EPSON

Epson RC+ 8.0 Option Remote Control Reference

Original instructions

Rev.2
ENM256S7368F

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1. FOREWORD

1.1 FOREWORD

Thank you for purchasing our robot products. This manual contains the information necessary for the correct use of the Epson RC+ software. Please carefully read this manual and other related manuals when using this software. Keep this manual in a handy location for easy access at all times.

The robot system and its optional parts are shipped to our customers only after being subjected to the strictest quality controls, tests, and inspections to certify its compliance with our high performance standards. Please note that the basic performance of the product will not be exhibited if our robot system is used outside of the usage conditions and product specifications described in the manuals.

This manual describes possible dangers and consequences that we can foresee. Be sure to comply with safety precautions on this manual to use our robot system safety and correctly.

1.2 TRADEMARKS

Microsoft, Windows, Windows logo, Visual Basic, and Visual C++ are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries. Other brand and product names are trademarks or registered trademarks of the respective holders.

1.3 Notation

Microsoft® Windows® 10 operating system
Microsoft® Windows® 11 operating system
In this manual, the above operating systems are referred to as Windows 10 and Windows 11, respectively. Windows 10 and Windows 11 are sometimes collectively referred to as Windows.

1.4 Terms of Use

Please contact us if you find any errors in this document or if you have any questions about the information in this document.

1.5 Manufacturer

SEIKO EPSON CORPORATION

1.6 Contact Information

Contact information details are listed in the "Supplier" section in the following manual.
Note that the contact information may vary depending on your region.
"Safety Manual - Contact Information"

The Safety Manual is also available at the following site.
URL: https://download.epson.biz/robots/

1.7 Before Use

Before using this manual, be sure that you understand the following information.

SAFETY PRECAUTIONS

Installation of robots and robotic equipment should only be performed by qualified personnel in accordance with national and local codes.

Please carefully read this manual and other related manuals when using this software.

Keep this manual in a handy location for easy access at all times.

⚠ WARNING

This symbol indicates that a danger of possible serious injury or death exists if the associated instructions are not followed properly.

⚠ CAUTION

This symbol indicates that a danger of possible harm to people or physical damage to equipment and facilities exists if the associated instructions are not followed properly.

The Installation Folder for Epson RC+ 8.0

You can change the path for the installation folder for Epson RC+ 8.0 anywhere. This manual assumes that Epson RC+ 8.0 is installed in `C:\EpsonRC80`.

2. Before Reading This Manual

This manual contains information on how to use the remote I/O control extended function. This manual assumes that users have sufficient knowledge about our Robot Controllers. Before using this feature, be sure to read the contents of related manuals for the robot systems, and understand their function.

2.1 Main Features

- This function allows you to execute commands in the controller similar to SPEL commands using inputs and outputs. By selecting “Remote I/O” as a control device for Epson RC+ 8.0 and configuring the appropriate I/O settings, the function can be used in addition to the standard Remote I/O.
- This function can be used with the Controller’s standard inputs and outputs, and also with optional Fieldbus inputs and outputs (DeviceNet, PROFIBUS-DP, PROFINET, CC-Link, and EtherNet/IP, EtherCAT, Modbus).
- The following resources are provided for command execution:
    - Handshake signals: Input/Output 7 bit port
    - Command/response data signals: Up to 8 words (16 bits per word)
- Commands are categorized.
- Some data can be stored in tables and lists for more efficient command execution.

2.2 Overview

This function enables direct control of the robot system from external equipment by using discrete I/O or Fieldbus, without running any SPEL programs. The external equipment controls the robot system by setting commands in the selected Remote I/O space. Results of the commands can be acquired in the Remote I/O space selected for the response data.

⚠ CAUTION

- A command is completed when you receive a response after sending a request. A new command cannot be requested until the response of the previous command is received.
- A received command is executed even if the Ethernet is disconnected.

The provided command functions are based on Epson RC+ 8.0 SPEL+.

To use this function, also refer to the following manual.

"Epson RC+ 8.0 SPEL+ Language Reference"

Please note that names of SPEL commands may be used in the descriptions of each command.

⚠ CAUTION

- This function is not compatible with N series.
- Although this function is based on Epson RC+ 8.0 SPEL+ functions, it does not provide all of the Epson RC+ 8.0 SPEL+ functions. This function may not be effective for CP motion with a short moving distance.

3. Remote I/O to Be Used

3.1 Remote I/O Function

This function exchanges commands with external equipment using I/O described below.

- **Control signals**: Handshake data
- **Data signals**: Data (command, response) signals for exchanging control signals and information

3.2 Control signals

3.2.1 External Equipment Control Signals

Control signals output from the external equipment consist of the following signal.

