	Pr59.120 (Block command 252)
4BF2h	Block data 252	-	-2147483648 to 2147483647	2	R/W	Pr59.121 (Block data 252)
4BF4h	Block command 253	-	-2147483648 to 2147483647	2	R/W	Pr59.122 (Block command 253)
4BF6h	Block data 253	-	-2147483648 to 2147483647	2	R/W	Pr59.123 (Block data 253)
4BF8h	Block command 254	-	-2147483648 to 2147483647	2	R/W	Pr59.124 (Block command 254)
4BFAh	Block data 254	-	-2147483648 to 2147483647	2	R/W	Pr59.125 (Block data 254)
4BFCh	Block command 255	-	-2147483648 to 2147483647	2	R/W	Pr59.126 (Block command 255)
4BFEh	Block data 255	-	-2147483648 to 2147483647	2	R/W	Pr59.127 (Block data 255)

(To be continued)

Address	Register name	Unit	Range	Number of register	Attribute	Contents
4D00h	Position deviation (after filter)	pulse	-2147483648 to 2147483647	2	Read Only	Position deviation (after filter)
4D02h	Encoder resolution	pulse/r	-2147483648 to 2147483647	2	Read Only	Encoder resolution
4D06h	Actual velocity	r/min	-2147483648 to 2147483647	2	Read Only	Actual speed
4D08h	Torque command	0.05%	-2147483648 to 2147483647	2	Read Only	Torque command
4D0Ah	Velocity command (before filter)	r/min	-2147483648 to 2147483647	2	Read Only	Velocity command (before filter)
4D0Ch	Velocity command (after filter)	r/min	-2147483648 to 2147483647	2	Read Only	Velocity command (after filter)
4D0Eh	External scale position	pulse	-2147483648 to 2147483647	2	Read Only	External scale position *2) [1] Block operation disabled Displays the amount of change in the external scale position after the power is turned on.(It is 0 when the power is turned on, and then changes according to the external scale position.) [2] Block operation enabled External scale Displays the lower 32 bits of 48-bit absolute position information.
4D10h	Regeneration load rate	0.1%	-2147483648 to 2147483647	2	Read Only	Regeneration load rate
4D12h	Overload load rate	0.2%	-2147483648 to 2147483647	2	Read Only	Overload load rate
4D14h	Enhanced logic input	-	-2147483648 to 2147483647	2	Read Only	Enhanced logic input
4D16h	Enhanced logic output	-	-2147483648 to 2147483647	2	Read Only	Enhanced logic output
4D18h	Physical input	-	-2147483648 to 2147483647	2	Read Only	Physical input
4D1Ah	Physical output	-	-2147483648 to 2147483647	2	Read Only	Physical output
4D1Ch	Inertia ratio	%	-2147483648 to 2147483647	2	Read Only	Inertia ratio (Estimated value)
4D1Eh	Motor automatic recognition effective state	-	-2147483648 to 2147483647	2	Read Only	Motor automatic recognition effective state
4D20h	Warning flag	-	-2147483648 to 2147483647	2	Read Only	Warning flag
4D22h	Control mode	-	-2147483648 to 2147483647	2	Read Only	0: Position control 1: velocity control 2: Torque control 3: full-closed control
4D24h	Mechanical angle (Encoder 1 rotation data)	pulse	-2147483648 to 2147483647	2	Read Only	Mechanical angle (Encoder 1 rotation data)
4D26h	Electrical angle	0.0879°	-2147483648 to 2147483647	2	Read Only	Electrical angle
4D28h	Multi-rotation data of absolute encoder	R	-2147483648 to 2147483647	2	Read Only	Multi-rotation data of absolute encoder *1
4D2Ah	Counter reference time	30min.	-2147483648 to 2147483647	2	Read Only	Counter reference time
4D2Ch	Accumulated power on time	30min.	-2147483648 to 2147483647	2	Read Only	Accumulated power on time
4D2Eh	Alarm generated time	30min.	-2147483648 to 2147483647	2	Read Only	Alarm generated time
4D30h	Amplifier temperature	°C	-2147483648 to 2147483647	2	Read Only	Amplifier temperature
4D32h	Encoder temperature	°C	-2147483648 to 2147483647	2	Read Only	Encoder temperature
4D34h	Fan operating time	30min.	-2147483648 to 2147483647	2	Read Only	Fan operating time
4D36h	Integrated fan life hours	0.1%	-2147483648 to 2147483647	2	Read Only	Integrated fan life hours

(To be continued)

*1) At the increment mode (Pr0.15=1), the multi-rotation data become undefined values.

*2) Pr3.23 Only serial communication type can be monitored for "External scale type."

Address	Register name	Unit	Range	Number of register	Attribute	Contents
4D38h	Capacitor life accumulated hours	0.1%	-2147483648 to 2147483647	2	Read Only	Capacitor life accumulated hours
4D3Ah	Main power supply PN voltage	V	-2147483648 to 2147483647	2	Read Only	Main power supply PN voltage
4D42h	Encoder communication abnormal count	times	-2147483648 to 2147483647	2	Read Only	Encoder communication abnormal count
4D46h	External scale communication abnormal count	times	-2147483648 to 2147483647	2	Read Only	External scale communication abnormal count
4D54h	Number of irruptive resistance relay change	times	-2147483648 to 2147483647	2	Read Only	Number of irruptive resistance relay change
4D56h	Number of dynamic brake relay change	times	-2147483648 to 2147483647	2	Read Only	Number of dynamic brake relay change
4D5Ch	Logic input	-	-2147483648 to 2147483647	2	Read Only	Logic input
4D5Eh	Logic output	-	-2147483648 to 2147483647	2	Read Only	Logic output
4D60h	External scale position (before command direction reversing)	pulse	-2147483648 to 2147483647	2	Read Only	External scale position (before command direction reversing)
4DC0h	Deterioration diagnosis state	-	-2147483648 to 2147483647	2	Read Only	Deterioration diagnosis state bit0 : Deterioration diagnosis warning valid bit1 : Load characteristics estimation valid bit2 : Load characteristics estimation convergence completed bit3 : Deterioration diagnosis velocity output bit4 : Deterioration diagnosis torque average time passed bit5 : Deterioration diagnosis warning factor (Torque command average value) bit6 : Deterioration diagnosis warning factor (Inertia ratio) bit7 : Deterioration diagnosis warning factor (Unbalanced load) bit8 : Deterioration diagnosis warning factor (Dynamic wear) bit9 : Deterioration diagnosis warning factor (Viscous friction)
4DC2h	Average deterioration diagnosis torque command value	0.1%	-2147483648 to 2147483647	2	Read Only	Average deterioration diagnosis torque command value
4DC4h	Standard deviation of deterioration diagnosis torque command	0.1%	-2147483648 to 2147483647	2	Read Only	Standard deviation of deterioration diagnosis torque command
4DC6h	Deterioration diagnosis inertia ratio estimate	%	-2147483648 to 2147483647	2	Read Only	Deterioration diagnosis inertia ratio estimate
4DC8h	Deterioration diagnosis unbalanced load estimate	0.1%	-2147483648 to 2147483647	2	Read Only	Deterioration diagnosis unbalanced load estimate
4DCAh	Deterioration diagnosis dynamic wear estimate	0.1%	-2147483648 to 2147483647	2	Read Only	Deterioration diagnosis dynamic wear estimate
4DCCh	Deterioration diagnosis viscous friction estimate	0.1%/(1000 r/min)	-2147483648 to 2147483647	2	Read Only	Deterioration diagnosis viscous friction estimate
4DD8h	Position demand internal value (no backlash)	pulse	-2147483648 to 2147483647	2	Read Only	Internal command position (Backlash compensation amount not included)
4DDAh	Position actual internal value (no backlash)	pulse	-2147483648 to 2147483647	2	Read Only	Motor position (Backlash compensation amount not included) Encoder units are used except for full-closed control, and external scale units are used for full-closed control.

[Address in the 6000h order]

Address	Register name	Unit	Range	Number of register	Attribute	Contents
6001h *2)	Error code	-	0 to 65535	1	Read Only	Error number Main number (1byte), Sub number (1byte) Example) In case of Err26.0 FF1Ah (main number : FFh fixed, sub number : 1Ah = 26
600Ah	Modes of operation display	-	- 128 to 127	1	Read Only	Amplifier internal control mode
600Bh	Position demand value	command unit	-2147483648 to 2147483647	2	Read Only	Pre-filter command position
600Dh *2)	Position actual internal value	pulse	-2147483648 to 2147483647	2	Read Only	Motor position (FB scale unit) Encoder units are used except for full-closed control, and external scale units are used for full-closed control.
600Fh	Position actual value	command unit	-2147483648 to 2147483647	2	Read Only	Motor position
601Ah	Velocity demand value	command unit/s	-2147483648 to 2147483647	2	Read Only	Internal command velocity
601Ch *2)*3)	Velocity actual value	command unit/s	-2147483648 to 2147483647	2	Read Only	Motor velocity
6025h *2)	Torque demand	0.1%	-32768 to 32767	1	Read Only	Internal command torque
6026h	Motor rated current	mA	0 to 4294967295	2	Read Only	Rated motor current Note) fixed to 0
602Ch *2)	DC link circuit voltage	mV	0 to 4294967295	2	Read Only	Main power supply PN voltage
609Ch	Following error actual value	command unit	-2147483648 to 2147483647	2	Read Only	Position deviation
609Eh *2)	Control effort	command unit/s	-2147483648 to 2147483647	2	Read Only	Internal command velocity (output of position loop)
60A0h *2)*4)	Position demand internal value	pulse	-2147483648 to 2147483647	2	Read Only	Internal command position
60A2h *2)	Digital inputs	-	0 to 4294967295	2	Read Only	External input signal monitor

*1) When using addresses in the 6000h range, set block operation to “Valid” (Pr 6.28 is non 0).

*2) Function enhancement version 9 or later can read also when Pr6.28 = 0 (Block operation disabled (Pulse train enabled)).

*3) It is fixed to 0 under Pr6.28 = 0 and speed/torque control.

*4) It is fixed to 0 under Pr6.28 = 0 and full-closed control.

2-2 Basic specification of block operation functions

Item	Specification
Block processing cycle	1.0 [ms]
Number of blocks	256
Number of velocity set parameters	16
Number of acceleration set parameters	16
Number of deceleration set parameters	16
Activation method	Modbus communications, input signal
Conditional branch	Compatible (Jump, =, >, <)
Control mode	Position control, full closed control
Origin return	Compatible *1)
Renew velocity	Compatible
Wrap around	Compatible
Electronic gear	Compatible *2)

*1) By setting Pr. 60.55 “set invalid origin return” to 1 will enable positioning action to be made without origin return even in increment mode.

*2) When “Special function select” = 4 is true, the electronic gear ratio is fixed at 1:1.
The command division/multiplication applied to pulse train is not 1 time fixed, but changeable.

2-3 Initial setting and limitations

In order to validate block operation functions by Modbus communications, it is necessary to set parameter Pr. 6.28 “Special function select” to 1 and Pr. 5.37 “Modbus connection setting” to either 1 or 2. In addition, to activate block operation function, parameter Pr6.28 “Special function select” needs to be selected to 2.

In these cases, analog and pulse I/F will become invalid.

When “Block operation method by input signal” is true, Pr6.28 must be set at 4 to enable pulse I/F.

When Pr6.28 “Special function select” = 0 is not true, it is impossible to perform the trial run.

Class	No.	Name	Attribute	Set value	Command I/F	Control mode
6	28	Special function select	Reclose power supply	0	Analog/pulse input method (Pulse train enabled)	Position/velocity/torque/full-closed control
				1	Block operation method by Modbus communications (Pulse train disabled)	Position/full-closed control
				2	Block operation method by input signal(Pulse train disabled)	Position/full-closed control
				4	Block operation method by input signal(Pulse train enabled)	Position/full-closed control

Set Pr.60.55 “Set invalid origin return” to 1 to conduct relative positioning action or absolute positioning action omitting origin return action under increment mode. In such a case, the position when the power is reclosed shall become the origin (0). Origin return action will not be required in case of JOG.

Class	No.	Parameter name	Set range	Attribute	Unit	Set value	Contents
60	55	Set invalid origin return	0 to 1	Reclose power supply	-	0	Under increment mode, origin return action will be required prior to relative positioning or absolute positioning action is made. In absolute mode, origin return will not be required, regardless of this setting.
						1	Origin return action will not be required for both increment mode and absolute mode.

Remarks) Increment mode: Position control mode where the current position at the time of power closing will be the origin (0). (Pr0.15 = 1)

Absolute mode: Position control mode where the current position at the time of power closing is referenced by the position memorized by the absolute encoder. (Pr0.15 = non 1)

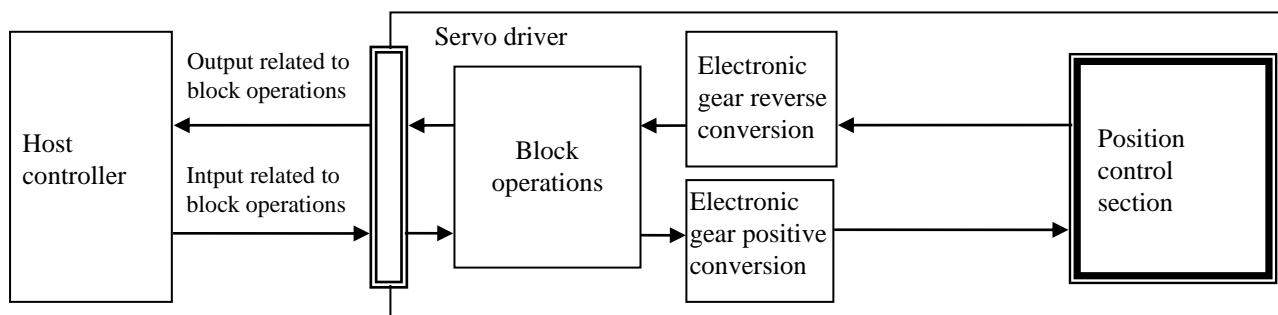
Please set the block parameter prior to starting the block operation. Please refer to Chapter 3 for details of block parameters.

- Limitations when Pr6.28 “Special function select” = 4 “Block operations by input signal enabled (Pulse train enabled)” is true.

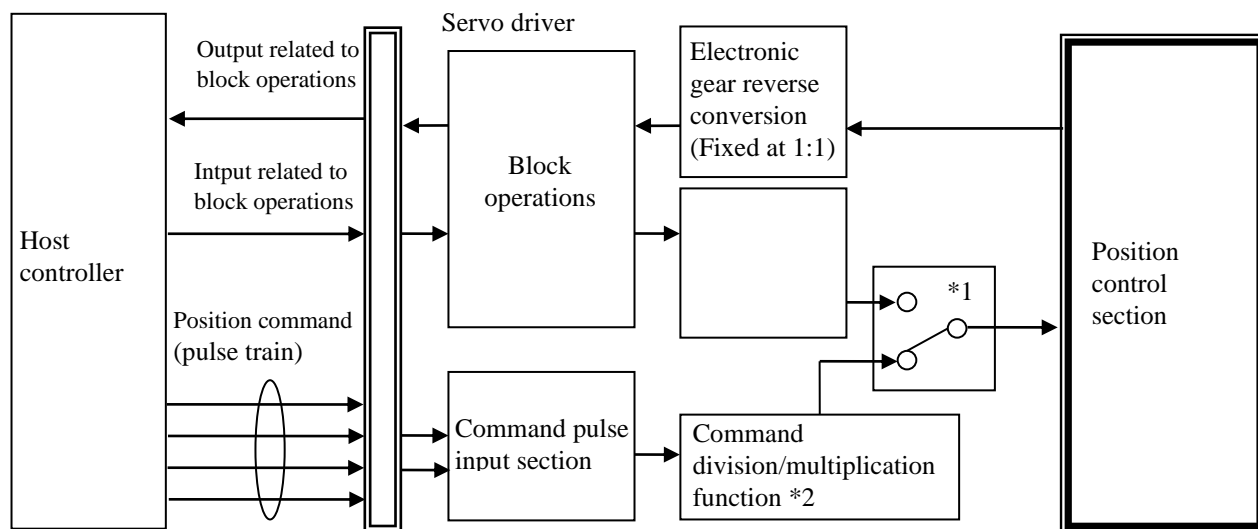
Except that pulse train inputs are accepted and the following constraints, the specifications are the same as those when Pr6.28 “Special function select” = 2 “Block operations by input signal enabled (Pulse train disabled)” is true.

- The electronic gear ratio is fixed at 1:1.
- Only incremental mode (Pr0.15 = 1) is available. *3

< When Pr6.28 “Special function select” = 2 “Block operations by input signal enabled (Pulse train disabled)” is true >



< When Pr6.28 “Special function select” = 4 “Block operations by input signal enabled (Pulse train enabled)” is true >



*1 For details about the switching timing between block operation and pulse train, refer to 4-12-2 “Start and finish of block operation.”

*2 The command division/multiplication applied to pulse train is not 1 time fixed, but changeable.

*3 Any mode other than incremental mode (Pr0.15 ≠ 1) can also be used in the function expansion version 9 or later.

2-4 Set various stop sequence actions

When block operation functions are validated, the following specifications shall apply for stop sequence in case of drive prohibited, servo OFF, main power supply OFF and alarm.

Furthermore, slow stop function (Refer to Technical reference (Functional Specification) 6-5-7) cannot be used when block operation is valid.

▪ Sequence at drive prohibited

Pr5.04	Pr5.05	Decelerating (30 r/min or greater)			After stop (30 r/min or less)		
		Stop method	Deviation	Internal position command generation / Block operation	Command after stop	Deviation	Internal position command generation / Block operation
0	0, 1, 2	Dynamic brake action	Clear	Forced stop	Torque command for drive prohibited direction = 0.	Maintain *1)	Restarting block operation will validate action only in reverse direction to the drive prohibited direction.*2)

(Note) Origin return is not dependent on the value of Pr.5.05 “(Sequence at drive prohibited). Please refer to paragraph 4-5 for details.

- *1) In case drive prohibited input is detected while in action at 30 r/min or less, deviation will be temporarily cleared at the detection timing.
- *2) Block operation will be forced stop, in case drive prohibited input is detected while in action at 30 r/min or less.
Please note that internal position command will be generated in where the torque command is 0 (zero) and block operation has been restarted against the drive prohibited direction.

▪ Sequence at servo OFF

Pr5.06	Decelerating (30 r/min or greater)			After stop (30 r/min or less)		
	Stop method	Deviation	Internal position command generation / Block operation	Command after stop	Deviation	Internal position command generation / Block operation
0, 4	Dynamic brake action	Clear	Forced stop	Dynamic brake action	Clear	Forced stop
1, 5	Free run	Clear	Forced stop	Dynamic brake action	Clear	Forced stop
2, 6	Dynamic brake action	Clear	Forced stop	Free run	Clear	Forced stop
3, 7	Free run	Clear	Forced stop	Free run	Clear	Forced stop
8	Immediate stop*3) *4)	Maintain	Forced stop	Dynamic brake action	Clear	Forced stop
9	Immediate stop*3) *4)	Maintain	Forced stop	Free run	Clear	Forced stop

*3) In case of immediate stop, torque limit shall be in accordance with the set value of Pr 5.11 (Immediate stop torque limit).

*4) For A6SL and A6SM, the stop judgment reference speed can be changed from 30 r/min with the software of function enhancement version 9 or later.
Please refer to MINAS A6L series Technical Reference (Functional specification) for details.

▪ Sequence at main power supply OFF

Pr5.07	Decelerating (30 r/min or greater)			After stop (30 r/min or less)		
	Stop method	Deviation	Internal position command generation / Block operation	Command after stop	Deviation	Internal position command generation / Block operation
0,4	Dynamic brake action	Clear	Forced stop	Dynamic brake action	Clear	Forced stop
1,5	Free run	Clear	Forced stop	Dynamic brake action	Clear	Forced stop
2,6	Dynamic brake action	Clear	Forced stop	Free run	Clear	Forced stop
3,7	Free run	Clear	Forced stop	Free run	Clear	Forced stop
8	Immediate stop *5) *6)	Maintain	Forced stop	Dynamic brake action	Clear	Forced stop
9	Immediate stop *5) *6)	Maintain	Forced stop	Free run	Clear	Forced stop

*5) In case of immediate stop, torque limit shall be in accordance with the set value of Pr 5.11 (Immediate stop torque limit).

*6) For A6SL and A6SM, the stop judgment reference speed can be changed from 30 r/min with the software of function enhancement version 9 or later.