Name	Label	Description
Command set	ExtCmdSet	Requests the command execution. Requests by setting the signal to High. Be sure to execute the command after setting the command data to the data field for preventing errors. This signal should be cleared after the Controller receives the command.
Response acquisition	ExtRespGet	Set this signal to High to notify the Controller that the response from the Controller is acquired. This signal should be cleared once the response set signal is cleared.
Function reset	ExtCmdReset	This signal initializes the interface function. Keep this signal to High while using the function. Function can not work in Low state. This signal also can be used to reset in case of interface function error or to abort the motion command halfway.

3.2.2 Controller Control Signals

Control signals output from the Controller consist of the following signal.

Name	Label	Description
Command acquisition	ExtCmdGet	This signal outputs the command acquisition state of the Controller. (High = acquired) The signal can be cleared when the command set signal is cleared.
Response set signal	ExtRespSet	This signal is output when the response is set (High = Set)
Command result	ExtCmdResult	This signal outputs the command execution result. (High = error, Low = normal) Contents output to the response data vary according to the result of this signal.
Function error	ExtError	“High” will be output in case the this function cannot continue. (Normal = Low) At this point, an error code is output to the response data. The external equipment needs to judge the error code whether to reset the function or the controller. The function remains in halt state until either reset operation is done.

3.3 Data signals

3.3.1 Command Signals (ExtCmd0 to ExtCmd127)

This is the data used to specify a command and its associated parameters. Commands consist of several words.

- Word
  A word consists of a 16-bit port.

- Command syntax
  Commands consist of up to eight words. The number of words varies according to the command to be used. The minimum command consists of one word.

Command number	Parameter 1	Parameter 2	......	Parameter 7

3.3.2 Response Signals (ExtResp0 to ExtResp127)

This is the data for the command response. The response data consists of several words.

- Word
  A word consists of a 16-bit port.
- Response syntax
  Commands consist of up to eight words. The number of words varies according to the command to be used. The minimum command consists of one word. For error response, all commands use three words.

Command number	Response 1	Response 2	......	Response 7

⚠ CAUTION

Fields described as “Reserved” in descriptions of each command may be used in the future.

4. Configuration

4.1 Configuration

To enable this function, you must configure the Controller beforehand.

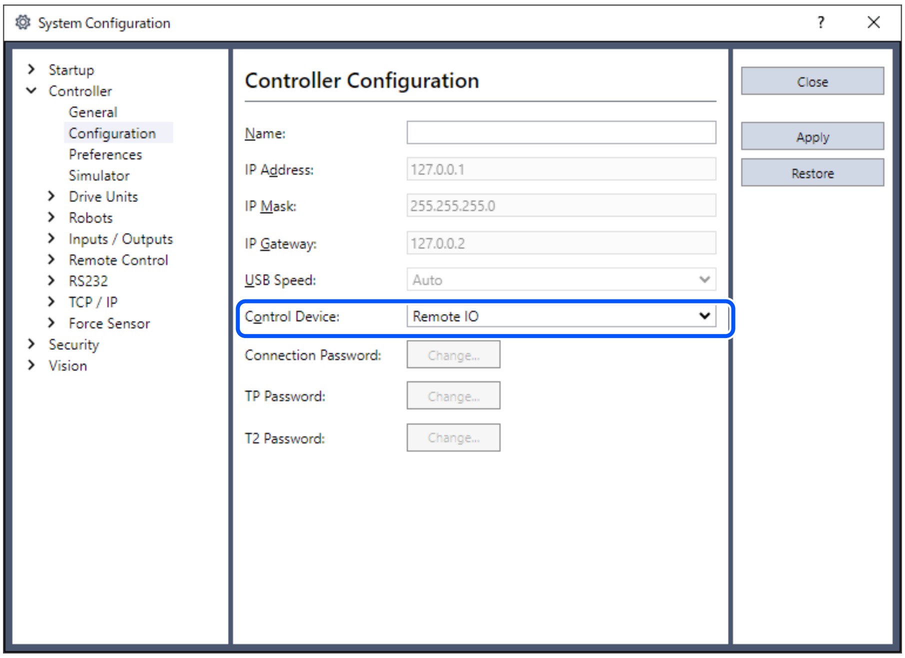
Set each signal described in the following in Epson RC+ 8.0.

Remote I/O to Be Used

4.2 Selecting the Control Device

This function operates as one of the Remote IO functions. To use this function, first select Remote IO as the control device.