Please refer to MINAS A6L series Technical Reference (Functional specification) for details.

▪ Sequence at alarm

Pr5.10	Decelerating (30 r/min or greater)			After stop (30 r/min or less)		
	Stop method	Deviation	Internal position command generation / Block operation	Command after stop	Deviation	Internal position command generation / Block operation
0	Dynamic brake action	Clear	Forced stop	Dynamic brake action	Clear	Forced stop
1	Free run	Clear	Forced stop	Dynamic brake action	Clear	Forced stop
2	Dynamic brake action	Clear	Forced stop	Free run	Clear	Forced stop
3	Free run	Clear	Forced stop	Free run	Clear	Forced stop
4	Action A *7)	Immediate stop *8) *9)	Forced stop	Dynamic brake action	Clear	Forced stop
	Action B *7)	DB action				
5	Action A *7)	Immediate stop *8) *9)	Forced stop	Dynamic brake action	Clear	Forced stop
	Action B *7)	Free run				
6	Action A *7)	Immediate stop *8) *9)	Forced stop	Free run	Clear	Forced stop
	Action B *7)	DB action				
7	Action A *7)	Immediate stop *8) *9)	Forced stop	Free run	Clear	Forced stop
	Action B *7)	Free run				

*7) Actions A and B indicates whether to trigger immediate stop when errors occur. When immediate stop supported alarm has been activated, in case the set value is from 4 to 7, action A will be taken and will stop immediately. In case immediate stop unsupported alarm has been activated, it will not stop immediately, but dynamic brake (DB) action or free run, specified in action B, will be taken.

Please maintain the main circuit power supply until it decelerates and stops.

Please refer to the Technical Reference (Basic function specifications) for immediate stop supporting alarms.

*8) In case of immediate stop, torque limit shall be in accordance with the set value of Pr 5.11 (Immediate stop torque limit).

*9) For A6SL and A6SM, the stop judgment reference speed can be changed from 30 r/min with the software of function enhancement version 9 or later.

Please refer to MINAS A6L series Technical Reference (Functional specification) for details.

2-5 Input/output signal assignment function for block operation

For input/output signals, arbitrary function used for block operation can be assigned to any input/output pin of I/F connector. To use function that relevant to block operation, for instance origin input (HOME) or returned to origin completed state output (HOME-CMP), Pr4.00~Pr4.09 and Pr4.10~Pr4.15 need to be changed and assigned to each of the pins. Function numbers that relevant to block operation are as following.

Input function number for block operation table

Signal name	Symbol	Input signal assignment Pr4.00 to 4.09 Setup value		Corresponding Modbus coil/register	
		a-contact	b-contact		
Invalid	-	00h	Setting is impossible.	-	
Positive direction drive prohibition input	POT	01h	81h	Logic input signal operation	-
Negative direction drive prohibition input	NOT	02h	82h		-
Servo-ON input	SRV-ON	03h	83h		0060h
Alarm clear	A-CLR	04h	Setting is impossible.		0061h
Gain switch input	GAIN	06h	86h		0069h
Torque limit switch input	TL-SEL	09h	89h		0075h
Vibration suppression control switch input	VS-SEL1	0Ah	8Ah		0073h
Vibration suppression control switch input 2	VS-SEL2	0Bh	8Bh		0076h
Forced alarm input	E-STOP	14h	94h		0067h
Inertia ratio switch input	J-SEL	15h	95h		0072h
Dynamic brake switching input	DB-SEL	16h	Setting is impossible.		-
Position compare switch input	CMP-SEL	17h	97h		-
Origin input	HOME	21h	A1h	Block operation control operation	0122h
Immediate stop input	H-STOP	22h	A2h		0123h
Decelerated stop input	S-STOP	23h	A3h		0124h
Strobe input	STB	24h	A4h		0120h
Designated block number input 1	B-SEL 1	25h	A5h	4414h "Block number"	
Designated block number input 2	B-SEL 2	26h	A6h		
Designated block number input 4	B-SEL 4	27h	A7h		
Designated block number input 8	B-SEL 8	28h	A8h		
Designated block number input 16	B-SEL 16	29h	A9h		
Designated block number input 32	B-SEL 32	2Ah	AAh		
Designated block number input 64	B-SEL 64	2Bh	ABh		
Designated block number input 128	B-SEL 128	2Ch	ACCh		

Output function number for block operation table

Signal name	Symbol	Output signal assignment Pr4.10 to 4.15 Setup value	Corresponding Modbus coil	
Invalid	-	00h	-	
Alarm output	ALM	01h	Logic output state monitor	00A1h
Servo-ready output	S-RDY	02h		00A0h
External brake release signal	BRK-OFF	03h		00A3h
Positioning complete	INP	04h		00A2h
Speed arrival output	AT-SPEED	05h		00A9h
Torque in-limit signal is output	TLC	06h		00A5h
Zero-speed detection signal	ZSP	07h		00A4h
Speed matching output	V-COIN	08h		00A6h
Warning output 1	WARN1	09h		00B0h
Warning output 2	WARN2	0Ah		00B1h
Position command ON/OFF output	P-CMD	0Bh		00B2h
Positioning complete 2	INP2	0Ch		00B3h
Speed in-limit output	V-LIMIT	0Dh		00B4h
Alarm attribute output	ALM-ATB	0Eh		00B5h
Velocity command ON/OFF output	V-CMD	0Fh		00B6h
Servo-ON status output	SRV-ST	10h		-
Position compare output	CMP-OUT	14h		-
Deterioration diagnosis velocity output	V-DIAG	15h		-
Action implementation state output	BUSY	21h	Block operation control operation	0140h
Returned to origin completed state output	HOME-CMP	22h		0141h
Block operation output 1	B-CTRL1	23h		0142h
Block operation output 2	B-CTRL2	24h		0143h
Block operation output 3	B-CTRL3	25h		0144h
Block operation output 4	B-CTRL4	26h		0145h
Block operation output 5	B-CTRL5	27h		0146h
Block operation output 6	B-CTRL6	28h		0147h

Please refer to the Technical Reference (Functional specifications) for detail of input/output signal assignment.
[Block operation disabled (Pr6.28=0)]

- Modbus coil is disabled for block operation-related input functions and enabled for block operation-related output functions(except 21h(BUSY) to 28h(B-CTRL6)).

[When block operation by Modbus communication start is valid (Pr6.28 =1)]

- I/F connector input and Modbus coil (Logic input signal operation/block operation control operation) will function in OR. However, servo on input (SRV-ON) will function as AND for the I/F connector input and Modbus coil (0060h). In case servo on input is not assigned to the I/F connector input, servo on/off will be operated only by the Modbus coil (0060h).
- Modbus register 4414h "Block number" is used to designate block numbers (0 to 255).
(Designated block number input is invalid)

[When block operation by start by input signal is effective (Pr6.28 = 2,4)]

- Modbus coil is disabled for block operation-related input functions and enabled for block operation-related output functions.
- Use designated block number input to designate block numbers (0 to 255). In order to designate all 256 blocks, it is necessary to allocate all 8 signals of B-SEL1 to B-SEL128 as input signals. The method to designate block numbers are as follows: (Modbus register 4414h "Block number" is disabled)

Block number	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Designated block number input	B-SEL 128	B-SEL 64	B-SEL 32	B-SEL 16	B-SEL 8	B-SEL 4	B-SEL 2	B-SEL 1

(Example) To designate Block number 145 B-SEL 1, B-SEL 16 and B-SEL 128 must be turned ON.

2-6 Wraparound of command position

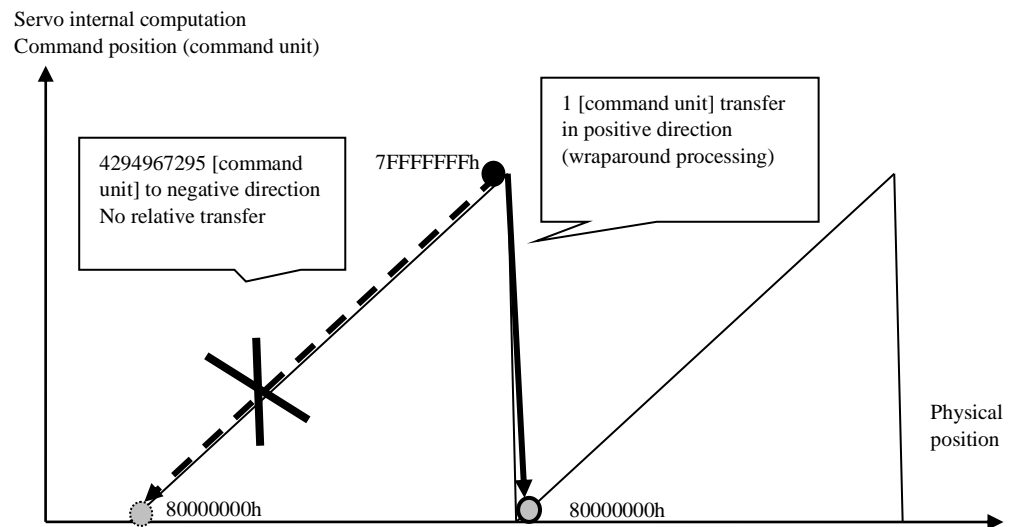
Wrap around processing will be activated when the amount of change of the command position exceeds the following values:

Absolute encoder setting	Command position range [Command unit]		Wraparound threshold [Command unit]
	Lower limit	Upper limit	
Infinite rotation absolute mode *1)	0	$(2^{23} \times (\text{set value for Pr6.88} + 1) / \text{Electronic gear ratio}) - 1$	$(2^{23} \times (\text{set value for Pr6.88} + 1) / \text{Electronic gear ratio}) / 2$
Other than infinite rotation absolute mode	80000000h (-2147483648)	7FFFFFFFh (2147483647)	7FFFFFFFh (2147483647)

*1) Please refer to 6-1 for infinite rotation absolute mode.

Example of wraparound processing

When absolute target position has changed from 7FFFFFFFh to 80000000h in Infinite rotation absolute mode.



2-7 Initialization of absolute encoder

*This shall not apply to MINAS-A6L Series ([A6SL]/[A6SM]).

Homing operation is not necessary with the absolute encoder at the position control mode (except when using the absolute encoder as the incremental mode). However, it is necessary to clear “Multi-turn data” at the first start up of the machine after installing the battery. If Err94.2 occurs at return to origin in absolute mode, it is necessary to clear multi-turn data.

2-7-1 Absolute data

There are 2 types of data which are read out from the absolute encoder (23 bits/r), “Single-turn data” which shows the position of motor’s rotation within a single turn, and “Multi-turn data” which counts each single turn. Of these, because the multi-rotation data is an electrical counter, it is backed up internally.

Both data have a polarity to increase in the direction of CCW.

You can select whether Err41.0, “Absolute encoder counter overflow” will be generated or not when Multi-turn data has overflowed, with the parameter, Pr0.15 “Absolute encoder set up”.

	Back up when power supply has been shut off	Data width	Code	Data range
Single rotation data	Not required	23 bit	None	0 to 8388607
Multi-rotation data	*2)	16 bit	Yes	0 to 65535 (max) *1)

*1) In the infinite rotation absolute mode, the upper limit can be set by Pr6.68 “Absolute multi-rotation upper limit.”

Set to 65535 (maximum value) for setting other than infinite rotation absolute mode.

Please refer to 6-1 for infinite rotation absolute mode.

*2) Backup in the event of power shutdown varies depending on Pr0.15 "Absolute Encoder Setting".

Absolute encoder type	Pr0.15 “Absolute encoder setup”	
	0, 2, 4	1
Battery-powered	Battery backup	Not required
Battery-less *3)	Not required	

*3) It is not supported in versions corresponding to function enhancement version 3 or earlier.

When power is switched on, the servo amplifier will set the motor position based on the following formula:

The range of actual position (APOS) is 32 bits, and it is calculated from multi-rotation data and one rotation data.

A 23-bit absolute encoder uses 23 bits for single-turn data and 16 bits for multi-turn data, which amounts to 39 bits for compound data, but a Actual position value returned to the host device is a 32-bit value.

Parameter Pr.0.00 (Rotational direction setup)	Actual_position *3)
When set to 1 (CCW is positive direction)	$APOS = ((M \times 2^{23} + S) \times \text{electric gear reverse conversion value}) + OFS$
When set to 0 (CW is positive direction)	$APOS = - ((M \times 2^{23} + S) \times \text{electric gear reverse conversion value}) + OFS$

APOS : Actual_Position

Motor position

M : Multi-turn_Data


Multi-rotation data

S : Single-turn_Data

Single rotation data

OFS : Pr60.49 "Origin offset"

Function enhancement version 6 and later versions have extended effective bit length for multi-turn data, and can handle number of turns up to 65535 by setting Pr6.98 bit22 “Effective bit extension for multi-turn data” to 1.

	Pr6.98 bit22	Effective range for encoder data[pulse]		Actual positions data *2)		Effective maximum number of turns *1)	Err29.1
				(Multi-turn data $\times 2^{23}$ + Single-turn) / Electronic Gear			
				Electronic Gear ratio	Data range		
Function enhancement version 5 and earlier	-	Single turn data Multi-turn data		1 time or more	32bit	511 (-256–255)	- *4)
Function enhancement version 6 and later	0	23bit	9bit	Less than 1 time	32bit	510 or less (-255 or more – 254 or less) * It depends on the electronic gear ratio.	Detection *3)
			7bit Ignore				
	1	Single turn data Multi-turn data		128 times or more	32bit	65535 (-32768–32767)	- *4)
		23bit	16bit	Less than 128 times	32bit	65534 or less (-32767 or more – 32766 or less) * It depends on the electronic gear ratio.	Detection *3)

*1) For the value of multi-rotation data, unrestricted information (0 to 65535) is displayed as unsigned data on the PANATERM and via Modbus communication.

(In the infinite rotation absolute mode, the value of Pr6.88 is the upper limit to be displayed.) For a generated actual position [command unit], the signed data in () is used.

•"When Pr6.98 bit 22 is 0"

With the upper 7 bits of the multi-rotation data being ignored, the actual position is calculated in the range of the effective maximum rotation speed.

Example) The actual position is calculated, using multi-rotation data 1 = 1, 256 = -256, and 511 = -1.

If it is out of the range of the effective maximum rotation speed (the upper 7 bits of multi-rotation data are not 0), it is initialized at the same actual position as within the range of the effective maximum rotation speed (the upper 7 bits of multi-rotation data are 0).

•"When Pr6.98 bit 22 is 1"

With the upper 16 bits of the multi-rotation data being valid, the actual position is calculated within the range of the effective maximum rotation speed.

Example) The actual position is calculated, using multi-rotation data 1 = 1, 32768 = -32768, and 65535 = -1.

*2) The value of the actual position calculated from one rotation data, multi-rotation data, and the electronic gear inverse calculation value must be within 32-bit width. Make sure that the actual position does not exceed this range.

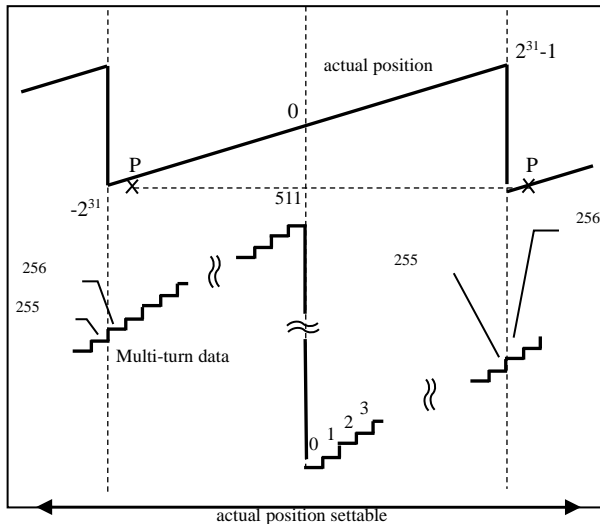
*3) If the value of the actual position calculated from one rotation data, multi-rotation data, and the electronic gear inverse calculation value exceeds 32-bit width, Err29.1 “Counter Overflow Protection 1” is generated.

*4) If you want to rotate it infinitely in one direction, set it to "Pr6.98 bit 3 = 1 and electronic gear ratio: 1 time or more" or "Pr6.98 bit 3 = 0 and electronic gear ratio: 128 times or more" to avoid error detection.
However, depending on the setting of the electronic gear ratio, the position when the power is turned on again after the actual position exceeds 32 bits may differ from the position before power shutdown.

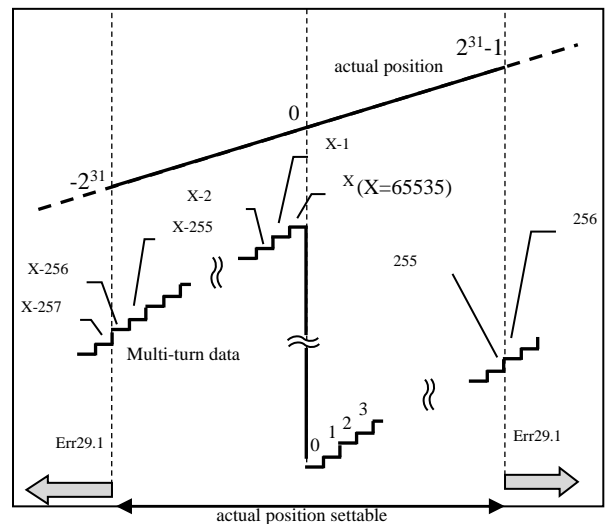
Since the shipment setup value for Pr6.98 bit22 is 0, use it by setting Pr6.98 bit22 to 0 if you wish to mask the upper 7bit of multi-turn data. The purposes to mask the upper 7bit of multi-turn data include axes turning infinitely in one direction with electronic gear ratio of 1. Please note that there are multiple actual positions.

Differences in actual position by the effective multi-turn bit number when electronic gear ratio is 1 are shown below.

[Function enhancement version 5 and earlier,
Function e enhancement version 6 and later,
and Pr6.98 bit22=0]



[Function enhancement version 6 and later,
and Pr6.98 bit22=1]



In addition, it can be calculated using the equation below if the position information on absolute encoder of 32bit or larger is required.

Please multiply this result by the reciprocal of electronic gear ratio when using electronic gear.

You can obtain single-turn data and multi-turn data by the PANATEM and via Modbus communication.

$$\text{Position information on absolute encoder} = \text{Multi-turn data} \times 2^{23} + \text{single-turn data}$$

2-7-2 Clearing multi-rotation data

When multi-rotation data is cleared, the point of variation of multi-rotation data on the CW side of the position where the clear was made, shall become the actual position “0.” To prevent deviation when setting, please conduct “clear” in a position that is farthest away from the point of variation of multi-rotation data, where the one rotation data is 2^{22} (for 23 bits/r).

<Points to note to prevent unnecessary troubles>

When clearing multi-rotation data, please turn off the servo, immobilize it with a brake, etc., if required, and secure safety before taking any action
Maintain the servo in OFF state during the operation, and after completion, first turn off all control power supply, and then reclose the power supply

Use set-up support software PANATERM (via USB communication) or Modbus communication to clear the multi-rotation data. *2)

When multi-rotation data is cleared, Err27.1 “Absolute clear error protection” will occur. This is a safety feature and is not an abnormality.

*2) Write values into the following register to clear multi-rotation data via Modbus communication.

Address 4100h “Absolute multiturn data clear function“

6165h : Execute absolute clear

3. Block parameters

This chapter lists the parameters related to block operation. These parameters must be set before activating the block operations. No guarantees can be made for the action due to the block operation related parameters changed after activation of block operation.

Unexpected action may occur as a result of errors in the setting of block operation commands and data, etc. The customer is requested to carry out fail-safe design and to secure safety within its operating range at the location of use.

Block parameters can be set by either of the following methods:

- Set-up support software (PANATERM)
Selecting “Other” → “Block operation editor” from the tool bar will enable the editing of block data (Classifications 56 to 59) and operation setting (Classification 60) in their respective dedicated screens. Clicking on the block number to be edited will indicate the edit screen.
- Via Modbus communications
Use Modbus function code “Write register (06h)” or “Write multiple registers (10h)” to write data into registers 4600h to 4BFFh (block parameter domain).
Please refer to 2-1-4-2 for details of the function codes and 2-1-4-4 for details of the registers.

3-1 Action set parameters

Classification	No	Name	Attribute	Size [bit]	Contents
60	0	Velocity [0]	Always effective *1)	16	Able to provide 16 types of block operation velocity. Units: [r/min] Set range: 0 to 32767 *2) *3) target velocity=velocity (Pr60.0~15) Set the values of argument 1 for relative positioning, absolute positioning, JOG, and speed update commands. The number set inside the brackets [] of the parameter name (velocity number) shall be set for the argument 1 of each command, and not the parameter No.
	1	Velocity [1]			
	2	Velocity [2]			
	3	Velocity [3]			
	4	Velocity [4]			
	5	Velocity [5]			
	6	Velocity [6]			
	7	Velocity [7]			
	8	Velocity [8]			
	9	Velocity [9]			
	10	Velocity [10]			
	11	Velocity [11]			
	12	Velocity [12]			
	13	Velocity [13]			
	14	Velocity [14]			
	15	Velocity [15]			
	16	Acceleration time [0]	Always effective *1)	16	It is possible to prepare 16 patterns for the acceleration of JOG acceleration, absolute positioning, and relative positioning. Able to provide 16 types of acceleration. Units: [ms] *6) Set range: 0 to 10000 *3) *4) To be set to acceleration time of 0 to 3000 [r/min]. Acceleration time(time of 0[r/min] to target velocity[r/min])[ms]=target velocity * (acceleration time(Pr60.16~31) * acceleration time unit(Pr60.56)) / 3000
	17	Acceleration time [1]			
	18	Acceleration time [2]			
	19	Acceleration time [3]			
	20	Acceleration time [4]			
	21	Acceleration time [5]			
	22	Acceleration time [6]			
	23	Acceleration time [7]			
	24	Acceleration time [8]			
	25	Acceleration time [9]			
	26	Acceleration time [10]			
	27	Acceleration time [11]			
	28	Acceleration time [12]			
	29	Acceleration time [13]			
	30	Acceleration time [14]			
	31	Acceleration time [15]			

Classification	No.	Name	Attribute	Size [bit]	Contents
60	32	Deceleration time [0]	Always effective *1)	16	<p>It is possible to prepare 16 patterns for the acceleration of JOG acceleration, absolute positioning, and relative positioning. Units: [ms] *6) Set range: 0 to 10000 *3) *4)</p> <p>To be set to deceleration time of 3000 to 0 [r/min]. Deceleration time(time of 0[r/min] to target velocity[r/min])[ms]=target velocity * (deceleration time(Pr60.16~31) * deceleration time unit(Pr60.56)) / 3000</p>
	33	Deceleration time [1]			
	34	Deceleration time [2]			
	35	Deceleration time [3]			
	36	Deceleration time [4]			
	37	Deceleration time [5]			
	38	Deceleration time [6]			
	39	Deceleration time [7]			
	40	Deceleration time [8]			
	41	Deceleration time [9]			
	42	Deceleration time [10]			
	43	Deceleration time [11]			
	44	Deceleration time [12]			
	45	Deceleration time [13]			
	46	Deceleration time [14]			
	47	Deceleration time [15]			
	48	Block operation method setting	Reclose power supply	16	<p>Sets origin offset valid/invalid for absolute mode. bit :0: used by manufacturer: Set fixed to 0 bit 1: Origin offset under absolute mode 0: invalid, 1: valid bit 2 -15: Not used, Set fixed to 0</p> <p>The lowermost bit is bit 0.</p>
	49	Origin offset *5)	Reclose power supply	32	<p>Sets offset amount of origin when origin return is completed in block operation, under increment mode. Sets the amount of offset between the encoder position in block operation and the machine coordinate position under absolute mode. Becomes valid when Pr60.48 (Block operation method setting) bit 1 is set to 1.</p>
	50	Positive direction software limit *5)	Reclose power supply	32	<p>Set range of software limit when origin return is completed in block operation. When Pr60.55 = 1 or in absolute mode, set the software limit for block operation after the power is turned on. When origin return is completed, set the software limit range for block operation after the origin return completion.</p>
	51	Negative direction software limit *5)	Reclose power supply	32	
	52	Origin return velocity (high speed)	Reclose power supply	16	<p>Sets high action velocity for origin return. Units: [r/min] Set range: 0 to 20000 *2) *3)</p>
	53	Origin return velocity (low speed)	Reclose power supply	16	<p>Sets low action velocity for origin return. Units: [r/min] Set range: 0 to 20000 *2) *3)</p>
	54	Origin return acceleration and deceleration	Reclose power supply	16	<p>Sets acceleration and deceleration for origin return action. Units: [ms] Set range: 0 to 10000 *3) *4) To be set for duration from 0 to 3000 [r/min].</p>
	55	Set invalid origin return	Reclose power supply	16	<p>Set to 1 to conduct relative positioning action or absolute positioning action without returning to origin under increment mode. To set the operation range for origin return before the origin return completion, set it to 1 and set Pr60.50 and Pr60.51. Set range: 0 to 1</p> <p>0: Under increment mode, origin return action will be required prior to relative positioning or absolute positioning action is made. In absolute mode, origin return will not be required, regardless of this setting. 1: Origin return action will not be required for both increment mode and absolute mode.</p>

Classification	No.	Name	Attribute	Size [bit]	Classification
60	56	Acceleration time unit *6)	Always effective *1)	16	Set the unit of block operation acceleration time. It does not apply to origin return. Setting range : 0~1000 0 : ms 1 : 0.1 ms 5 : 0.5 ms 10 : ms 100 : 10 ms 1000 : 100 ms Please do not set to values outside the setting range
	57	Deceleration time unit *6)	Always effective *1)	16	Set the unit of block operation deceleration time. It does not apply to origin return. Setting range : 0~1000 0 : ms 1 : 0.1 ms 5 : 0.5 ms 10 : ms 100 : 10 ms 1000 : 100 ms Please do not set to values outside the setting range
	64	For manufacturer's use	-	-	Please set fixed to 0 (zero).

- *1) Although the attribute is always effective, there are no guarantees for changes made while block operation is activated. To be always set before block operation. Always stop the block operation first, before changing values.
- *2) Block related velocity data, as a parameter set value, may be set up to a maximum of 20,000, however, the internal data will be limited to the maximum velocity of the motor.
- *3) If 0 (zero) is set for velocity, acceleration time, and deceleration time when block operation is activated, Err. 93.1 (block data setting abnormal protection) will be triggered.
- *4) Acceleration or deceleration velocity for 0[r/min]↔3000[r/min] exceeds 4294967295 [command units/s²], Err93.1 "Block data setting error protection" will be triggered .

【In case of Position control】

$$\begin{aligned} \text{acceleration[command units/s}^2\text{]} &= \text{velocity[r/s]}(3000[\text{r/min}] \div 60[\text{s}]) \\ &\quad \times \text{encoder resolution[pulse]} \div \text{electronic gear ratio} \\ &\quad \div \text{acceleration time[s]}(\text{Pr60.16} \sim 60.31[\text{ms}] \div 1000[\text{ms}]) \end{aligned}$$

For example, when the encoder resolution is 8388608 (= 2²³), the electronic gear ratio is 1/1, and Pr60.56 = 0, it will be as follows.

- Pr60.16=97 : Velocity becomes "50×8388698÷1÷1÷97÷1000=4324024742", Err93.1 will occur.
- Pr60.16=98 : Velocity becomes "50×8388608÷1÷1÷98÷1000=4279902041", Err93.1 will not occur.

【In case of full-closed control】

$$\begin{aligned} \text{acceleration[command units/s}^2\text{]} &= \text{velocity[r/s]}(3000[\text{r/min}] \div 60[\text{s}]) \\ &\quad \times \text{encoder resolution[pulse]} \div \text{electronic gear ratio} \\ &\quad \div \text{acceleration time[s]}(\text{Pr60.16} \sim 60.31[\text{ms}] \div 1000[\text{ms}]) \end{aligned}$$

【In case of linear motor】

$$\begin{aligned} \text{acceleration[command units/s}^2\text{]} &= \text{velocity[r/s]}(3000[\text{r/min}] \div 60[\text{s}]) \\ &\quad \times \text{encoder resolution[pulse]} \div \text{electronic gear ratio} \\ &\quad \div \text{acceleration time[s]}(\text{Pr60.16} \sim 60.31[\text{ms}] \div 1000[\text{ms}]) \end{aligned}$$

- *5) Please set positive direction soft limit with a value larger than the negative direction soft limit. Furthermore, the value for origin offset must be set to a value equal or larger than negative direction soft limit but equal or smaller than positive direction soft limit.
- *6) In Function enhancement version 8 and later, it is possible to change the unit of acceleration time unit with Pr60.56 and deceleration time unit with Pr60.57.

3-2 Block data

Block data is comprised of 64 bits of data per block, and is separated into 32 bit command region (block[n].command) and 32 bit data region (block[n].data).

(Note) Value in [] denotes the block number.

These block data are assigned to parameters (classifications 56 through 59) and must be set before the start of block operation.

Contents of block data will differ with each command. Please refer to Chapter 4 for details.

3-2-1 Block [n]. command structure

bit byte	7	6	5	4	3	2	1	0
0	(Reserved)							
1	Argument 3				Argument 4		Argument 5	
2	Argument 1				Argument 2			
3	Command code							

3-2-2 Block [n]. data structure

bit byte	7	6	5	4	3	2	1	0
0	Argument 7							LL
1								LH
2								HL
3								HH

3-2-3 Block data assignment

Although the attribute is always effective, there are no guarantees for changes made while block operation is activated. To be always set before block operation. Always stop the block operation first, before changing values.

Classification	No.	Name	Attribute	Size [bit]
56	000	Block[0].command	Always effective	32
	001	Block[0].data		32
	002	Block[1].command		32
	003	Block[1].data		32
	004	Block[2].command		32
	005	Block[2].data		32
	006	Block[3].command		32
	007	Block[3].data		32
	008	Block[4].command		32
	009	Block[4].data		32
	010	Block[5].command		32
	011	Block[5].data		32
	012	Block[6].command		32
	013	Block[6].data		32
	014	Block[7].command		32
	015	Block[7].data		32
	016	Block[8].command		32
	017	Block[8].data		32
	018	Block[9].command		32
	019	Block[9].data		32
	020	Block[10].command		32
	021	Block[10].data		32
	022	Block[11].command		32
	023	Block[11].data		32
	024	Block[12].command		32
	025	Block[12].data		32
	026	Block[13].command		32
	027	Block[13].data		32
	028	Block[14].command		32
	029	Block[14].data		32
	030	Block[15].command		32
	031	Block[15].data		32
	032	Block[16].command		32
	033	Block[16].data		32
	034	Block[17].command		32
	035	Block[17].data		32
	036	Block[18].command		32
	037	Block[18].data		32
	038	Block[19].command		32
	039	Block[19].data		32
	040	Block[20].command		32
	041	Block[20].data		32
	042	Block[21].command		32
	043	Block[21].data		32
	044	Block[22].command		32
	045	Block[22].data		32
	046	Block[23].command		32
	047	Block[23].data		32
	048	Block[24].command		32
	049	Block[24].data		32
	050	Block[25].command		32
	051	Block[25].data		32
	052	Block[26].command		32
	053	Block[26].data		32
	054	Block[27].command		32
	055	Block[27].data		32
	056	Block[28].command		32
	057	Block[28].data		32
	058	Block[29].command		32
	059	Block[29].data		32
	060	Block[30].command		32
	061	Block[30].data		32
	062	Block[31].command		32
	063	Block[31].data		32

Classification	No.	Name	Attribute	Size [bit]
56	064	Block[32].command	Always effective	32
	065	Block[32].data		32
	066	Block[33].command		32
	067	Block[33].data		32
	068	Block[34].command		32
	069	Block[34].data		32
	070	Block[35].command		32
	071	Block[35].data		32
	072	Block[36].command		32
	073	Block[36].data		32
	074	Block[37].command		32
	075	Block[37].data		32
	076	Block[38].command		32
	077	Block[38].data		32
	078	Block[39].command		32
	079	Block[39].data		32
	080	Block[40].command		32
	081	Block[40].data		32
	082	Block[41].command		32
	083	Block[41].data		32
	084	Block[42].command		32
	085	Block[42].data		32
	086	Block[43].command		32
	087	Block[43].data		32
	088	Block[44].command		32
	089	Block[44].data		32
	090	Block[45].command		32
	091	Block[45].data		32
	092	Block[46].command		32
	093	Block[46].data		32
	094	Block[47].command		32
	095	Block[47].data		32
	096	Block[48].command		32
	097	Block[48].data		32
	098	Block[49].command		32
	099	Block[49].data		32
	100	Block[50].command		32
	101	Block[50].data		32
	102	Block[51].command		32
	103	Block[51].data		32
	104	Block[52].command		32
	105	Block[52].data		32
	106	Block[53].command		32
	107	Block[53].data		32
	108	Block[54].command		32
	109	Block[54].data		32
	110	Block[55].command		32
	111	Block[55].data		32
	112	Block[56].command		32
	113	Block[56].data		32
	114	Block[57].command		32
	115	Block[57].data		32
	116	Block[58].command		32
	117	Block[58].data		32
	118	Block[59].command		32
	119	Block[59].data		32
	120	Block[60].command		32
	121	Block[60].data		32
	122	Block[61].command		32
	123	Block[61].data		32
	124	Block[62].command		32
	125	Block[62].data		32
	126	Block[63].command		32
	127	Block[63].data		32

Classification	No.	Name	Attribute	Size [bit]
57	000	Block[64].command	Always effective	32
	001	Block[64].data		32
	002	Block[65].command		32
	003	Block[65].data		32
	004	Block[66].command		32
	005	Block[66].data		32
	006	Block[67].command		32
	007	Block[67].data		32
	008	Block[68].command		32
	009	Block[68].data		32
	010	Block[69].command		32
	011	Block[69].data		32
	012	Block[70].command		32
	013	Block[70].data		32
	014	Block[71].command		32
	015	Block[71].data		32
	016	Block[72].command		32
	017	Block[72].data		32
	018	Block[73].command		32
	019	Block[73].data		32
	020	Block[74].command		32
	021	Block[74].data		32
	022	Block[75].command		32
	023	Block[75].data		32
	024	Block[76].command		32
	025	Block[76].data		32
	026	Block[77].command		32
	027	Block[77].data		32
	028	Block[78].command		32
	029	Block[78].data		32
	030	Block[79].command		32
	031	Block[79].data		32
	032	Block[80].command		32
	033	Block[80].data		32
	034	Block[81].command		32
	035	Block[81].data		32
	036	Block[82].command		32
	037	Block[82].data		32
	038	Block[83].command		32
	039	Block[83].data		32
	040	Block[84].command		32
	041	Block[84].data		32
	042	Block[85].command		32
	043	Block[85].data		32
	044	Block[86].command		32
	045	Block[86].data		32
	046	Block[87].command		32
	047	Block[87].data		32
	048	Block[88].command		32
	049	Block[88].data		32
	050	Block[89].command		32
	051	Block[89].data		32
	052	Block[90].command		32
	053	Block[90].data		32
	054	Block[91].command		32
	055	Block[91].data		32
	056	Block[92].command		32
	057	Block[92].data		32
	058	Block[93].command		32
	059	Block[93].data		32
	060	Block[94].command		32
	061	Block[94].data		32
	062	Block[95].command		32
	063	Block[95].data		32

Classification	No.	Name	Attribute	Size [bit]
57	064	Block[96].command	Always effective	32
	065	Block[96].data		32
	066	Block[97].command		32
	067	Block[97].data		32
	068	Block[98].command		32
	069	Block[98].data		32
	070	Block[99].command		32
	071	Block[99].data		32
	072	Block[100].command		32
	073	Block[100].data		32
	074	Block[101].command		32
	075	Block[101].data		32
	076	Block[102].command		32
	077	Block[102].data		32
	078	Block[103].command		32
	079	Block[103].data		32
	080	Block[104].command		32
	081	Block[104].data		32
	082	Block[105].command		32
	083	Block[105].data		32
	084	Block[106].command		32
	085	Block[106].data		32
	086	Block[107].command		32
	087	Block[107].data		32
	088	Block[108].command		32
	089	Block[108].data		32
	090	Block[109].command		32
	091	Block[109].data		32
	092	Block[110].command		32
	093	Block[110].data		32
	094	Block[111].command		32
	095	Block[111].data		32
	096	Block[112].command		32
	097	Block[112].data		32
	098	Block[113].command		32
	099	Block[113].data		32
	100	Block[114].command		32
	101	Block[114].data		32
	102	Block[115].command		32
	103	Block[115].data		32
	104	Block[116].command		32
	105	Block[116].data		32
	106	Block[117].command		32
	107	Block[117].data		32
	108	Block[118].command		32
	109	Block[118].data		32
	110	Block[119].command		32
	111	Block[119].data		32
	112	Block[120].command		32
	113	Block[120].data		32
	114	Block[121].command		32
	115	Block[121].data		32
	116	Block[122].command		32
	117	Block[122].data		32
	118	Block[123].command		32
	119	Block[123].data		32
	120	Block[124].command		32
	121	Block[124].data		32
	122	Block[125].command		32
	123	Block[125].data		32
	124	Block[126].command		32
	125	Block[126].data		32
	126	Block[127].command		32
	127	Block[127].data		32

Classification	No.	Name	Attribute	Size [bit]
58	000	Block[128].command	Always effective	32
	001	Block[128].data		32
	002	Block[129].command		32
	003	Block[129].data		32
	004	Block[130].command		32
	005	Block[130].data		32
	006	Block[131].command		32
	007	Block[131].data		32
	008	Block[132].command		32
	009	Block[132].data		32
	010	Block[133].command		32
	011	Block[133].data		32
	012	Block[134].command		32
	013	Block[134].data		32
	014	Block[135].command		32
	015	Block[135].data		32
	016	Block[136].command		32
	017	Block[136].data		32
	018	Block[137].command		32
	019	Block[137].data		32
	020	Block[138].command		32
	021	Block[138].data		32
	022	Block[139].command		32
	023	Block[139].data		32
	024	Block[140].command		32
	025	Block[140].data		32
	026	Block[141].command		32
	027	Block[141].data		32
	028	Block[142].command		32
	029	Block[142].data		32
	030	Block[143].command		32
	031	Block[143].data		32
	032	Block[144].command		32
	033	Block[144].data		32
	034	Block[145].command		32
	035	Block[145].data		32
	036	Block[146].command		32
	037	Block[146].data		32
	038	Block[147].command		32
	039	Block[147].data		32
	040	Block[148].command		32
	041	Block[148].data		32
	042	Block[149].command		32
	043	Block[149].data		32
	044	Block[150].command		32
	045	Block[150].data		32
	046	Block[151].command		32
	047	Block[151].data		32
	048	Block[152].command		32
	049	Block[152].data		32
	050	Block[153].command		32
	051	Block[153].data		32
	052	Block[154].command		32
	053	Block[154].data		32
	054	Block[155].command		32
	055	Block[155].data		32
	056	Block[156].command		32
	057	Block[156].data		32
	058	Block[157].command		32
	059	Block[157].data		32
	060	Block[158].command		32
	061	Block[158].data		32
	062	Block[159].command		32
	063	Block[159].data		32

Classification	No.	Name	Attribute	Size [bit]
58	064	Block[160].command	Always effective	32
	065	Block[160].data		32
	066	Block[161].command		32
	067	Block[161].data		32
	068	Block[162].command		32
	069	Block[162].data		32
	070	Block[163].command		32
	071	Block[163].data		32
	072	Block[164].command		32
	073	Block[164].data		32
	074	Block[165].command		32
	075	Block[165].data		32
	076	Block[166].command		32
	077	Block[166].data		32
	078	Block[167].command		32
	079	Block[167].data		32
	080	Block[168].command		32
	081	Block[168].data		32
	082	Block[169].command		32
	083	Block[169].data		32
	084	Block[170].command		32
	085	Block[170].data		32
	086	Block[171].command		32
	087	Block[171].data		32
	088	Block[172].command		32
	089	Block[172].data		32
	090	Block[173].command		32
	091	Block[173].data		32
	092	Block[174].command		32
	093	Block[174].data		32
	094	Block[175].command		32
	095	Block[175].data		32
	096	Block[176].command		32
	097	Block[176].data		32
	098	Block[177].command		32
	099	Block[177].data		32
	100	Block[178].command		32
	101	Block[178].data		32
	102	Block[179].command		32
	103	Block[179].data		32
	104	Block[180].command		32
	105	Block[180].data		32
	106	Block[181].command		32
	107	Block[181].data		32
	108	Block[182].command		32
	109	Block[182].data		32
	110	Block[183].command		32
	111	Block[183].data		32
	112	Block[184].command		32
	113	Block[184].data		32
	114	Block[185].command		32
	115	Block[185].data		32
	116	Block[186].command		32
	117	Block[186].data		32
	118	Block[187].command		32
	119	Block[187].data		32
	120	Block[188].command		32
	121	Block[188].data		32
	122	Block[189].command		32
	123	Block[189].data		32
	124	Block[190].command		32
	125	Block[190].data		32
	126	Block[191].command		32
	127	Block[191].data		32