Epson RC+ 8.0-[Setup]-[System Configuration]-[Controller]-[Configuration]

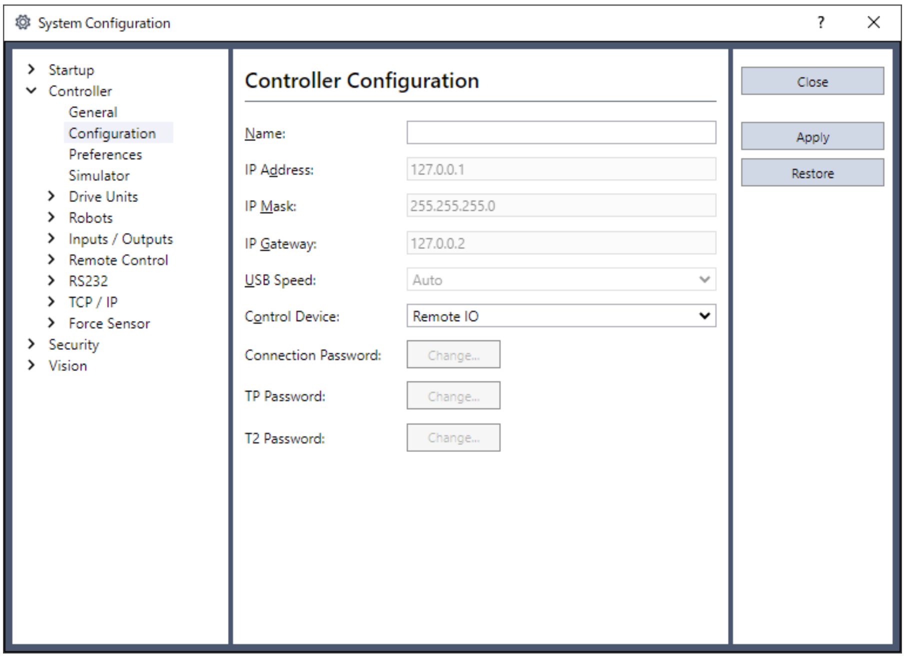


4.3 Setting the Control Signals

4.3.1 Setting the Input Signals

Set each signal controlled by the external equipment as an input signal of the Remote I/O.

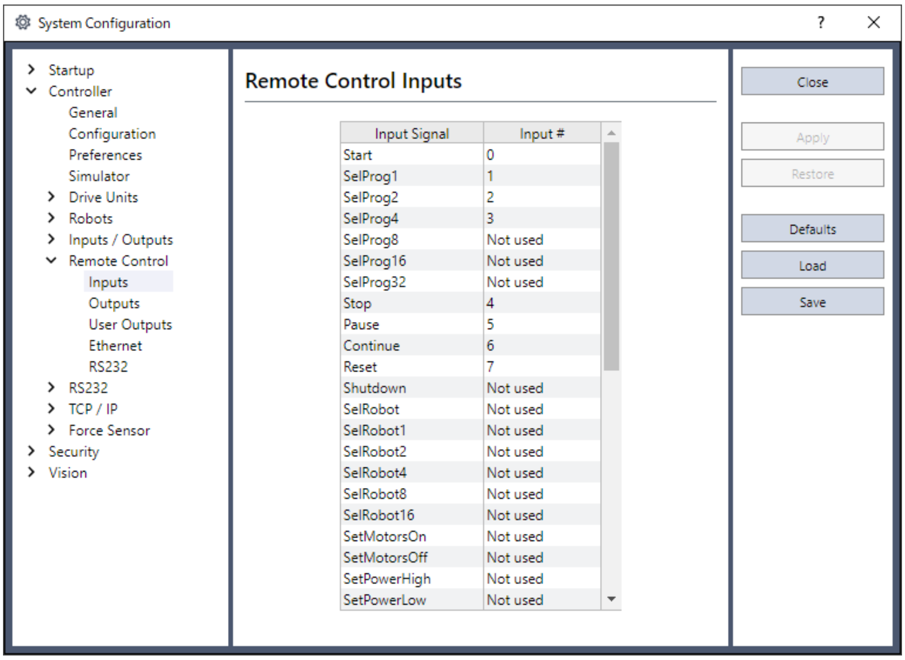
> ⚠ CAUTION
>
> This function will not become effective unless all signals are set.



4.3.2 Setting the Output Signals

Set each signal output by the external equipment as output signals of the Remote I/O.

> ⚠ **CAUTION**
>
> This function will not become effective unless all signals are set.