Classification	No.	Name	Attribute	Size [bit]
59	000	Block[192].command	Always effective	32
	001	Block[192].data		32
	002	Block[193].command		32
	003	Block[193].data		32
	004	Block[194].command		32
	005	Block[194].data		32
	006	Block[195].command		32
	007	Block[195].data		32
	008	Block[196].command		32
	009	Block[196].data		32
	010	Block[197].command		32
	011	Block[197].data		32
	012	Block[198].command		32
	013	Block[198].data		32
	014	Block[199].command		32
	015	Block[199].data		32
	016	Block[200].command		32
	017	Block[200].data		32
	018	Block[201].command		32
	019	Block[201].data		32
	020	Block[202].command		32
	021	Block[202].data		32
	022	Block[203].command		32
	023	Block[203].data		32
	024	Block[204].command		32
	025	Block[204].data		32
	026	Block[205].command		32
	027	Block[205].data		32
	028	Block[206].command		32
	029	Block[206].data		32
	030	Block[207].command		32
	031	Block[207].data		32
	032	Block[208].command		32
	033	Block[208].data		32
	034	Block[209].command		32
	035	Block[209].data		32
	036	Block[210].command		32
	037	Block[210].data		32
	038	Block[211].command		32
	039	Block[211].data		32
	040	Block[212].command		32
	041	Block[212].data		32
	042	Block[213].command		32
	043	Block[213].data		32
	044	Block[214].command		32
	045	Block[214].data		32
	046	Block[215].command		32
	047	Block[215].data		32
	048	Block[216].command		32
	049	Block[216].data		32
	050	Block[217].command		32
	051	Block[217].data		32
	052	Block[218].command		32
	053	Block[218].data		32
	054	Block[219].command		32
	055	Block[219].data		32
	056	Block[220].command		32
	057	Block[220].data		32
	058	Block[221].command		32
	059	Block[221].data		32
	060	Block[222].command		32
	061	Block[222].data		32
	062	Block[223].command		32
	063	Block[223].data		32

Classification	No.	Name	Attribute	Size [bit]
59	064	Block[224].command	Always effective	32
	065	Block[224].data		32
	066	Block[225].command		32
	067	Block[225].data		32
	068	Block[226].command		32
	069	Block[226].data		32
	070	Block[227].command		32
	071	Block[227].data		32
	072	Block[228].command		32
	073	Block[228].data		32
	074	Block[229].command		32
	075	Block[229].data		32
	076	Block[230].command		32
	077	Block[230].data		32
	078	Block[231].command		32
	079	Block[231].data		32
	080	Block[232].command		32
	081	Block[232].data		32
	082	Block[233].command		32
	083	Block[233].data		32
	084	Block[234].command		32
	085	Block[234].data		32
	086	Block[235].command		32
	087	Block[235].data		32
	088	Block[236].command		32
	089	Block[236].data		32
	090	Block[237].command		32
	091	Block[237].data		32
	092	Block[238].command		32
	093	Block[238].data		32
	094	Block[239].command		32
	095	Block[239].data		32
	096	Block[240].command		32
	097	Block[240].data		32
	098	Block[241].command		32
	099	Block[241].data		32
	100	Block[242].command		32
	101	Block[242].data		32
	102	Block[243].command		32
	103	Block[243].data		32
	104	Block[244].command		32
	105	Block[244].data		32
	106	Block[245].command		32
	107	Block[245].data		32
	108	Block[246].command		32
	109	Block[246].data		32
	110	Block[247].command		32
	111	Block[247].data		32
	112	Block[248].command		32
	113	Block[248].data		32
	114	Block[249].command		32
	115	Block[249].data		32
	116	Block[250].command		32
	117	Block[250].data		32
	118	Block[251].command		32
	119	Block[251].data		32
	120	Block[252].command		32
	121	Block[252].data		32
	122	Block[253].command		32
	123	Block[253].data		32
	124	Block[254].command		32
	125	Block[254].data		32
	126	Block[255].command		32
	127	Block[255].data		32

4. Commands

4-1 Command list

■ Position control

Command name	Blockdata [n] (64bit)							
	Command							Data
	Command code	Argument 1	Argument 2	Argument 3	Argument 4	Argument 5	Argument 6	Argument 7
	8bit	4bit	4bit	4bit	2bit	2bit	8bit	32bit
Relative positioning	01h	Operation (target velocity)	Operation (acceleration time)	Operation (deceleration time)	-	Block transition (the start of the next block, processing continue)	-	Operation (Relative travel amount)
Absolute positioning	02h	Operation (target velocity)	Operation (acceleration time)	Operation (deceleration time)	-	Block transition (the start of the next block, processing continue)	-	Operation (Relative travel amount)
JOG	03h	Operation (target velocity)	Operation (acceleration time)	Operation (deceleration time)	Operation (Operation direction)	Block transition (the start of the next block, processing continue)	-	--
Origin return	04h	Operation (origin detection method)	-	-	Operation (Origin return direction)	Block transition (the start of the next block, processing continue)	-	-
Renew velocity	06h	Operation (target velocity)	-	-	Operation (Operation direction) *1)	Block transition (the start of the next block, processing continue)	-	-

*1) Only effective in case of JOG.

■ Stop

Command name	Blockdata [n] (64bit)							
	Command							Data
	Command code	Argument 1	Argument 2	Argument 3	Argument 4	Argument 5	Argument 6	Argument 7
	8bit	4bit	4bit	4bit	2bit	2bit	8bit	32bit
Decelerate stop	05h	Stop method	-	-	-	Block transition condition	-	-

■ Branches

Command name	Blockdata [n] (64bit)							
	Command							Data
	Command code	Argument 1	Argument 2	Argument 3	Argument 4	Argument 5	Argument 6	Argument 7
	8bit	4bit	4bit	4bit	2bit	2bit	8bit	32bit
Jump	09h	-	Jump destination block			Block transition (the start of the next block, processing continue)	-	-
Conditional branch (=)	0Ah	Comparison judge (comparison item)	TRUE judge condition (Jump destination block)			Block transition (judge method, processing continue)	-	Comparison judge (Comparison value)
Conditional branch (>)	0Bh							
Conditional branch (<)	0Ch							

■ Signal operation

Command name	Blockdata [n] (64bit)							
	Command							Data
	Command code	Argument 1	Argument 2	Argument 3	Argument 4	Argument 5	Argument 6	Argument 7
	8bit	4bit	4bit	4bit	2bit	2bit	8bit	32bit
Output signal operation	08h	Operation (B-CTRL1,B-CTRL2,B-CTRL3, B-CTRL4,B-CTRL5,B-CTRL6)			-	Block transition (the start of the next block, processing continue)	-	-

■ Other

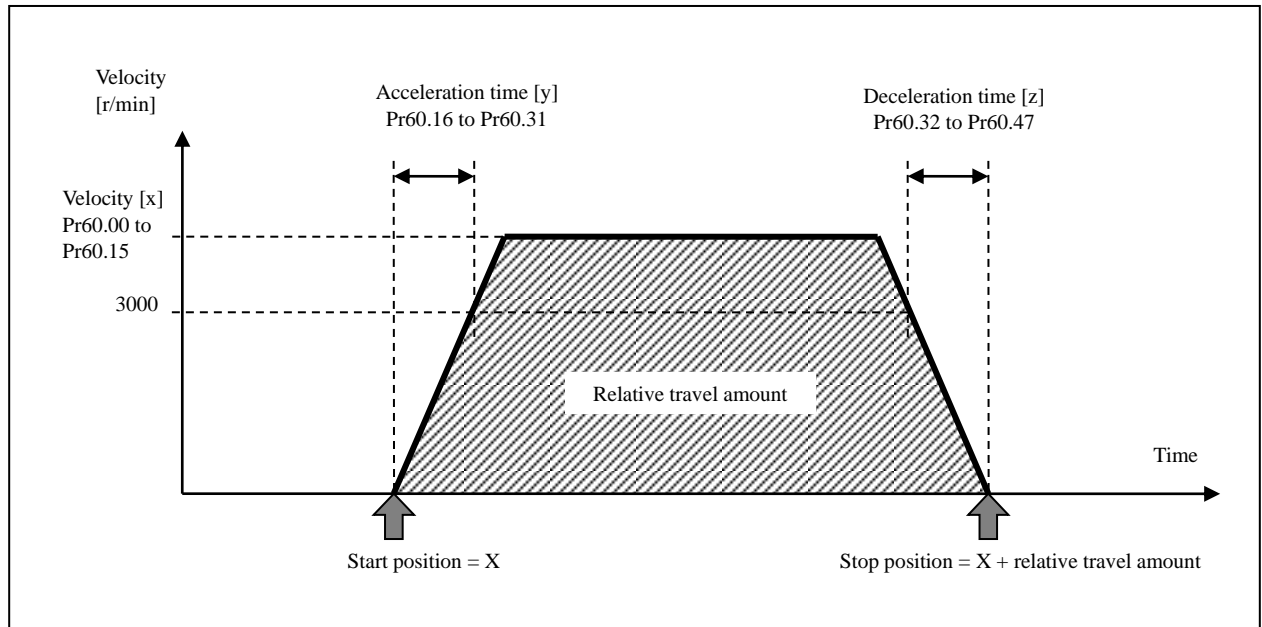
Command name	Blockdata [n] (64bit)							
	Command							Data
	Command code	Argument 1	Argument 2	Argument 3	Argument 4	Argument 5	Argument 6	Argument 7
	8bit	4bit	4bit	4bit	2bit	2bit	8bit	32bit
Decrement counter	07h	-	-	-	-	Block transition (the start of the next block, processing continue)	-	Counter (Time)

4-2 Relative positioning

Command Code : 1h

Used in case of conducting relative positioning action.

Command name	Blockdata [n] (64bit)							
	Command							Data
	Command code	Argument 1	Argument 2	Argument 3	Argument 4	Argument 5	Argument 6	Argument 7
	8bit	4bit	4bit	4bit	2bit	2bit	8bit	32bit
Relative positioning	01h	Operation (target velocity)	Operation (acceleration time)	Operation (deceleration time)	-	Block transition (the start of the next block, processing continue)	-	Operation (Relative travel amount)



Setting items	Argument	Set range	Unit	Description
Block transition				
Continue processing	Argument 5 bit1	0 to 1	—	0 (OFF) : Be terminated with this block. 1 (ON) : Continue block operation.
Start next Block	Argument 5 bit0	0 to 1	—	0 (After start of this Block) : Transit to next Block after start of this Block. 1 (After completion of this block) : Transit to next Block after completion of positioning. *1)
Operation				
Relative travel amount	Argument 7	-2147483647 to 2147483647	Command unit	Set relative travel amount.
Target velocity	Argument 1	0 to 15	r/min	0(Pr60.00 Velocity [0])to15(Pr60.15 Velocity [15]) Target velocity = Velocity [x] * Pr60.64 "Velocity unit"
Acceleration time	Argument 2	0 to 15	Ms *2)	0 (Pr60.16 Acceleration time [0]) to 15 (Pr60.31 Acceleration time [15]) Acceleration time (time from 0[r/min] to target velocity[r/min]) [ms] = target velocity * (Acceleration time[y] * Pr60.56 "Acceleration time unit") / 3000
Deceleration time	Argument 3	0 to 15	Ms *2)	0 (Pr60.32 Deceleration time [0]) to 15 (Pr60.47 Deceleration time [15]) Deceleration time (time from target velocity[r/min] to 0[r/min]) [ms] = target velocity * (Deceleration time[z] * Pr60.57 "Deceleration time unit") / 3000

*1) "After completion of positioning" shall mean the point when internal positioning command generation processing has ended. It is not judged by the actual stopping of the motor. Furthermore, please note that movement command will be issued even if the internal positioning command generation processing has ended, in case position command filter (FIR, smoothing) is being used.

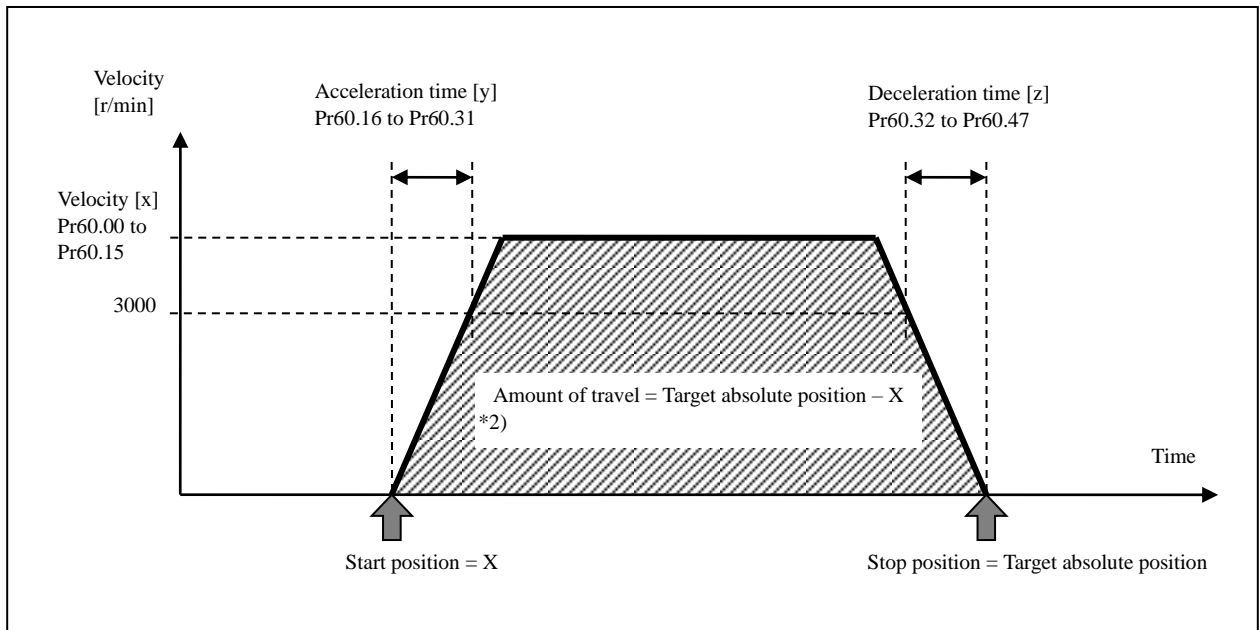
*2) In Function enhancement version 8 and later, it is possible to change the unit of acceleration time unit with Pr60.56 and deceleration time unit with Pr60.57.

4-3 Absolute positioning

Command Code : 2h

Used in case of conducting absolute positioning action.

Command name	Blockdata [n] (64bit)							
	Command							Data
	Command code	Argument 1	Argument 2	Argument 3	Argument 4	Argument 5	Argument 6	Argument 7
	8bit	4bit	4bit	4bit	2bit	2bit	8bit	32bit
Absolute positioning	02h	Operation n (target velocity)	Operation (acceleration time)	Operation (deceleration time)	-	Block transition (the start of the next block,processing continue)	-	Operation (Relative travel amount)



Setting items	Argument	Set range	Unit	Description
Block transition				Set Block transition condition.
Continue processing	Argument 5 bit1	0 to 1	—	0 (OFF) : Be terminated with this block. 1 (ON) : Continue block operation.
Start next Block	Argument 5 bit0	0 to 1	—	0 (After start of this Block) : Transit to next Block after start of this Block. 1 (After completion of this block) : Transit to next Block after completion of positioning. *1)
Operation				Set positioning action.
Target absolute position	Argument 7	-2147483648 to 2147483647	Command unit	Set Target absolute position (signed). When the travel amount is 80000000h(2147483648), perform as if the amount of travel is 0. When the travel amount exceeds 80000000h(2147483648), the wrap around processing will be activated. (Please refer 2-6)
Target velocity	Argument 1	0 to 15	r/min	0(Pr60.00 Velocity [0])to15(Pr60.15 Velocity [15]) Target velocity = Velocity [x] * Pr60.64 "Velocity unit"
Acceleration time	Argument 2	0 to 15	Ms *3	0 (Pr60.16 Acceleration time [0]) to 15 (Pr60.31 Acceleration time [15]) Acceleration time (time from 0[r/min] to target velocity[r/min]) [ms] = target velocity * (Acceleration time[y] * Pr60.56 "Acceleration time unit") / 3000
Deceleration time	Argument 3	0 to 15	Ms *3	0 (Pr60.32 Deceleration time [0]) to 15 (Pr60.47 Deceleration time [15]) Deceleration time (time from target velocity[r/min] to 0[r/min]) [ms] = target velocity * (Deceleration time[z] * Pr60.57 "Deceleration time unit") / 3000

*1) "After completion of positioning" shall mean the point when internal positioning command generation processing has ended. It is not judged by the actual stopping of the motor. Furthermore, please note that movement command will be issued even if the internal positioning command generation processing has ended, in case position command filter (FIR, smoothing) is being used.

*2) Case where warp around is not performed.

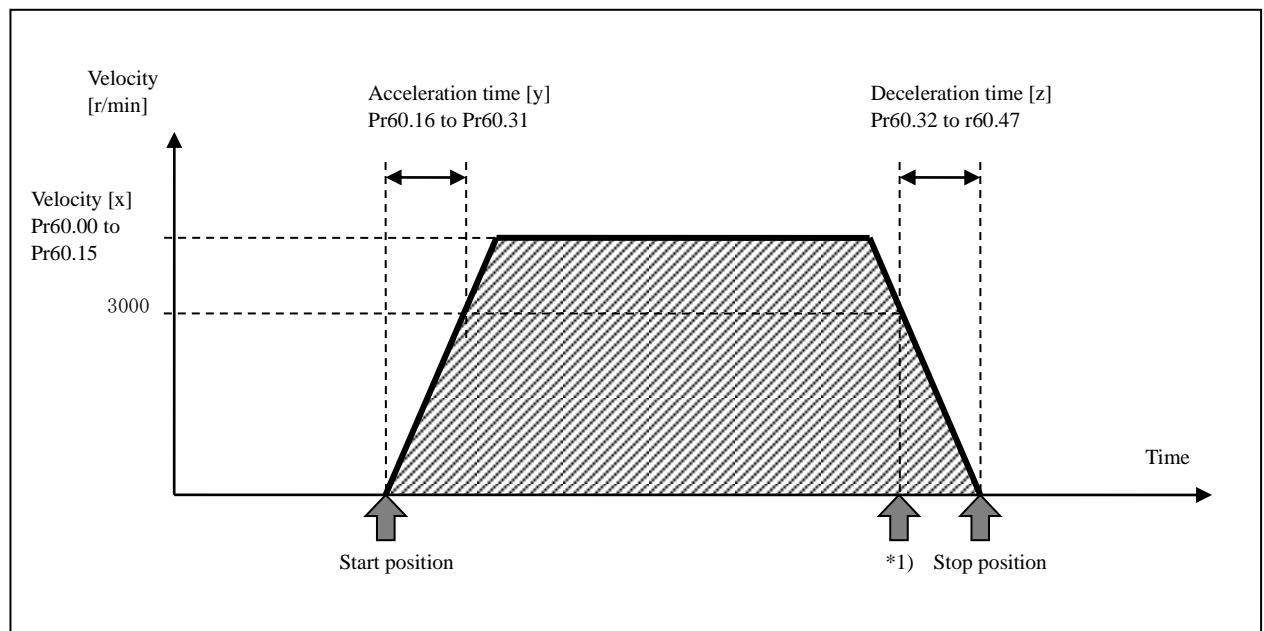
*3) In Function enhancement version 8 and later, it is possible to change the unit of acceleration time unit with Pr60.56 and deceleration time unit with Pr60.57.

4-4 JOG

Command code: 3h

Used in case of conducting for JOG action.