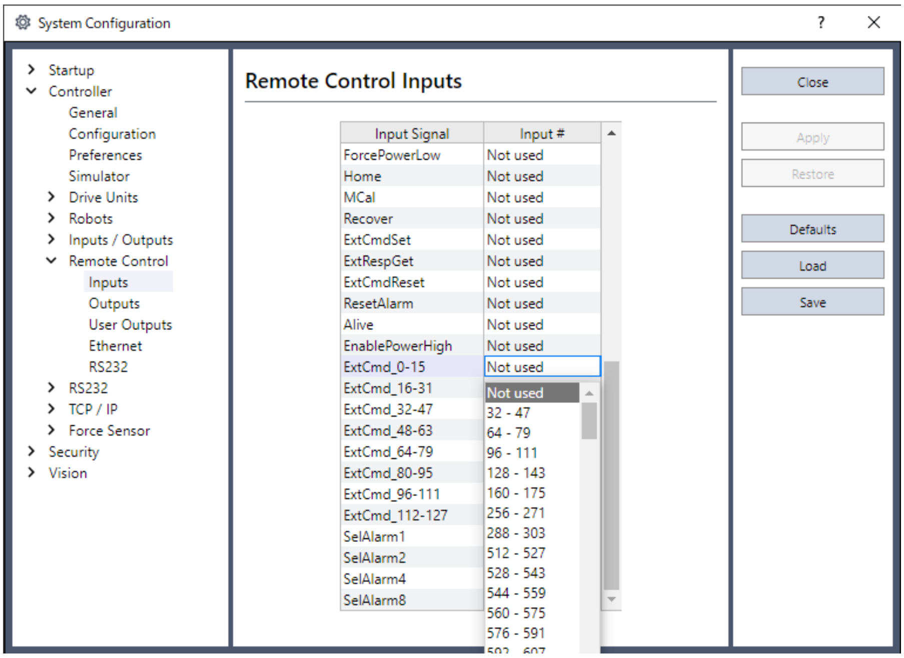
4.4 Setting the Data Signals

4.4.1 Setting the Command Signals

Set the command data signals in units of words. Check the size of the command and set it with the largest size.

Also, be careful of the following:

- For data signals, make sure to set the number of words you need successively from “ExtCmd0”. If you do not set the data signals successively from "ExtCmd_0-15", it cannot send the data correctly.

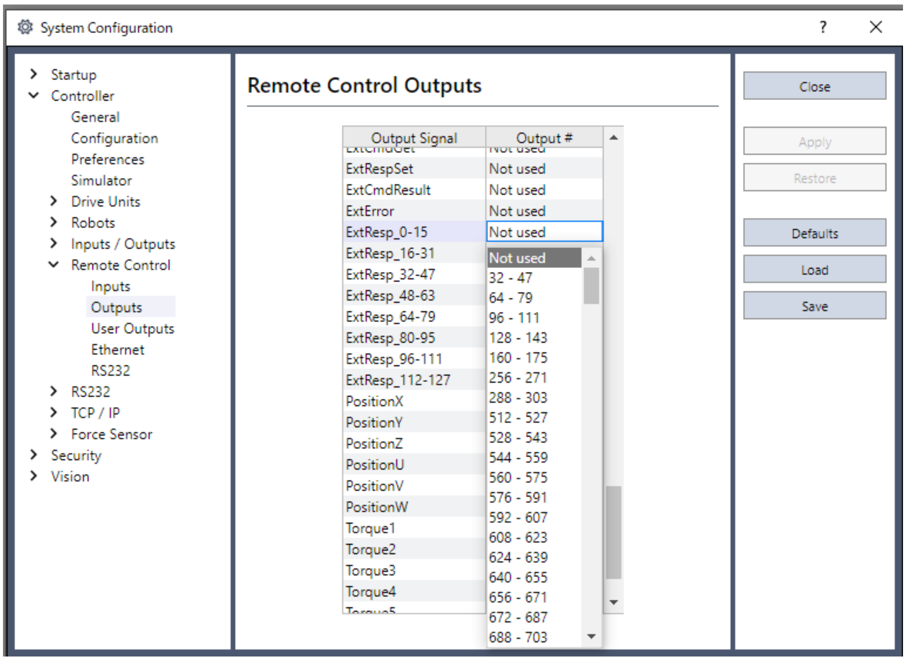


4.4.2 Setting the Response Signals

Set the outputs for acquiring the response data from the Controller in units of words. Check the size of the command response and set it with the largest size.

Also, be careful of the following:

- For data signals, make sure to set the number of words you need successively from “ExtResp0”. If you do not set the data signals successively from "ExtResp_0-15", it cannot acquire the data correctly.
- Be sure to set 3 or more words for the response signal.



5. Control Method

5.1 Initial External Equipment Output Signal States

When connecting to the Controller or resetting this function, set the outputs from the external equipment as shown below.

Name	Label	Output
Command set	ExtCmdSet	Low
Response acquisition	ExtRespGet	Low
Reset	ExtCmdReset	Low