Command name	Block data [n] (64 bits)							
	Command							Data
	Command code	Argument 1	Argument 2	Argument 3	Argument 4	Argument 5	Argument 6	Argument 7
	8 bits	4 bits	4 bits	4 bits	2 bits	2 bits	8 bits	32 bits
JOG	03h	Operation (Target velocity)	Operation (Acceleration time)	Operation (Deceleration time)	Operation (Operating direction)	Block transition (Start next Block, Continue processing)	—	—



Setting items	Argument	Set range	Unit	Description
Block transition				Set Block transition condition.
Continue processing	Argument 5 bit1	0 to 1	—	0 (OFF) : Ends this block. 1 (ON) : Continue block operation.
Start next Block	Argument 5 bit0	0 to 1	—	0 (After start-up of this block) : Transitions to next block after start.
Operation				Sets positioning action.
Operating direction	Argument 4	0 to 1	Command unit	0 (Positive direction) : Operate in positive direction. 1 (Negative direction) : Operate in negative direction.
Target velocity	Argument 1	0 to 15	r/min	0(Pr60.00 Velocity [0])to15(Pr60.15 Velocity [15]) Target velocity = Velocity [x]
Acceleration time	Argument 2	0 to 15	Ms *2	0 (Pr60.16 Acceleration time [0]) to 15 (Pr60.31 Acceleration time [15]) Acceleration time (time from 0[r/min] to target velocity[r/min]) [ms] = target velocity * (Acceleration time[y] * Pr60.56 "Acceleration time unit") / 3000
Deceleration time	Argument 3	0 to 15	Ms *2	0 (Pr60.32 Deceleration time [0]) to 15 (Pr60.47 Deceleration time [15]) Deceleration time (time from target velocity[r/min] to 0[r/min]) [ms] = target velocity * (Deceleration time[z] * Pr60.57 "Deceleration time unit") / 3000

*1) Please use either of the two following methods to stop JOG. (Entering block number for deceleration and stop command in strobe input operation will not stop the operation).

[1] Immediate stop or decelerated stop by immediate stop input(H-STOP)/decelerated stop input(S-STOP).

(In case of decelerated stop by decelerated stop input(S-STOP), stop will be made in accordance with the deceleration time [z], specified by the deceleration time number.)

[2] Immediate stop and decelerated stop by combination of conditional branch command and decelerated stop command.

*2) In Function enhancement version 8 and later, it is possible to change the unit of acceleration time unit with Pr60.56 and deceleration time unit with Pr60.57.

4-5 Return to origin

Command Code : 4h

Used in case of conducting origin return action.

In the case of increment mode, there is a need to conduct origin return action. However, by setting Pr.60.55 "set invalid origin return" to 1, origin return action can be omitted. In such a case, the position when the power is reclosed shall become the origin (0). Origin return action will not be required for JOG.

In case origin return command is executed in absolute mode, Err 94.2 "Origin return abnormal protection" will occur.

When the origin position detection method is 1 (HOME + Z phase) or 2 (HOME), the origin sensor must be connected by assigning the vicinity of origin input (HOME) to the general-purpose input (SIn). Furthermore, there is a need to connect the limit sensor (prohibited drive input) in advance and assign general input (SIn) to positive direction prohibited drive input (POT) and negative direction prohibited drive input (NOT). A noise canceling filter process is conducted in the read-out of the input signal. Please set so that the sensor signal width is 4 ms or wider.

Furthermore, in case detection method is 1, in order to prevent detection error, please arrange so that the time from the leading edge reference detection of the vicinity of origin input (HOME) to the Z phase is 10 ms or larger. In case there are problems in installing the vicinity of origin input (HOME) and limit sensor (drive prohibited input), Err 94.2 "Origin return error protection" will occur.

When drive prohibited input in homing direction is turned ON during homing action, please note that regardless of the value of Pr 5.05 "Sequence at drive prohibition", reverse action still under servo-ON state will be executed. When the drive prohibited input for homing direction is turned ON and the drive prohibited input for the direction opposite to the homing direction being turned ON while it is in reverse action, Err 94.2 "Origin return error protection" will occur.

When the origin position detection method is 2 (HOME), SI4 only can be assigned to the vicinity of origin input (HOME). If any other pins are assigned, Err 94.2 "Origin return error protection" will occur.

When the origin position detection method is 3(Z phase), 4(Z phase(approximate)), 15 (actual position set), it is not necessary to assign the vicinity of origin input (HOME), positive direction drive inhibit input (POT), and negative direction drive inhibit input (NOT) to the general-purpose input (SIn).

When both the positive direction drive inhibit input (POT) and negative direction drive inhibit input (NOT) are turned ON, even if Pr5.04 "Drive inhibit input setting" = 1 (POT/NOT disabled), Err94.2 "Origin return error protection" occurs regardless of the origin position detection method.

Origin return operation speed shall be set according to Pr 60.52 "origin return velocity (high speed)" and Pr 60.53 "origin return velocity (low speed)". The deceleration shall be set according to Pr 60.54 "Origin return acceleration and deceleration".

Velocity and acceleration or deceleration velocity are other than 0 or in case of acceleration or deceleration velocity exceeds 4294967295 [command units/s²], Err93.1 "Block data setting error protection" will be triggered. However, when the origin position detection method is 15 (actual position set), Err93.1 will not occur even if the velocity and acceleration or deceleration velocity are 0.

When Pr6.98 bit28 (start of block operation when servo is turned on) = 1 (enabled), the strobe input (STB) is automatically turned on in the servo driver when the servo-on input (SRV-ON) is turned on.

Only the homing command is supported. If any command other than the homing command is automatically started, Err93.1 "block data setting error protection" occurs.

In addition, since it is not affected by the block number specification input (B-SELn) and Modbus register 4414h (Block number), set the homing command to block number 0.

In addition, the MSB of argument 5 "Block transition condition" of the homing command that is automatically started is forcibly set to 0 (the blocking operation is terminated when the block processing is finished).

Do not issue commands during the period between the control power ON and the end of the block operation.

When Pr6.98 bit28 (Start of block operation when servo is turned on) = 1 (Valid) and bit29 (Extension of start of block operation when servo is turned on) = 1 (Valid), all commands are supported.

In addition, since it is affected by the block number specification input (B-SELn) and Modbus register 4414h (Block number), the command can be set to other than block number 0.

In addition, the MSB of argument 5 "Block transition condition" of the homing command that is automatically started is not forcibly set to 0.

Software versions prior to the enhanced version 9 are not supported.

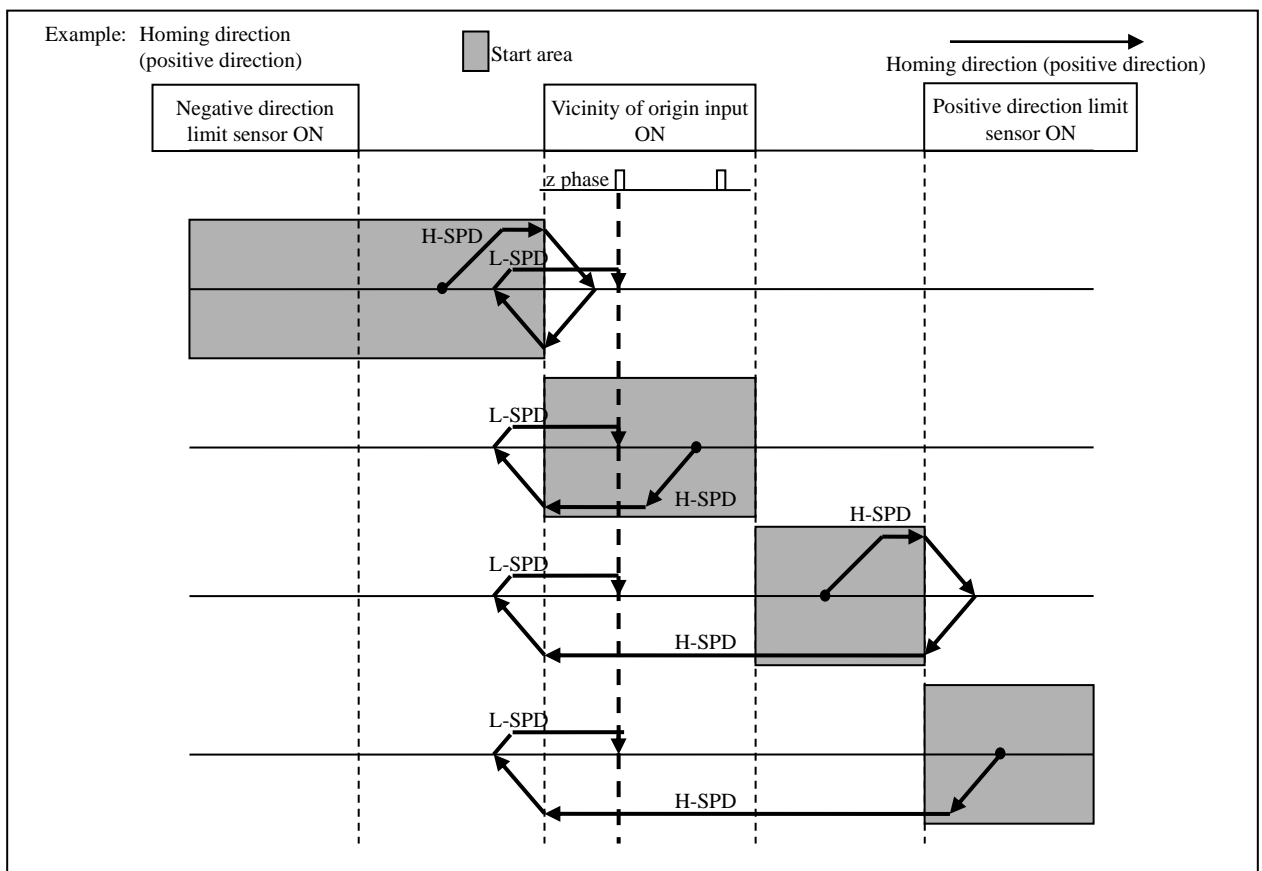
Command name	Blockdata [n] (64bit)							
	Command							Data
	Command code	Argument 1	Argument 2	Argument 3	Argument 4	Argument 5	Argument 6	Argument 7
	8bit	4bit	4bit	4bit	2bit	2bit	8bit	32bit
Origin return	04h	Operation (origin detection method)	-	-	Operation (Origin return direction)	Block transition (the start of the next block, processing continue)	-	-

Setting items	Argument	Set range	Description
Block transition			Set Block transition condition.
Continue processing	Argument 5 bit1	0 to 1	0 (OFF): Ends this block. 1 (ON) : Continue block operation.
Start next Block	Argument 5 bit0	0 to 1	1 (After completion of this block) : Transitions to next block after completion of origin return.
Operation			Sets the origin return method.
Origin detection method	Argument 1	0 to 15	1: Leading edge reference of origin sensor (HOME) + z phase. 2: Leading edge reference of origin sensor (HOME) 3: Z phase *2) 4: Z phase(approximate) *2) 15: Actual position setup *1) 0: Unspecified (Err.93.1 (block data setting error protection) occurs.) 5 to 14: Unused (Err.93.1 (block data setting error protection) occurs.)
Origin return direction	Argument 4	0 to 1	Sets operation direction for origin detection. 0 (Positive direction) : Operate in positive direction. 1 (Negative direction) : Operate in negative direction.

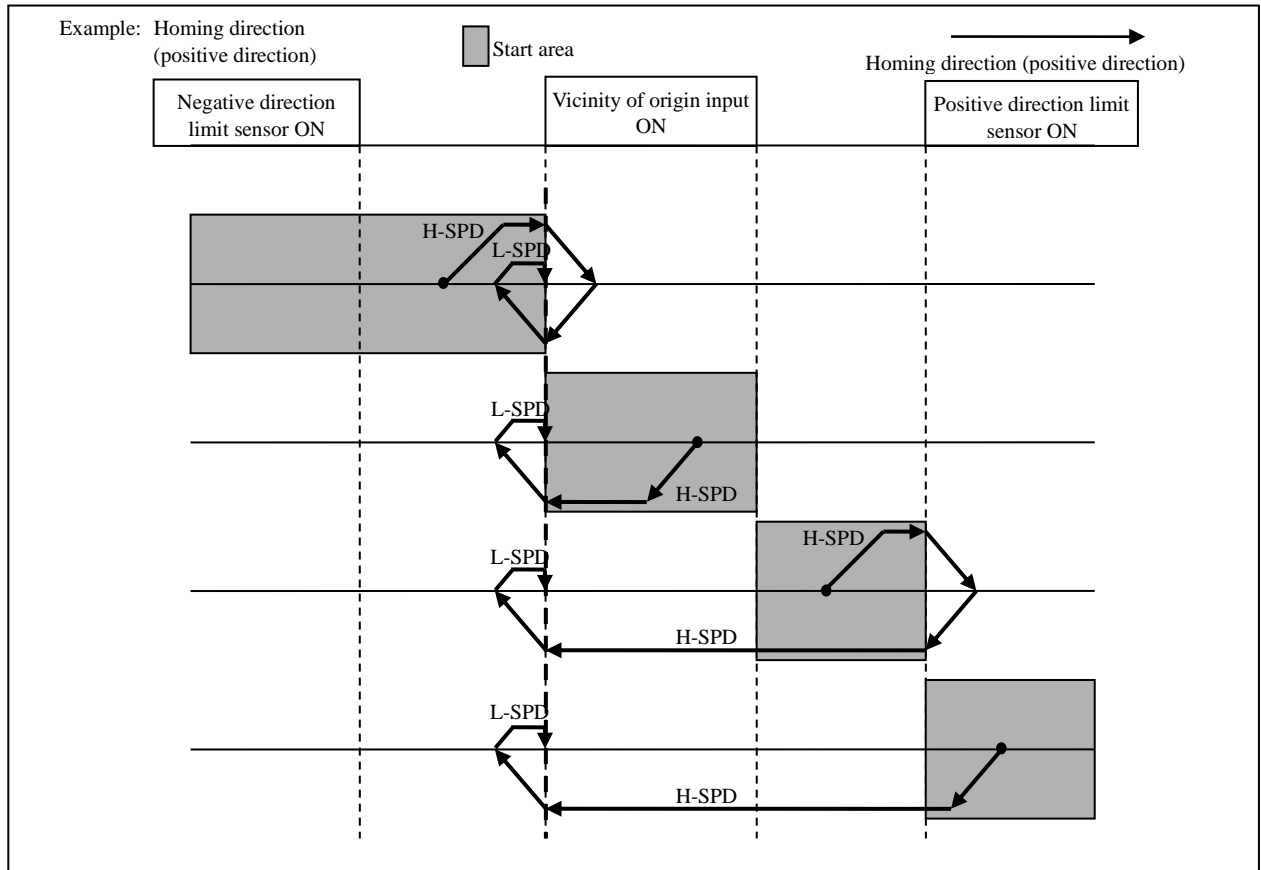
*1) Software prior to function enhancement version 6 is not supported.

*2) Software versions prior to the enhanced version 9 are not supported.

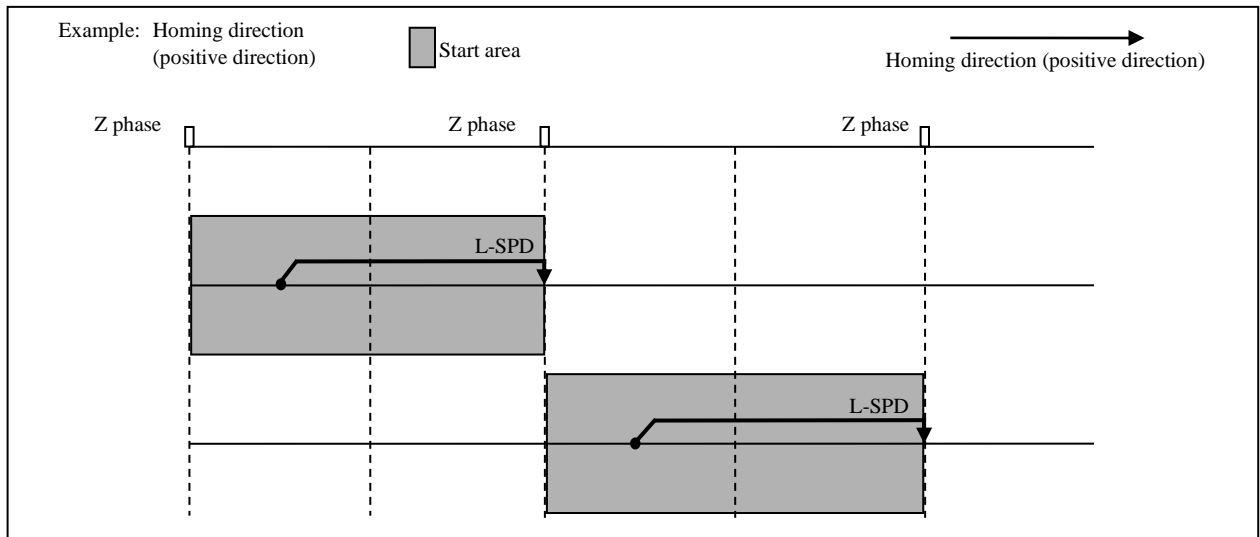
Example 1) Detection method 1: Leading edge reference of origin sensor (HOME) + z phase.



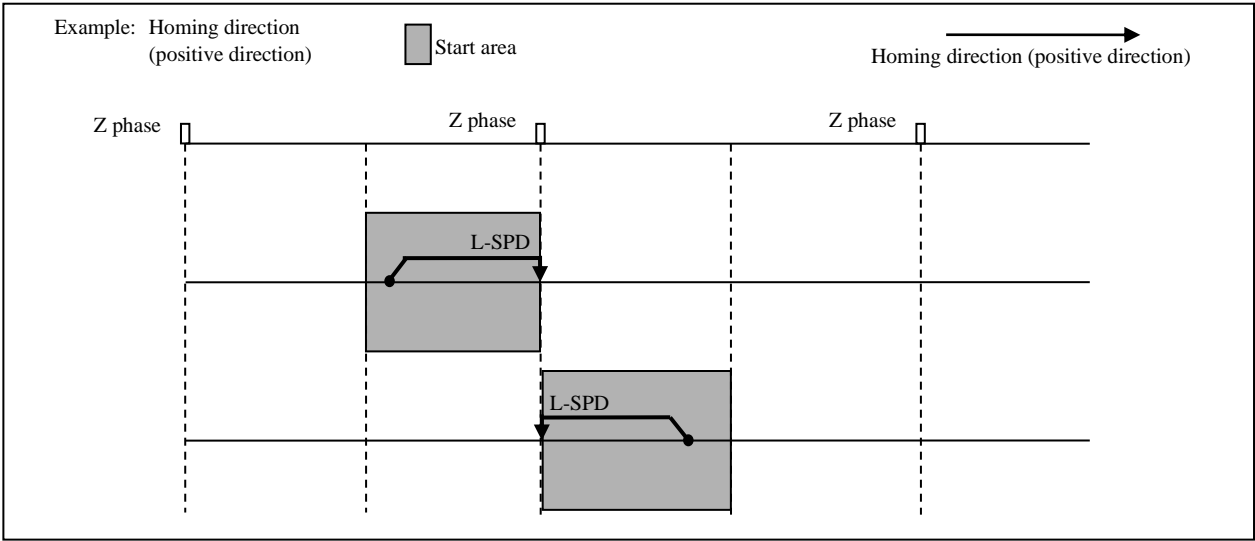
Example 2) Detection method 2: Leading edge reference of vicinity of origin sensor (HOME)



Example 3) Detection method 3: Z phase

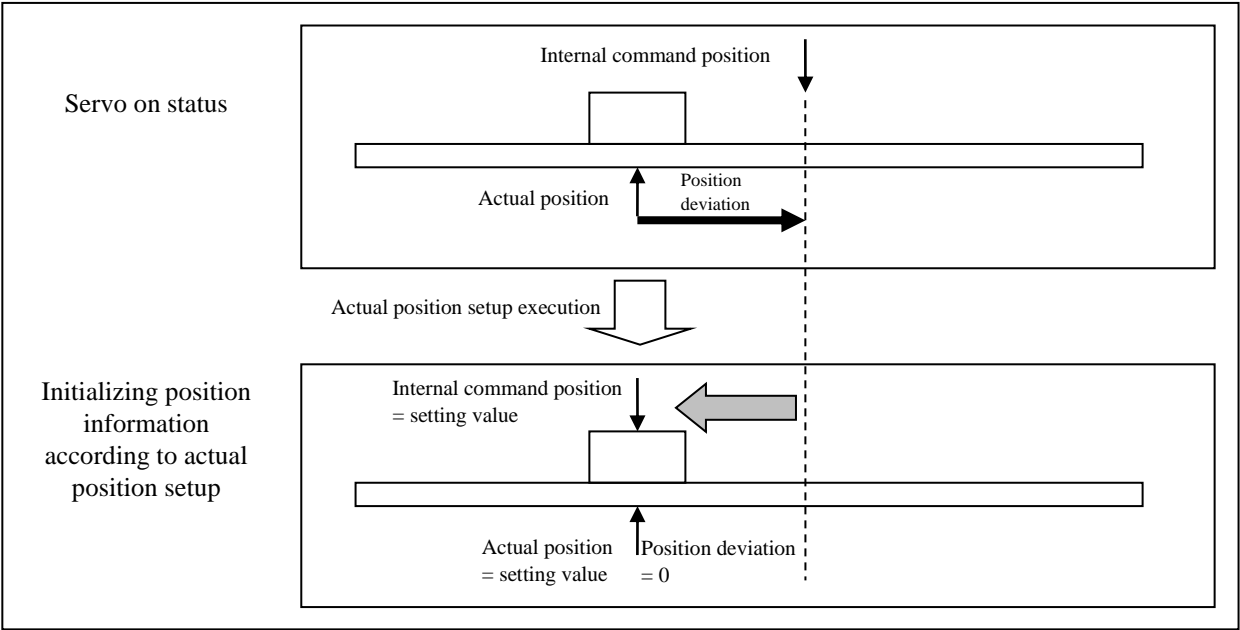


Example 4) Detection method 4: Z phase (approximate)
Err93.1 "block data setting error protection" occurs when using with full-closed control (Pr0.01=6) and linear motor. 20 [r/min] is set when Pr60.53 "Homing speed (low speed)" = 0, or 5000 [ms/(3000r/min)] is set when Pr60.54 "homing acceleration/deceleration" = 0 in the servo driver.



Example 5) Detection method 15: Actual position setup
Initialize the motor position (actual position at the time the servo driver started origin return action) to the setting value to clear the position deviation, and set the internal command position to the motor position (actual position). Subsequently, when the host controller issues a command and motor moves, initialized motor position may deviate from the target position.

Location information after execution
Actual position = internal command position = setting value (Setting_Data)
Position deviation = 0

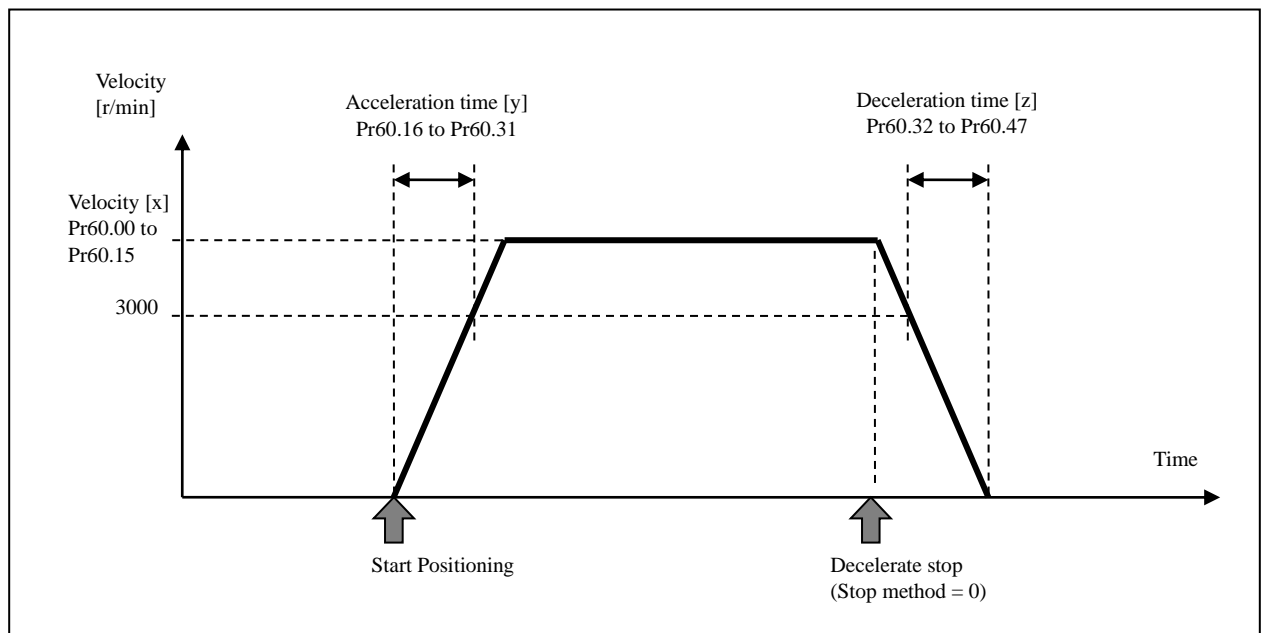


4-6 Decelerate stop

Command Code : 5h

Used in case of conducting forced stop of positioning action. *2

Command name	Blockdata [n] (64bit)							
	Command							Data
	Command code	Argument 1	Argument 2	Argument 3	Argument 4	Argument 5	Argument 6	Argument 7
	8bit	4bit	4bit	4bit	2bit	2bit	8bit	32bit
Decelerate stop	05h	Operation (Stop method)	-	-	-	Block transition (the start of the next block, processing continue)	-	-



Setting items	Argument	Set range	Description
Block transition			Set Block transition condition.
Continue processing	Argument 5 bit1	0 to 1	0 (OFF): Ends this block. 1 (ON) : Continue block operation.
Start next Block	Argument 5 bit0	0 to 1	1 (After completion of this block) : Transitions to next block after deceleration and stop. *1
Operation			Sets how to stop positioning action.
Stop method	Argument 1	0 to 1	0 (Decelerate stop) Stops at the set deceleration established at the time of start up of the current action 1 (Immediate stop) Stops immediately.

- *1) “After deceleration and stop” shall mean the point when internal positioning command generation processing has ended. It is not judged by the actual stopping of the motor. Furthermore, please note that movement command will be issued even if the internal positioning command generation processing has ended, in case position command filter (FIR, smoothing) is being used.
- *2) Regarding function enhancement version 1 or earlier, when this command is executed when positioning action is not being executed, it may cause abnormal positioning thereafter (block operation state output (BUSY) remains unchanged at 1). In such case, turn servo OFF to return to normal condition.

4-7 Renew velocity

Command Code : 6h

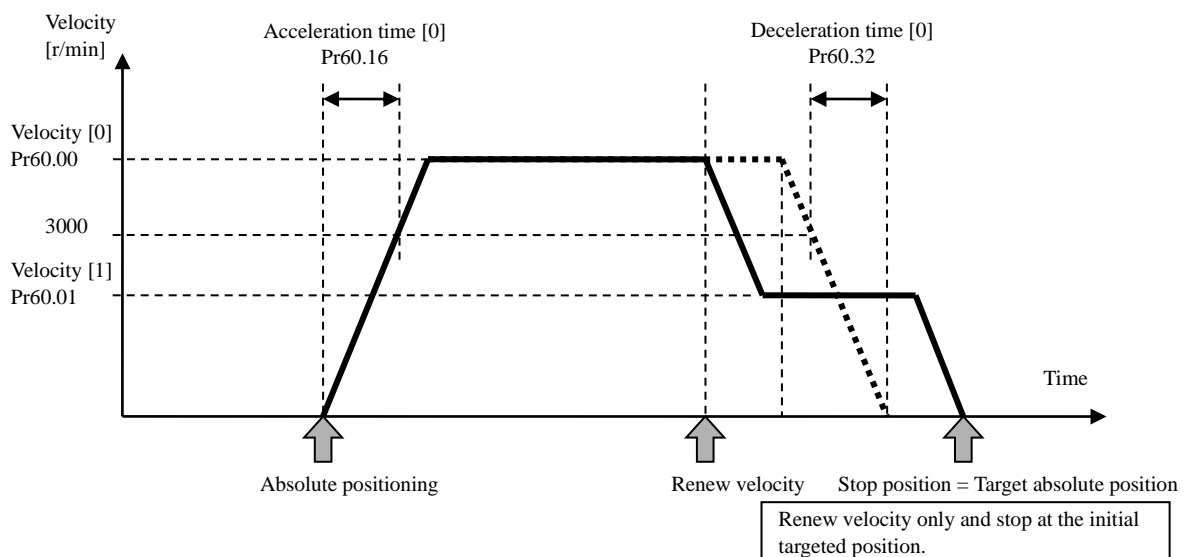
To be used to renew the velocity of the current action.

Action prior to execution of this command will be continued during renewal of velocity and after renewal.

This is only valid for relative positioning action, absolute positioning action, and JOG, and the velocity during origin return action cannot be renewed during the action. Furthermore, velocity cannot be renewed, once the action has entered the deceleration stop action.

Command name	Blockdata [n] (64bit)							
	Command							Data
	Command code	Argument 1	Argument 2	Argument 3	Argument 4	Argument 5	Argument 6	Argument 7
	8bit	4bit	4bit	4bit	2bit	2bit	8bit	32bit
Renew velocity	06h	Operation (target velocity)	-	-	Operation (Operation direction)	Block transition (the start of the next block, processing continue)	-	-

Example: Velocity change during absolute positioning (Velocity [0] Pr60.00 ⇒ Velocity [1] Pr60.01)



Setting items	Argument	Set range	Unit	Description
Block transition				Set Block transition condition.
Continue processing	Argument 5 bit1	0 to 1	—	0 (OFF) : Ends this block. 1 (ON) : Continue block operation.
Start next Block	Argument 5 bit0	0 to 1	—	0 (After start of this Block) : Transitions to next block after start. 1 (After completion of this block) : Transitions to the next block after completing the action. *1
Operation				Sets the current running update rate.
Operating direction *2)	Argument 4	0 to 1	—	0 (Positive direction) : Operate in positive direction. 1 (Negative direction) : Operate in negative direction.
Target velocity	Argument 1	0 to 15	r/min	0(Pr60.00 Velocity [0])to15(Pr60.15 Velocity [15]) Target velocity = Velocity [x]

*1) “After completion of action” shall mean the point when internal positioning command generation processing has ended. It is not judged by the actual stopping of the motor. Furthermore, please note that movement command will be issued even if the internal positioning command generation processing has ended, in case position command filter (FIR, smoothing) is being used.

*2) Effective only under JOG command.

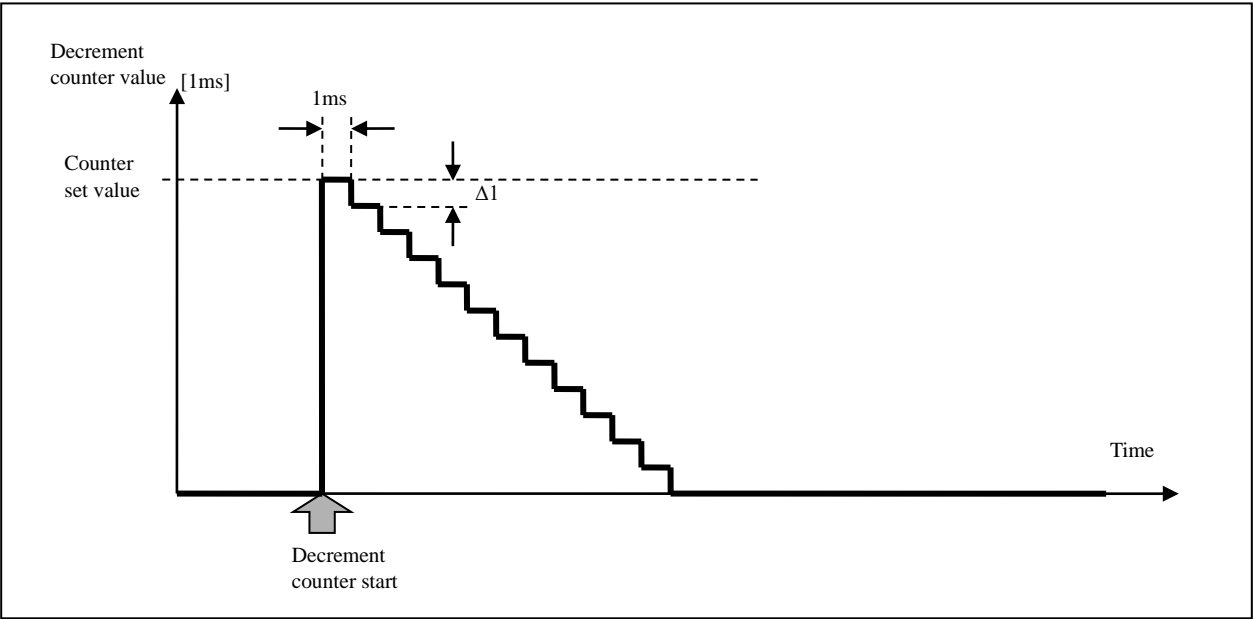
4-8 Start decrement counter

Command Code : 7h

Used to start the decrement counter.

The value of the decrement counter is referenced by the conditional branch commands (Ah, Bh, and Ch).

Command name	Blockdata [n] (64bit)							
	Command							Data
	Command code	Argument 1	Argument 2	Argument 3	Argument 4	Argument 5	Argument 6	Argument 7
	8bit	4bit	4bit	4bit	2bit	2bit	8bit	32bit
Decrement counter	07h	-	-	-	-	Block transition (the start of the next block, processing continue)	-	Counter (Time)



Setting items	Argument	Set range	Unit	Description
Block transition				Set Block transition condition.
Continue processing	Argument 5 bit1	0 to 1	—	0 (OFF) : Ends this block. 1 (ON) : Continue block operation.
Start of the next block	Argument 5 bit0	0 to 1	—	0 (After start of this Block) : Transitions to next block after start. 1 (After completion of this block) : Transitions to the next block after completing. Transitions to the next block when the count reaches 0.
Counter				Set the counter set value
Time	Argument 7	0 to 1000000	ms	Set the counter set value Counter will decrement from the initial value by 1 for each 1 ms cycle and will stop when it reaches 0.

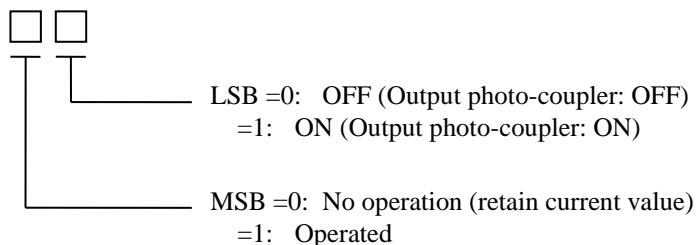
4-9 Output signal operation

Command Code : 8h

To be used to operate the output signal.

Block operation output (B-CTRLn) must be assigned to the generic output terminal (SOn) in advance.

Command name	Blockdata [n] (64bit)							
	Command							Data
	Command code	Argument 1	Argument 2	Argument 3	Argument 4	Argument 5	Argument 6	Argument 7
	8bit	4bit	4bit	4bit	2bit	2bit	8bit	32bit
Output signal operation	08h	Operation			-	Block transition (Start next Block, Continue processing)	-	-
		B-CTRL1 B-CTRL2	B-CTRL3 B-CTRL4	B-CTRL5 B-CTRL6				



Setting items	Argument	Set range	Contents
Block transition			
Continue processing	Argument 5 bit1	0 to 1	Set Block transition condition.
			0 (OFF) : Ends this block. 1 (ON) : Continue block operation..
Start next Block	Argument 5 bit0	0 to 1	0 (After start of this Block) : Transitions to next block after start.
Operation			
B-CTRL1	Argument 1 bit2-3	0 to 3	Set output signal 0 (Keep) : No operation. Keep current state. 1 (For manufacturer use) : Not usable. 2 (OFF) : Output photo-coupler OFF. 3 (ON) : Output photo-coupler ON.
B-CTRL2	Argument 1 bit0-1	0 to 3	
B-CTRL3	Argument 2 bit2-3	0 to 3	
B-CTRL4	Argument 2 bit0-1	0 to 3	
B-CTRL5	Argument 3 Bit2-3	0 to 3	
B-CTRL6	Argument 3 bit0-1	0 to 3	

4-10 Jump

Command Code : 9h

Used when transitioning (jumping) to the designated block number.

Command name	Blockdata [n] (64bit)							
	Command							Data
	Command code	Argument 1	Argument 2	Argument 3	Argument 4	Argument 5	Argument 6	Argument 7
	8bit	4bit	4bit	4bit	2bit	2bit	8bit	32bit
Jump	09h	-	Jump destination block -		Block transition (the start of the next block, processing continue)		-	-

Setting items	Argument	Set range	Contents
Block transition			Sets the execution type of block.
Continue processing	Argument 5 bit1	0 to 1	1 (ON) : Continues block operation.
Start next Block	Argument 5 bit0	0 to 1	0 (After start of this Block) : Transitions to next block after start.
Jump destination block	Argument 2 to 3	0 to 255	Specifies the jump destination block.

4-11 Conditional branch

Command Code : Ah, Bh, Ch

Used when transitioning to the designated block number (destination when YES), when the designated conditions are satisfied.

Command name	Blockdata [n] (64bit)							
	Command							Data
	Command code	Argument 1	Argument 2	Argument 3	Argument 4	Argument 5	Argument 6	Argument 7
	8bit	4bit	4bit	4bit	2bit	2bit	8bit	32bit
Conditional branch (=)	0Ah	Comparison judge (Comparison item)	TRUE judgment (Jump destination block)			Block transition (judge method, Continue processing)	-	Comparison judge (Comparison value)
Conditional branch (>)	0Bh							
Conditional branch (<)	0Ch							

Setting items	Argument / Command code	Set range	Contents			
Block transition			Sets block transition conditions.			
Continue processing	Argument 5 bit1	0 to 1	0 (OFF) : Ends this block. 1 (ON) : Continue block operation.			
Judge method	Argument 5 bit0	0 to 1	0 (Immediate judgment) : Immediately judges after starting this block. Transitions to the jump destination block when the judgment result is TRUE, and transitions to the next block when it is FALSE. 1 (Wait until condition is met) Waits until it is determined to be TRUE. Transitions to the jump destination block when the judgment result is TRUE.			
Comparison condition			Sets a conditional expression.			
Comparison item	Argument 1	0 to 15	Value	Setting items	Unit	Remarks
			0	Command position	Command unit	Command position after filter
			1	Current position	Command unit	Current position of motor
			2	Position deviation	Command unit	Position deviation (= Command position - current position)
			3	Command velocity	r/min	Command motor velocity (before filter)
			4	Motor velocity	r/min	Current motor velocity
			5	Command torque	0.1%	Command motor torque
			6	Decrement counter	-	Decrement counter value
			7	Input signal	-	Can be used under conditional branch (=). *1)
			8	Output signal	-	Can be used under conditional branch (=). *2)
			9 to 15		(Reserved)	-
Comparison expression	Command code	0Ah、0Bh、0Ch	Selects a comparison expression with the comparison item. 0Ah (=) 0Bh (>) 0Ch (<)			
Compared value	Argument 7	- 2147483648 to 2147483647	Sets a comparison value with the comparison item.			
TRUE judgment			Sets the behavior when the specified conditions are met.			
Jump destination block	Argument 2 to 4	0 to 255	Specifies the jump destination block.			

(Note) In case of conditional branch (=), there is a possibility of judgment error from sampling timing and electronic gear input errors. In such case, please use conditional branches (>) or (<).

*1) Comparison subject: Input signal (7h)

Can be used under conditional branch (=). Err 93.1 (Block data set abnormal protection) will occur when conditional branches (>) and (<) are set for comparison.

Transition to the designated block number (destination when YES) will be executed, when all conditions for each of the signals are satisfied.

Compared value (4 byte)		bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Function	Byte								
Signal condition	LL	SI8	SI7	SI6	SI5	SI4	SI3	SI2	SI1
	LH	-	-	-	-	-	-	SI10	SI9
With or without comparison	HL	SI8	SI7	SI6	SI5	SI4	SI3	SI2	SI1
	HH	-	-	-	-	-	-	SI10	SI9

Always set 0 to the “for manufacturer use” bit (-).

The 4 byte compared value data is separated into 2 byte units.

- Upper 2 bytes (HH, HL): Sets whether to compare or not, for each bit.
0: Without comparison
1: Compare
- Lower 2 bytes: (LH, LL): Sets the value to be compared (signal state of physical level) for each bit.
0: Input photo-coupler OFF (physical level)
1: Input photo-coupler ON (physical level)

For example, if the comparison value (threshold) is set to "196610" in decimal, the conditional branch (Ah (=)) is determined to be TRUE when (SI1 is off) and (SI2 is on)).

*2) Comparison subject: Output signal (8h)

Can be used under conditional branch (=). Err 93.1 (Block data set abnormal protection) will occur when conditional branches (>) and (<) are set for comparison.

Transitioning to the designated block number (destination when YES) will be executed, when all conditions for each of the signals are satisfied.