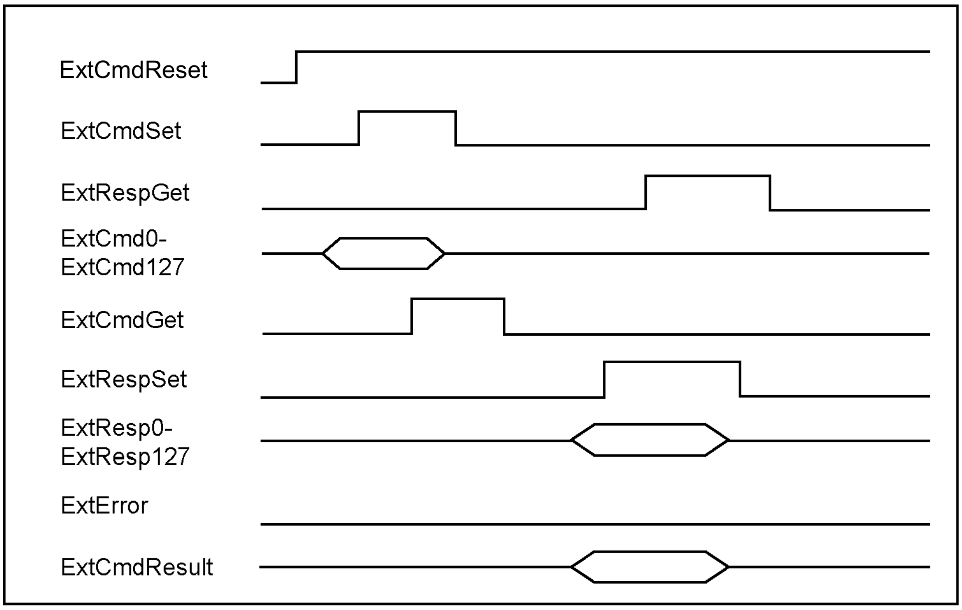
5.2 Starting a Function

- Before a function can be started, the reset signal (ExtCmdReset) must be High.
- A command request can be received when the command set input (ExtCmdSet) is changed from Low to High while the reset input (ExtCmdReset) is set to High.
- When the command set input (ExtCmdSet) is set to High while the reset input is in Low state, the request will be ignored.
- When the reset input (ExtCmdSet) is changed to High while the command set input (ExtCmdSet) is set to High, the Controller cannot recognize the signal as a command request.

⚠ CAUTION

Release of the reset input should be executed after the Controller becomes operable. Also, initialize each input when the Controller is reset.

5.3 Command Execution



This section describes the command execution sequence for one command.

1. The ExtCmdReset input is set to High to allow the command to be executed.
2. The input data for the command to be executed is set in the command data area (ExtCmd0 - ExtCmd127).

3. The command execution is requested by setting the ExtCmdSet input to High.
4. The commDDand acquisition of the Controller is confirmed when the command acquired output (ExtCmdGet) is set to High.
5. After confirmation of the command acquisition, the command request input (ExtCmdSet) is set to Low.
6. Command completion is indicated when the response set output (ExtRespSet) is set to High.
7. The command result output (ExtCmdResult) indicates the command execution result.
8. After the command result is checked, the response acquisition input (ExtRespGet) is set to High.
9. The response set output (ExtRespSet) is set to Low.
10. The response acquisition input (ExtRespGet) is set to Low.

5.4 Response Acquisition

This section describes the response acquisition procedure. A command response is one of two types: Normal response and Error response.

- Normal response
  This indicates that the proper command was requested and execution was also completed normally. For settings commands and control commands, command number and normal response codes are returned in the response data outputs. For acquisition commands, acquired data is returned in the response data outputs.
- Error response
  This indicates that the requested command or the execution result was not correct. For response data outputs, command number and response codes (error codes) are returned.

The external equipment acquires whether the requested command is either one of the above response by the command result output (ExtCmdResult).

Be sure to check this output when acquiring the response data signal.

- Low
  The result is normal. Execute the acquisition process for the requested command.
- High
  The result is abnormal. Check the abnormality from the response codes and deal with the error as necessary.

Set the response acquisition input (ExtRespGet) after the acquisition of the response result and the response data is completed. If the response acquisition input is set before the acquisition completion, the Controller may rewrite the information.

5.5 Malfunction

A malfunction is a situation where the robot control using this function can not continue. Controller aborts the command execution if there is a running command. Also, a response for the executing command can not be returned. The function remains in halt state and commands can not be accepted until “High” is output to the malfunction signal (ExtError), the error code is set to the response data signal, and the function or the controller is reset.

5.5.1 Malfunction Factors

Malfunction occurs due to two main factors:

- Controller factor: Controller needs to be reset

- External equipment factor: Operation can be resumed after a function reset.
  This occurs when a new command execution request is sent while another commad is still executing. Command processing of this function is under the premise that one command is complete by a set of request and response. If a new command