Compared value (4 byte)		bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Function	Byte								
Signal condition	LL	-	-	TLC	ZSP	BRK-OFF	INP	ALM	S-RDY
	LH	-	INP2	-	WARN2	WARN1	-	-	-
With or without comparison	HL	-	-	TLC	ZSP	BRK-OFF	INP	ALM	S-RDY
	HH	-	INP2	-	WARN2	WARN1	-	-	-

Always set 0 to the “for manufacturer use” bit (-).

The 4 byte compared value data is separated into 2 byte units.

- Upper 2 bytes (HH, HL): Sets whether to compare or not, for each bit.
0: Without comparison
1: Compare
- Lower 2 bytes: (LH, LL): Sets the value to be compared (signal state of logic level) for each bit.
0: OFF (Logic level)
1: ON (Logic level)

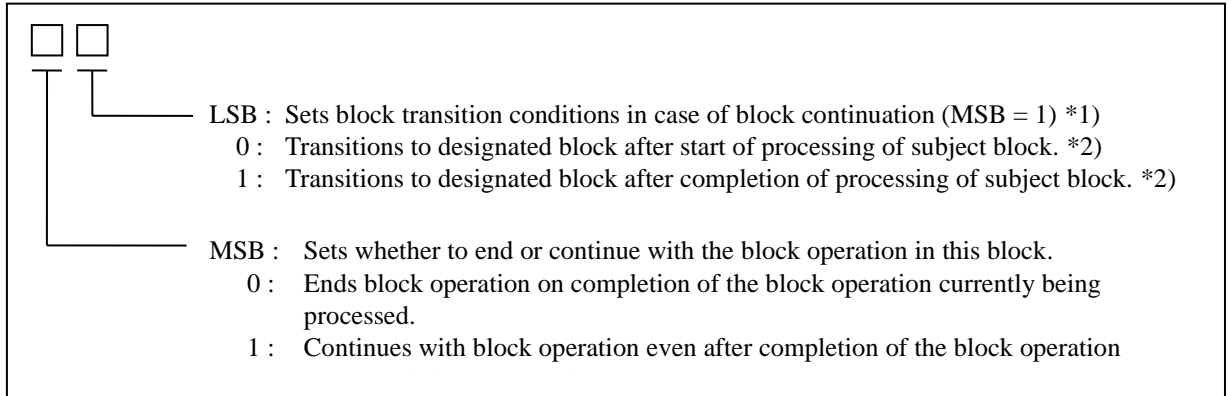
For example, if the comparison value (threshold) is set to "196609" in decimal, the conditional branch (Ah (=)) is determined to be TRUE when (ALM is off) and (S-RDY is on)).

4-12 Block transition, start, and finish

4-12-1 Block transition conditions

The number of blocks that can be set is limited to a maximum of 256 and efficient block setting (block programming) is necessary to conduct complex actions. Efficiency of block programming can be achieved by effectively using block transition conditions.

Block transition conditions are set by argument 5 (Block transition condition) for each block, and the functions of the upper bit (MSB) and the lower bit (LSB) are grouped as follows:



- *1) In case block end (MSB = 0) is set, the lower bit (LSB) setting will become invalid and block operation will end upon completion of the processing of the subject block.
- *2) The functions of lower bits (LSB) will vary with each command. The above indicates the basic commands, however, for example, with jump command (9h), regardless of the set value, it will transition to the designated block after start. Please refer to the explanations for each command for details.

4-12-2 Start and finish of block operation

To start block operation, designate the block No. to be started and turn strobe input (STB) ON. Block operation state output (BUSY) will turn to 1 with the starting of block operation.

- Block No. designation: Register 4414h or I/F connector input (B-SEL 1 to 128)
- Strobe input (STB): Coil 0120h or I/F connector (STB)

To finish block operation, pre-set the block transition condition to $MSB = 0$ by the block No. command of the block to be finished. Block operation state output (BUSY) will turn to 0 with the finish of block operation.

However, in case action type command (relative positioning, absolute positioning, JOG operation, origin return) is in the process of being executed, before the subject block is reached, then block operation will not be completed until the action has been completed (*1) and block operation condition output (BUSY) will continue to be 1.

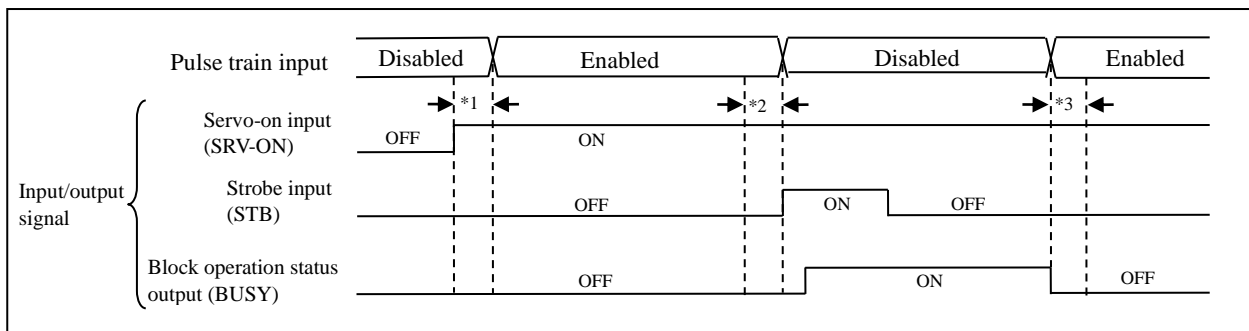
- *1) “Completion of action” shall mean the point when internal positioning command generation processing has ended. It is not judged by the actual stopping of the motor. Furthermore, please note that movement command will be issued even if the internal positioning command generation processing has ended, in case position command filter (FIR, smoothing) is being used.

In addition, the following block operation will be forced terminated, as exceptional processing.

- When immediate stop or decelerated stop has been input (external input, Modbus communications).
- Upon servo-OFF condition (including servo OFF caused by triggering of alarm or drive prohibited input).
- Absolute position has reached to the software limit. *2)

- *2) If the absolute position is greater than or equal to the position set by the positive (negative) direction software limit, the operation in the positive (negative) direction is forced to terminate.

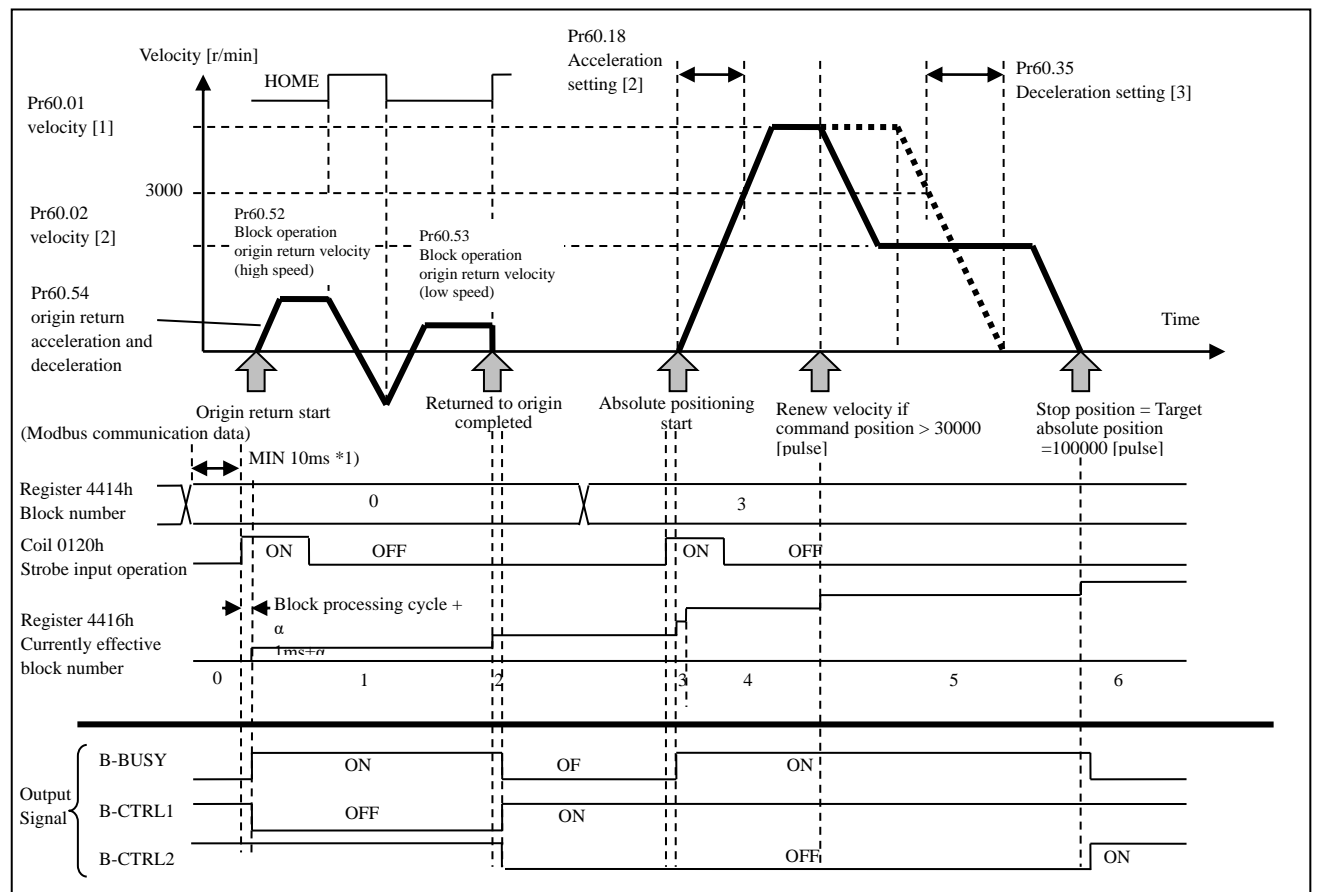
- Control timing when Pr6.28 “Special function select” = 4 “Block operations by input signal enabled (Pulse train enabled)” is true.



- *1 After SRV-ON input, do not input the pulse train and STB for about 100 ms or more.
Please refer to Technical Reference (Functional specification) 9-2-1 for details.
- *2 When STB signal rising edge is detected, pulse train input is ignored, so do not input pulse train before STB signal is input. Please note that the cause of position shift by use.
- *3 Pulse train input is ignored while BUSY signal is on, so input pulse train after the BUSY signal is off.
Please note that the cause of position shift by use.

5. Block operation example

Block number	Block parameter set value Upper: Command Lower: Data	Blockdata [n] (64bit)						
		Command						Data
		Command code 8bit	Argument 1 4bit	Argument 2 4bit	Argument 3 4bit	Argument 4 2bit	Argument 5 2bit	Argument 7 32bit
0	08800200h 00000000h	Output signal operation	B-CTRL1 OFF B-CTRL2 maintain	B-CTRL3 maintain B-CTRL4 maintain	B-CTRL5 maintain B-CTRL6 maintain	-	Block continue Transition after start	-
		08h	8	0	0	0	2	0
1	04200300h 00000000h	Origin return	HOME leading edge	-	-	Positive direction	Block continue Transition after completion	-
		04h	2	0	0	0	3	0
2	08E00000h 00000000h	Output signal operation	B-CTRL1 ON B-CTRL2 OFF	B-CTRL3 maintain B-CTRL4 maintain	B-CTRL5 maintain B-CTRL6 maintain	-	Block complete	-
		08h	Eh	0	0	0	0	0
3	02123200h 000186A0h (100000)	Absolute positioning	Velocity	Acceleration	Deceleration	-	Block continue Transition after start	Target absolute position
		02h	1	2	3	0	2	100000
4	0B001700h 00007530h (30000)	Conditional branch (>)	Command position	Destination when YES (lock number 5)			Block continue Wait transition till YES	Compared value
		0Bh	0	5			3	30000
5	06200300h 00000000h	Renew velocity	Velocity	-	-	-	Block continue Transition after completion	-
		06h	2	0	0	0	3	0
6	08300000h 00000000h	Output signal operation	B-CTRL1 maintain B-CTRL2 ON	B-CTRL3 maintain B-CTRL4 maintain	B-CTRL5 maintain B-CTRL6 maintain	-	Block complete	-
		08h	3	0	0	0	0	0
7 to 255	00000000h 00000000h	-	-	-	-	-	-	-
		0h	0	0	0	0	0	0



*1) Maintain interval of 10 ms or more from B-SELn input to STB input.

6. Applied functions

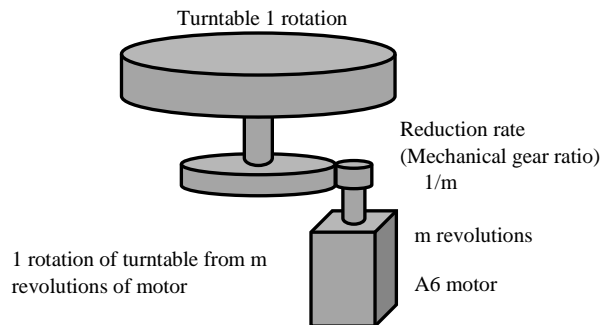
6-1 Infinite rotation absolute function

*This shall not apply to MINAS-A6L Series ([A6SL]/[A6SM]).

This is a function to allow the setting of the upper limit value of multi-rotation data of the absolute encoder to any value.

This function enables the turntable angle of rotation (position) to be obtained in case the usage of a turntable, etc. is rotated continuously in one direction, during use as a turntable, etc.

In addition, being an absolute encoder, there is no need to reset the origin after reclosing of the power supply.



(1) Applicable scope

This function cannot be applied unless the following conditions are satisfied:

Condition where infinite length absolute function is activated	
Control mode	- Position control mode
Other	<ul style="list-style-type: none"> - The amount of motor revolutions per 1 turntable rotation is an integer of 512 or smaller. - Command position per 1 turntable rotation = Encoder resolution (2^{23}) / Electronic gear ratio / Reduction ratio (1/m), is an integer of $2^{23}-1$ or smaller. - Elements other than the control parameter to be appropriately set and shall not interfere with the normal revolutions of the motor. - Pr6.28=4 (Block operations by input signal enabled (Pulse train enabled)) was not true.

(2) Related parameters

Classification	No.	Parameter name	Set range	Unit	Functions
0	15	Absolute encoder set	0 to 4	-	Sets the method of use of the absolute encoder. 0: Use under absolute system (Absolute mode) 1: Use under incremental system (incremental mode) 2: Ignore multi-rotation counter overflow even though used under the absolute system (Absolute mode). 3: For manufacturer use (Not to be set) 4: Upper limit of multi-rotation counter can be set at any value, even though used under the absolute system (Absolute mode). Ignore multi-rotation counter overflow. (infinite revolution absolute mode)
6	88	Absolute multi-rotation data upper limit	0 to 65534	-	Sets the upper limit value of absolute multi-rotation data. When the multi-rotation data exceeds the set value, the multi-rotation data will change to 0. Inversely, if it turns less than 0, it will change to this set value. In case Pr0.15 is set to 0 or 2 (absolute mode), the upper limit value for absolute multi-rotation data will be 65535, regardless of the set value.
60	49	Origin offset	-2147483648 to 2147483647	Command unit	Sets the amount of origin offset when return to origin has been completed under block operations in increment mode, Sets the amount of offset between the encoder location and mechanical coordinate system location under block operations in absolute mode. Setting bit 1 to 1 in Pr60.48 (Block operation method set," will activate the setting.

(3) Notes

This function will become effective by setting Pr0.15 “Absolute encoder set” to 4, and reclosing the control power supply.

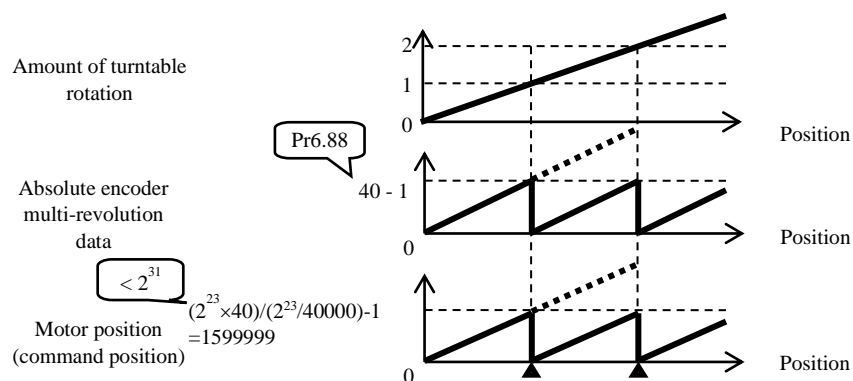
- When the encoder multi-rotation data upper limit value and the amplifier parameter multi-rotation data upper limit value does not match when the control power supply is reclosed, Err92.3 “Multi-rotation data upper limit inconsistency error protection” will be triggered but this is not an error. Reclosing the amplifier control power supply will eliminate any further occurrences.
- Set Pr6.88 “Absolute multi-rotation data upper limit value” to $(m-1)$. m is the denominator of the reduction ratio.
- The motor position will wrap around also at the position where the multi-rotation data will wrap around.
- Command position should be provided to match this motor position.
- Please refer to item 2-6 for details of wrap around process.
- Set Pr6.88 “Absolute multi-rotation data upper limit value” and the reciprocal of electronic gear ratio so that the motor position and command position will not exceed $(2^{31}-1)$.
- The motor position of this amplifier is set, taking Pr0.00 “Rotational direction set,” Pr60.49 “Origin offset” etc., into consideration.
- Please refer to Item 2-7 for details.
- Please refer to Item 4-7-1-1 of Technical Reference (Functional specification) for absolute system configuration.
- Please set Pr60.49 “Origin offset” within the range of 0 to $((\text{Set value for Pr6.88} + 1) \times \text{encoder resolution} / \text{electronic gear ratio}) - 1$. If setting is made outside this range Err93.8 “Parameter set error protection” will be triggered.

(4) Operation example

Procedure when the electronic gear ratio is $2^{23}/4000$, with a reduction ratio of 40 motor revolutions to 1 turntable rotation ($m = 40$) shall be as follows:

- [1] Set Pr0.15 = 4 and Pr6.88 = 39, and write into EEPROM
- [2] Reclose amplifier control power supply
- [3] The multi-rotation data upper limit on the encoder side will be automatically renewed by switching on the amplifier
- [4] Err92.3 “Multi-rotation data upper limit inconsistency error protection” generated.
- [5] Reclose amplifier control power supply
- [6] Multi-rotation data upper limit is now effective and the motor position is generated as shown in the figure below
- [7] The motor position will wrap around at $2^{23} \times 40 - 1$. The command position shall match this and will wrap around to operate.

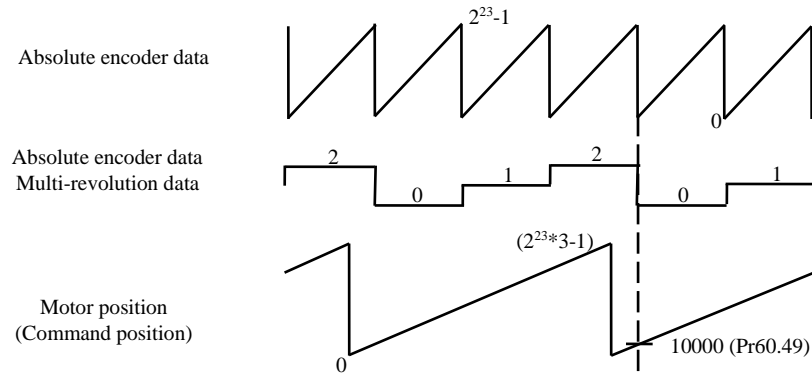
* The multi-rotation data upper limit is maintained by a battery power source connected to the encoder. When the amplifier control power supply is switched-on the next occasion, the procedure will start from [6] above.



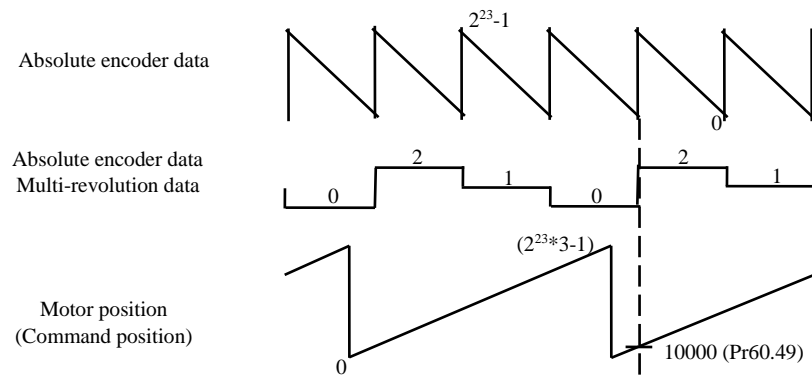
(5) Absolute origin position offset

When using the continuous rotating absolute encoder function, the absolute origin position offset shall be as follows:

- i) When CCW = positive direction, electronic gear ratio (Pr0.09 / Pr 0.10) = 1/1, Pr 6.88 “Absolute multi-rotation data upper limit value” = 2, and Pr60.49 “Origin offset” = 10000



- ii) When CW = positive direction, electronic gear ratio (Pr0.09 / Pr 0.10) = 1/1, Pr 6.88 “Absolute multi-rotation data upper limit value” = 2, and Pr60.49 “Origin offset” = 10000



7. Protection functions to detect when Modbus communication/block operation function is effective

7-1 List of protection functions to detect when Modbus communication/block operation function is effective

(Note) Please refer to Technical reference (Functional Specifications) for protection functions other than those indicated below.

Alarm number		Alarm name	Attribute		
Main	Sub		History record	Clear enabled	Immediate stop *1)
27	1	Absolute clear abnormal protection	○	×	×
29	1	Counter overflow protection 1	○	×	×
29	2	Counter overflow abnormal protection 2	○	×	×
80	0	Modbus communication timeout protection	○	×	×
92	0	Encoder data recovery abnormal protection	○	×	×
92	1	External scale data recovery error protection	○	×	×
92	3	Multi-rotation data upper limit inconsistency error protection	○	×	×
93	0	Parameter setup error 1	○	×	×
93	1	Block data setting error protection	○	○	×
93	8	Parameter set error protection 6	○	×	×
94	0	Block operation abnormal protection	○	○	×
94	2	Origin return abnormal protection	○	○	×
97	0	Control mode setting error protection	×	×	×

*1) Immediate stop indicates alarms that will trigger immediate stop, when Pr.5.10 (Sequence upon alarm) is set between 4 and 7. Please refer to Technical Reference (Functional specification) for details.

7-2 Details of protection functions to detect when Modbus communication/block operation function is effective

Alarm number		Alarm name	Cause	Treatment
Main	Sub			
27	1	Absolute clear abnormal protection	Absolute encode multi-rotation clear has been executed by USB communications.	<ul style="list-style-type: none"> Confirm whether absolute encode multi-rotation clear has been executed by USB communications. (Note) This is a safety measure and is not an abnormality. Alarm will not be triggered when multi-rotation clear is conducted by Modbus communications, however, please reset the control power supply, even in this case.
29	1	Counter overflow error protection 1	The value of absolute encoder (absolute external scale) position [in pulse units] / electronic gear ratio has exceeded $\pm 2^{31}$ (2147483648) or an overflow occurred during the calculation, in the position information initialization process after reclosing of control power supply in absolute mode when block operation is valid.	<ul style="list-style-type: none"> Confirm the operational range of absolute encoder (absolute external scale) position and conduct a review of the electronic gear ratio.
	2	Counter overflow abnormal protection 2	The value of positioning deviation has exceeded $\pm 2^{30}$ (1073741824) in command units.	<ul style="list-style-type: none"> Confirm that motor rotates in accordance with the positioning command. Confirm that output torque has not saturated by the torque monitor. Adjust gain. Set Pr.0.13 ("1st torque limit setting" and Pr5.22 "2nd torque limit setting" to maximum Connect encoder connection wiring as per the wiring diagram.
80	0	Modbus communications timeout protection	Modbus communication against own axis has not been received for more than the set time, under a state where rights have been acquired under register 4300h "Modbus communication rights setting."	<ul style="list-style-type: none"> Set Pr5.40 "Modbus communication timeout period" to 0 to be disabled or to appropriate time. Check the connection of Modbus communication.

Alarm number		Alarm name	Cause	Treatment
Main	Sub			
92	0	Encoder data recovery abnormal protection	Initialization process of internal position information has not conducted normally under absolute and semi-closed control mode.	<ul style="list-style-type: none"> Secure encoder power supply voltage at $DC5V \pm 5\%$ (4.75 to 5.25V). Care must be taken when the encoder lines are lengthy. If motor wires and encoder wires are bundled together, separate them. Connect shield to FG
	1	External scale data recovery error protection	Initialization of internal position location has been conducted abnormally under full closed control and under absolute mode, with block operations valid	<ul style="list-style-type: none"> Secure power supply voltage of $5VDC \pm 5\%$ (4.75 to 5.25 V) for the external scale. Special care should be taken in case the external scale connecting cable is long. In case the motor line and the external scale connecting cable is bundled together, separate them. Connect shield to FG. Refer to connection diagram for external scale.
	3	Multi-rotation data upper limit inconsistency error protection	The encoder multi-rotation upper limit value and the amplifier parameter multi-rotation data upper limit value does not match, under. infinite revolution absolute mode.	<ul style="list-style-type: none"> Confirm set values of the parameters In case it occurs immediately after switching the control power supply on, reclose the control power supply. (This is not abnormal.)
93	0	Parameter setup error 1	[1] Electronic gear ratio exceeds the allowable range. [2] When block operation is valid by start by Modbus communications (Pr6.28 = 1) and Modbus connection was disabled (Pr 5.37 is 0) [3] When the backlash compensation function is enabled (Pr7.04 bit1-0 is other than 0) and the block operation is disabled (Pr6.28 = 0), the value of Pr7.18 "Backlash compensation amount holding range" converted to pulse units by the electronic gear ratio exceeds 2147483647.	<ul style="list-style-type: none"> Check the setting value of the parameter. [1] When a block operation was enabled (Pr 6.28 is non 0), Electronic gear ratio must be in the range 1/1000 to 8000. [2] When a block operation was enabled (Pr 6.28 is non 0), Modbus connection was disabled (Pr 5.37 is 0). [3] Pr 7.18 Check the settings of the "Backlash compensation amount holding range" and the electronic gear ratio.
	1	Block data setting abnormal protection	[1] The speed, acceleration, and deceleration were set to 0, or the acceleration and deceleration were set to values exceeding 429496729 [command unit/s ²], so a block operation was started. [2] Conditional branching command does not support the subject of comparison. [3] Specified block data command was undefined. [4] A command other than the homing command was automatically started with Pr6.98 bit28 (Start of block operation when servo is turned on) = 1 (Valid). [5] Detection method 4 (Z phase (approximate)) for homing command was started when using with full-closed control (Pr0.01 = 6) or a motor other than MINAS-A6. [6] Other, abnormal block data settings exists.	[1] Set value other than 0 to velocity, acceleration and deceleration. [2] Confirm there are no problems with the conditional branch command or comparison subjects. [3] Check whether the block data setup does not have any problems. Confirm there are no problems with the block number designations. [4] Check whether the block data setup does not have any problems. Alternatively, both Pr6.98 bit28 and bit29 are set to 1 (Valid). [5] Check whether the block data setup does not have any problems. [6] Check whether the block data setup does not have any problems.
	8	Parameter set error protection 6	The absolute origin position offset has been set outside the range under absolute mode origin offset valid setting (Pr60.48 bit 1 = 1) under infinite revolution absolute mode, when block operation is valid (Pr6.28 is other than 0).	<ul style="list-style-type: none"> Check set values of parameters

Alarm number		Alarm name	Cause	Treatment
Main	Sub			
94	0	Block operation abnormal protection	[1] A new action command was executed while an action command (during execution of position command generation process) was being executed. [2] Start conducted by specifying new block number while block operation was being conducted. [3] Block operation started even though servo was OFF, etc.	[1] Confirm there are no problems with the block operation sequence. [2] Confirm there are no problems with the upper side sequence. [3] Confirm there are no problems with the upper side sequence.
	2	Origin return abnormal protection	[1] A block operation of origin return command was executed while in absolute mode. [2] Drive prohibited input for origin return direction has been turned ON during the origin return action, and the drive prohibited input for the direction opposite to the origin return direction has been turned ON while it is in reverse action. [3] Both drive prohibition inputs (POT and NOT) have been turned ON during the homing operation of the block operation. [4] Relative positioning or absolute positioning has been executed under origin return uncompleted state. [5] When setting 1 (HOME + Z phase) and 2 (HOME only) for the detection method of the return-to-origin command, HOME, POT, and NOT are not assigned to input signals. [6] When setting 2 (HOME only) for the detection method of the return-to-origin command, HOME is not assigned to SI4.	[1] Confirm there are no problems with the block data settings or the absolute mode settings. [2] Confirm there are no problems in the arrangement of the drive prohibited input and the origin (sensor input, Z phase). [3] Check the positioning relation between the drive prohibition inputs for any problems. [4] Check if there are any issues with setting block data, etc. [5] Set the function assignment for connector pins correctly [6] Set the function assignment for connector pins correctly.
97	0	Control mode setting error protection	[1] Block operation is set to enabled, when other than Position control (Pr0.01 = 0) or full-close control (Pr0.01 = 6) [2] When Pr6.28“Special function select” = 4 (Block operations by input signal enabled(Pulse train enabled))was true, Pr0.15 “absolute encoder setup” = 1 “incremental mode” was not true. (The software of function enhancement version 9 or later does not detect alarms due to this cause.)	[1] Check the setting of Pr 0.01“control mode setting” and Pr 6.28 “Special function selection” [2] Check the settings of Pr6.28“control mode setting” and Pr0.15 “absolute encoder setup”.

8. List of parameters

Classification 0: Special settings

Class	No	Parameter title	Unit	Set range	Functions, contents	Attribute	Related control modes	Relations
0	15	Absolute encoder setting	-	0 to 4	Select method of use of absolute encoder	Reclose power supply	All	6-1

Classification 5: Extended settings

Class	No	Parameter title	Unit	Set range	Functions, contents	Attribute	Related control modes	Relations
5	29	RS232 communications baud rate setting *1	-	0 to 7	Set baud rate for RS232 communications. 0: 2400, 1: 4800, 2: 9600 3: 19200, 4: 38400, 5: 57600, 6: 115200, 7: 230400 bps Note) In case it is not Modbus communications (Pr.5.37 = 0), when value is set to 7, it will be set internally to 9600 bps.	Reclose power supply	All	2-1-2
	30	RS485 communications baud rate setting *1	-	0 to 7	Set baud rate for RS485 communications. 0: 2400, 1: 4800, 2: 9600 3: 19200, 4: 38400, 5: 57600, 6: 115200, 7: 230400 bps Note) In case it is not Modbus communications (Pr.5.37 = 0), when value is set to 7, it will be set internally to 9600 bps.	Reclose power supply	All	2-1-2
	31	Axis number	-	0 to 127	Sets axis number for RS232/RS485 communications. In case of MINAS standard protocol, please use within the range up to 31. In case of Modbus, use within the range of 1 to 127. (However, the maximum number of connection axis shall be limited to 31.) 0: will invalidate Modbus communications.	Reclose power supply	All	-
	37	Modbus connection setting	-	0 to 2	Sets RS232/RS485 communications protocol. 0: MINAS standard protocol 1: Modbus-RTU (RS232 communications, 1:1 only) 2: Modbus-RTU (RS485 communications, 1:N compatible)	Reclose power supply	All	-
	38	Modbus communication setting	-	0 to 5	Sets parity (Even, odd, none) and stop bit length (1 bit, 2 bits) for Modbus communications. 0: Even/1bit 1: Even/2bit 2: Odd/1bit 3: Odd/2bit 4: None/1bit 5: None/2bit	Reclose power supply	All	2-1-3
	39	Modbus response waiting Time	ms	0 to 10000	Set waiting time to be added from the receipt of Modbus communications request until response data is transmitted. Note) Even if value is set to 0, delay will occur for generation of response data.	Always effective	All	2-1-3
	40	Modbus communications Time out time	ms	0 to 10000	Sets time to detect Err 80.0 "Modbus communications time out protection", in case Modbus communications specifying own axis or broadcast could not be received within the set length of time from the last time received, when rights have been acquired under register 4300h "Modbus communication rights setting" and Err 80.0 is not detected when set value is 0.	Always effective	All	2-1-3

(Continued)

Class	No	Parameter title	Unit	Set range	Functions, contents	Attribute	Related control modes	Relations
5	42	Modbus broadcast Setting	-	-32768 to 32767	<p>Sets request processing and response action, in case broadcast mode request has been received in Modbus communications.</p> <p>bit 0 response action 0: Invalid (No action) 1: Valid (Action) *1</p> <p>bit 1: Request processing 0: Valid (Process) 1: Invalid (No processing)</p> <p>bit 2: Strobe input operation automatic off 0: invalid, 1: valid *2</p> <p>bit 3: Request operation specification switch *1 0: use Pr5.40, 1: Use Pr5.39</p> <p>bit 4 - 15: Not used Please set to 0 (zero).</p> <p>The lowermost bit is designated as bit 0.</p> <p>*1 In case bit 3 = 0, returns response after $Pr5.31 \times Pr5.40[ms]$. In case bit 3 = 1, returns response after $Pr5.31 \times Pr5.39 [ms]$. Does not return response when bit 1 = 1.</p> <p>*2 After start-up of block operation, strobe input operation will be automatically turn OFF from the amplifier side. No need to write input OFF.</p>	Always effective	All	2-1-3 2-1-4
	58	Modbus mirror register setting 1	-	-32768 to 32767	Sets register address linked to Modbus register address 4418h "Mirror register 1."	Reclose power supply	All	2-1-4
	59	Modbus mirror register setting 2	-	-32768 to 32767	Sets register address linked to Modbus register address 4419h "Mirror register 2."	Reclose power supply	All	2-1-4
	60	Modbus mirror register setting 3	-	-32768 to 32767	Sets register address linked to Modbus register address 441Ah "Mirror register 3."	Reclose power supply	All	2-1-4
	61	Modbus mirror register setting 4	-	-32768 to 32767	Sets register address linked to Modbus register address 441Bh "Mirror register 4."	Reclose power supply	All	2-1-4
	62	Modbus mirror register setting 5	-	-32768 to 32767	Sets register address linked to Modbus register address 441Ch "Mirror register 5."	Reclose power supply	All	2-1-4
	63	Modbus mirror register setting 6	-	-32768 to 32767	Sets register address linked to Modbus register address 441Dh "Mirror register 6."	Reclose power supply	All	2-1-4
	64	Modbus mirror register setting 7	-	-32768 to 32767	Sets register address linked to Modbus register address 441Eh "Mirror register 7."	Reclose power supply	All	2-1-4
	65	Modbus mirror register setting 8	-	-32768 to 32767	Sets register address linked to Modbus register address 441Fh "Mirror register 8."	Reclose power supply	All	2-1-4
	79	Modbus mirror register setting 9	-	-32768 to 32767	Sets register address linked to Modbus register address 4420h "Mirror register 9."	Reclose power supply	All	2-1-4
	80	Modbus mirror register setting 10	-	-32768 to 32767	Sets register address linked to Modbus register address 4421h "Mirror register 10."	Reclose power supply	All	2-1-4
	81	Modbus mirror register setting 11	-	-32768 to 32767	Sets register address linked to Modbus register address 4422h "Mirror register 11."	Reclose power supply	All	2-1-4
	82	Modbus mirror register setting 12	-	-32768 to 32767	Sets register address linked to Modbus register address 4423h "Mirror register 12."	Reclose power supply	All	2-1-4
	83	Modbus mirror register setting 13	-	-32768 to 32767	Sets register address linked to Modbus register address 4424h "Mirror register 13."	Reclose power supply	All	2-1-4
	84	Modbus mirror register setting 14	-	-32768 to 32767	Sets register address linked to Modbus register address 4425h "Mirror register 14."	Reclose power supply	All	2-1-4
	85	Modbus mirror register setting 15	-	-32768 to 32767	Sets register address linked to Modbus register address 4426h "Mirror register 15."	Reclose power supply	All	2-1-4
	86	Modbus mirror register setting 16	-	-32768 to 32767	Sets register address linked to Modbus register address 4427h "Mirror register 16."	Reclose power supply	All	2-1-4

Classification 6: Special setting

Class	No	Parameter title	Unit	Set range	Functions, contents	Attribute	Related control modes	Relations
6	28	Special function select	-	0 to 4	Selects between enabling and disabling the block operation function. 0:Block operation disabled (Pulse train enabled) 1:Block operation by Modbus communication enabled (Pulse train disabled) 2:Block operations by input signal enabled (Pulse train disabled) 3:Use by manufacturer 4:Block operations by input signal enabled (Pulse train enabled)	Reclose power supply	Block operation	2-3
6	88	Absolute multi-rotation data upper limit value	-	0 to 65534	Sets absolute multi-rotation data upper limit value. When the multi-rotation data exceeds this set value, the multi-rotation data will turn to 0. Inversely, if it goes below 0, it will change to this set value. Internal value will be set to 65535 in case Pr0.15 is set to 0 or 2 (absolute mode)	Reclose power supply	All	6-1
6	98	Function expansion setting 4	-	-2147483648 to 2147483647	Sets various function in bit units: bit 0 to 21: manufacturer use Please set fixed to 0 bit22: Effective bit switching in multi-turn data. 0:Invalid(-256 to 255 Turn) 1:Valid(-32768 to 32767 Turn) bit 23 to 27: manufacturer use Please set fixed to 0 bit 28: Start of block operation when servo is turned on 0:Invalid 1:Valid bit 29: Extension of start of block operation when servo is turned on 0:Invalid 1:Valid bit 30 to 31: manufacturer use Please set fixed to 0 *bit 0 is the least significant bit	Reclose power supply	Block operation	4-5

Classification 56 to 60: Block data
Please refer to Item 3-2 for details.

Classification 60: Block operation setting

Class	No	Parameter title	Unit	Set range	Functions, contents	Attribute	Related control modes	Relations
60	48	Block operation method set	-	-32768 to 32767	Set origin offset valid or invalid under absolute mode	Reclose power supply	Block operation	3-1
	49	Origin offset	Command unit	-2147483648 to 2147483647	Sets the amount of origin offset at origin return completion in block operation under increment mode. Sets the amount of offset between the encoder position of block operation under absolute mode and the mechanical coordinate system location. Set bit 1 of Pr60.48 (Block operation method setting) to make it valid.	Reclose power supply	Block operation	3-1
	50	Positive direction software limit	Command unit	-2147483648 to 2147483647	Sets soft limit range in block operation after return to origin completion. When Pr60.55 = 1 or in absolute mode, set the software limit for block operation after the power is turned on.	Reclose power supply	Block operation	3-1
	51	Negative direction software limit	Command unit	-2147483648 to 2147483647	When origin return is completed, set the software limit range for block operation after the origin return completion.	Reclose power supply	Block operation	3-1

(Continued)

Class	No	Parameter title	Unit	Set range	Functions, contents	Attribute	Related control modes	Relations
60	52	Origin return velocity (high speed)	r/min	0 to 20000	Sets high-speed operation velocity for return to origin	Reclose power supply	Block operation	3-1
	53	Origin return velocity (low speed)	r/min	0 to 20000	Sets low-speed operation velocity for return to origin	Reclose power supply	Block operation	3-1
	54	Origin return acceleration and deceleration	ms/ (300 0r/ min)	0 to 10000	Sets acceleration and deceleration for return to origin	Reclose power supply	Block operation	3-1
	55	Set invalid origin return	-	0 to 1	Set to 1 when conducting relative positioning operations and absolute positioning operations, without return to origin operation under increment mode. To set the operation range for origin return before the origin return completion, set it to 1 and set Pr60.50 and Pr60.51. 0: Origin return operation is required before relative positioning operation or absolute positioning operation is performed in incremental mode. Origin return is not required in absolute mode regardless of this set value. 1: Origin return operation is not required in both incremental and absolute modes.	Reclose power supply	Block operation	3-1
	56	Acceleration time unit *1)	-	0~1000	Set the unit of acceleration for block operation It does not apply to origin return. 0 : ms 1 : 0.1ms 5 : 0.5ms 10 : ms 100 : 10ms 1000 : 100ms *Please do not set to values outside the setting range	Always effective *2)	Block operation	3-1
	57	Deceleration time unit *1)	-	0~1000	Set the unit of block operation deceleration It does not apply to origin return. 0 : ms 1 : 0.1ms 5 : 0.5ms 10 : ms 100 : 10ms 1000 : 100ms *Please do not set to values outside the setting range	Always effective *2)	Block operation	3-1
	64	For manufacturer's use	-	-	Please set fixed to 0 (zero).	-	-	-

*1) It is supported in versions corresponding to Function enhancement version 8 or earlier.

*2) Although the attribute is always effective, there are no guarantees for changes made while block operation is activated. To be always set before block operation. Always stop the block operation first, before changing values.