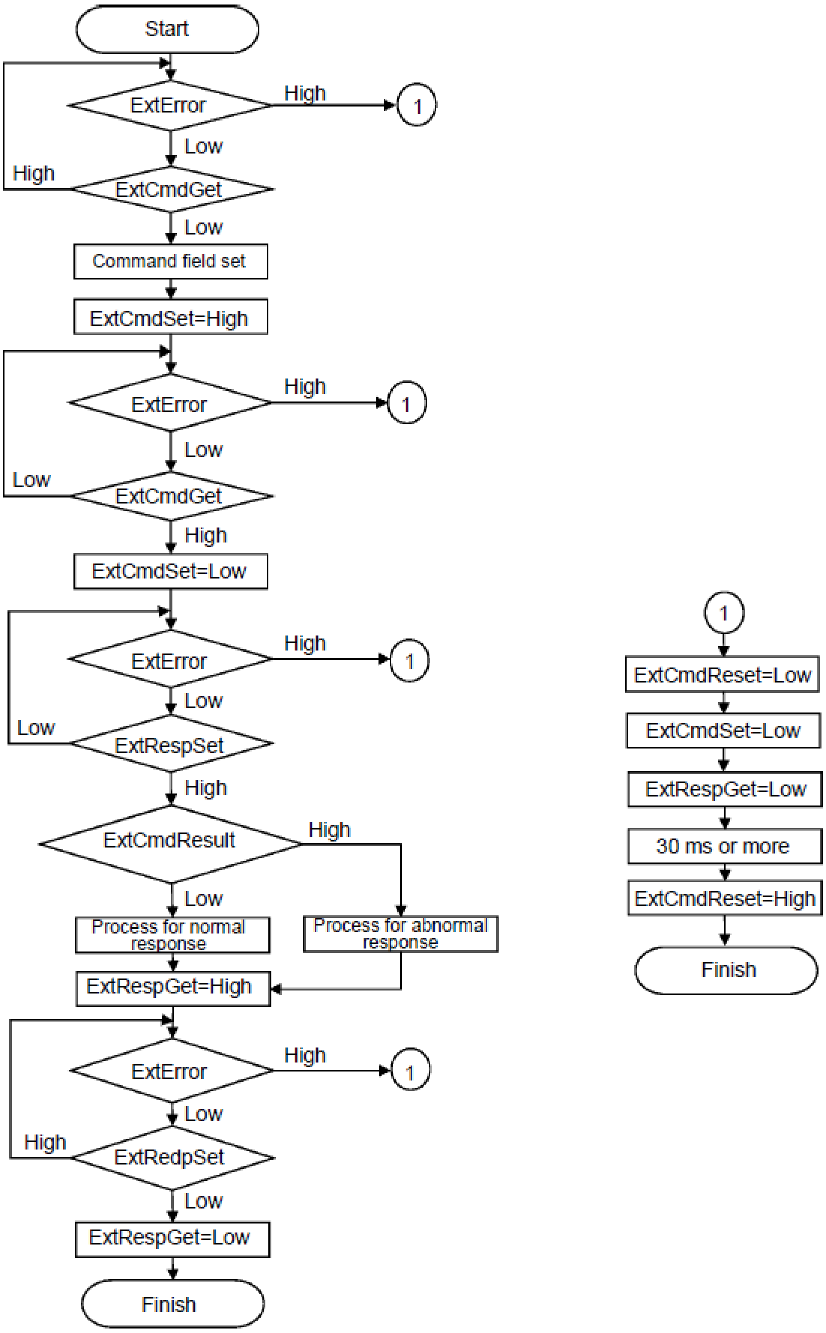
request is executed while the other command is being executed, phases of the external equipment and the Controller do not match. In this case, stop the operation for safety.

5.5.2 How to Reset a Malfunction

This section describes how to reset a malfunction condition.

1. Set the function reset input (ExtCmdReset) to the reset state (Low).
2. Set the command set input (ExtCmdSet) to the release state (Low).
3. Set the response acquisition input (ExtRespGet) to the release state (Low).
4. Wait at least 30 ms.
5. Set the function reset input (ExtCmdReset) to the release state (High).

Now, the malfunction reset is completed and a new commad can be requested.



6. Response Codes

Normal responses for commands other than data acquisition commands and error response are in the following format:

Command number	Response 1	Response 2

Note that some error codes do not have Response 2. In such cases, “0000H” will be returned.

6.1 Response 1 Codes

This section outlines the codes for response 1.

Outline	Description	Remedial measure	Hexadecimal
Normal	Command is completed normally.	-	0000
Command number error	Unsupported command number is requested.	*3	1000
Command sequence error	The order of the command requests is not proper.	*3	1002
Execution error	Requested command cannot be executed.	*3	2000
Command/Response Word number setting error	Word settings for both command and response necessary to execute the requested command are not proper.	*3	2001
Command word number setting error	Word setting for command necessary to execute the requested command is not proper.	*3	2002
Response word number setting error	Word setting for response necessary to execute the requested command is not proper.	*3	2003
Parameter error	Command parameter is not correct.	*3	2004
Table number specification error	Table number specification, such as speed table, exceeds the range.	*3	2005
Table registration error	Motion command option and the table specified for status acquisition are not registered.	*3	2006
Pallet undefined	Pallet specified by the pallet acquisition command is not registered.	*3	2007
Pallet point number discrepancy	Point number of registred pallet does not match that of the specified pallet.	*3	2008
Box undefined	Box specified by the Box acquisition command is not registered.	*3	2009
Command execution error	Error occurred as a result of command execution.	*3	200A
Command not accepted	Command execution cannot be accepted due to the system status.	*4	200B
RC error	Controller error occured.	*1	3000
Function error	The function has abnormality.	*2	9999

*1: Check the error code in Response 2, and refer to the each Controller manual.

*2: Reset the function using the function reset signal.

*3: Next command can be accepted without any change. Command in issue is not completed. Review the control method. (except 200B.)

*4: Reboot the system.

6.2 Response 2 Codes

This section describes the details of the codes for response 2. If there is no description in this section, “0000H” will be set.

6.2.1 Command Execution Error (Response 1: 200A)

Refer to the following manual.

“Status Code / Error Code List - Error Code”

6.2.2 RC Error (Response 1: 3000)

Refer to the following manual.

“Status Code / Error Code List - Error Code”

6.2.3 Function Error (Response 1: 9999)

Codes 9901 and 9902 are errors caused by the Controller.

Outline	Description	Hexadecimal
Command acceptance status error	Command request is sent while the other command is being executed.	0001
WBMPostMessageExtra failure	Message notification failed.	9901
PRINT message error	Content of the PRINT message is not proper.	9902

7. Command List

7.1 Setting Commands

Group	Command number	Hexadecimal	Description	Number of Words	
				Command	Response
Accel/Decel setting of PTP motion (Accel)	0	000H	Sets acceleration and deceleration for PTP motion	3	3
	1	001H	Registers to the accel/decel table	4	3
	2	002H	Acquires the currently set accel/decel values	1	3
	3	003H	Acquires acceleration and deceleration values from the accel/decel table for PTP motion	2	4
Accel/ Decel settings for Linear and CP motion (AccelS)	50	032H	Sets acceleration and deceleration	5	3
	51	033H	Sets acceleration setting value	3	3
	52	034H	Informs the Controller of deceleration setting value and sets acceleration and deceleration	3	3
	53	035H	Registers to the accel/decel table	6	3
	54	036H	Registers acceleration setting value to the accel/decel table	4	3
	55	037H	Registers deceleration setting value to the accel/decel table	4	3
	56	038H	Acquires the currently set accel/decel values	1	5
	57	039H	Acquires current acceleration value	1	3
	58	03AH	Acquires current deceleration value	1	3
	59	03BH	Acquires the registered values from the accel/ decel table	2	6
	60	03CH	Acquires the registered acceleration value from the accel/decel table	2	4
	61	03DH	Acquires the registered deceleration value from the accel/decel table	2	4

Group	Command number	Hexadecimal	Description	Number of Words	
				Command	Response
Accel/decel setting of Tool orientation change in CP motion (AccelR)	100	064H	Sets the acceleration and deceleration	5	3
	101	065H	Sets the acceleration value of the acceleration and deceleration	3	3
	102	066H	Sets the deceleration value of the acceleration and deceleration	3	3
	103	067H	Registers to the accel/decel table	6	3
	104	068H	Registers acceleration value to the accel/decel table	4	3
	105	069H	Registers deceleration value to the accel/decel table	4	3
	106	06AH	Acquires the currently set accel/decel values	1	5
	107	06BH	Acquires current acceleration value	1	3
	108	06CH	Acquires current deceleration value	1	3
	109	06DH	Acquires the registered value from the accel/decel table	2	6
	110	06EH	Acquires the registered acceleration value from the accel/decel table	2	4
	111	06FH	Acquires the registered deceleration value from the accel / decel table	2	4
Speed setting of PTP motion (Speed)	150	096H	Sets the speed	4	3
	151	097H	Registers to the speed table	5	3
	152	098H	Acquires current speed setting value	1	4
	153	099H	Acquires the setting value from the speed table	2	5

Group	Command number	Hexadecimal	Description	Number of Words	
				Command	Response
Arm speed setting of CP motion (SpeedS)	200	0C8H	Sets the speed, depart speed, and approach speed settings	7	3
	201	0C9H	Sets the setting values of speed and depart speed to the Controller.	5	3
	202	0CAH	Notifies and sets the approach speed setting value	3	3
	203	0CBH	Registers to the speed table	8	3
	204	0CCH	Registers speed and depart speed to the speed table	6	3
	205	0CDH	Registers approach speed to the speed table	4	3
	206	0CEH	Acquires current speed, depart speed, and approach speed	1	7
	207	0CFH	Acquires the setting values of current speed and depart speed	1	5
	208	0D0H	Acquires the set value of current approach speed	1	3
	209	0D1H	Acquires the setting value from the speed table	2	8
	210	0D2H	Registers speed and depart speed to the speed table	2	6
	211	0D3H	Acquires the approach speed from the speed table	2	4
Speed setting of Tool orientation change in CP motion when using ROT (SpeedR)	250	0FAH	Sets the speed	3	3
	251	0FBH	Registers to the speed table	4	3
	252	0FCH	Acquires current speed setting value	1	3
	253	0FDH	Acquires the setting value from the speed table	2	4
Parameter setting to offset speed and accel/decel in PTP motion (Weight)	300	12CH	Acquires the setting value from the speed table	5	3
	301	12DH	Sets the parameter for offsetting the speed and accel/decel in PTP motion without an arm length specified	3	3
	302	12EH	Acquires the parameter setting value for offsetting the speed and accel/decel in PTP motion	1	5

Group	Command number	Hexadecimal	Description	Number of Words	
				Command	Response
Load inertia and eccentricity setting (Inertia)	350	15EH	Sets the load inertia and eccentricity	5	3
	351	15FH	Sets the load inertia	3	3
	352	160H	Sets the eccentricity	3	3
	353	161H	Acquires the setting values of load inertia and eccentricity	1	5
	354	162H	Acquires the setting value of the load inertia	1	3
	355	163H	Acquires the setting value of the eccentricity	1	3
Arch parameter setting (Arch)	400	190H	Sets the arch parameter	6	3
	401	191H	Sets the depart distance of the arch parameter	4	3
	402	192H	Sets the approach distance of the arch parameter	4	3
	403	193H	Acquires the arch parameter	2	6
	404	194H	Acquires the depart distance setting value	2	4
	405	195H	Acquires the approach distance setting value	2	4
Setting of positioning end judgement range (Fine)	450	1C2H	Executes the settings of all joints	7	3
	451	1C3H	Sets the setting values of Joint #1, #2, and #3	4	3
	452	1C4H	Sets the setting values of Joint #4, #5, and #6	4	3
	453	1C5H	Acquires the setting values of all joints	1	7
	454	1C6H	Acquires the setting values of Joint #1, #2, and #3	1	4
	455	1C7H	Acquires the setting values of Joint #4, #5, and #6	1	4
Tool selection (Tool)	500	1F4H	Selects the tool	2	3
	501	1F5H	Acquires the tool selection status	1	3
	502	1F6H	Defines tool coordinate system	3	3

Group	Command number	Hexadecimal	Description	Number of Words	
				Command	Response
Pallet definition (Pallet)	550	226H	Defines the pallet by specifying 4 points	8	3
	551	227H	Defines the pallet by specifying 3 points	7	3
	552	228H	Limits the numbers of points and divisions to define the pallet	4	3
	553	229H	Selects the data type and defines the pallet by split	5	3
	554	22AH	Acquires the content of 4-point pallet definition	6	3
	555	22BH	Acquires the content of 3-point pallet definition	5	3
	556	22CH	Limits the number of points and division and acquires the pallet definition	4	3
	557	22DH	Selects the data type and acquires the details of pallet definition	5	4
	558	22EH	Acquires the point number set to the specified pallet	2	3
Approach check area setting (Box)	600	258H	Specifies the lower and upper positions to define the approach check area	7	3
	601	259H	Sets the lower limit position	5	3
	602	25AH	Sets the upper limit position	5	3
	603	25BH	Specifies the lower and upper limit positions and acquires the setting values of the approach check area	3	7
	604	25CH	Specifies the lower limit position and acquires the setting value of the approach check area	3	5
	605	25DH	Specifies the upper limit position and acquires the setting value of the approach check area	3	5
Approach check plane setting (Plane)	650	28AH	Set the approach check plane	5	3
	651	28BH	Acquires the setting value of the approach check plane	3	5

Group	Command number	Hexadecimal	Description	Number of Words	
				Command	Response
Local coordinate definition (Local)	700	2BCH	Sets the definition of Local coordinate system	5	3
	701	2BDH	Acquires the definition of Local coordinate system	3	5
Allowable motion area setting (XYLim)	750	2EEH	Set the allowable motion area by specifying the lower and upper limit positions	6	3
	751	2EFH	Sets the lower limit position	4	3
	752	2F0H	Sets the upper limit position	4	3
	753	2F1H	Acquires the setting value of the allowable motion area by specifying the lower and upper limit positions	2	6
	754	2F2H	Acquires the setting value of the allowable motion area by specifying the lower limit position	2	4
	755	2F3H	Acquires the setting value of the allowable motion area by specifying the upper limit position	2	4
Pulse value setting for the allowable motion area of the specified joint (Jrange)	800	320H	Sets the allowable motion area pulse value by specifying the upper and lower limit pulses	6	3
	801	321H	Sets the lower limit pulse value	4	3
	802	322H	Sets the upper limit pulse value	4	3
	803	323H	Acquires the allowable motion area pulse setting value by specifying the lower and upper limit pulses	2	6
	804	324H	Acquires the allowable motion area pulse setting value by specifying the lower limit pulse	2	4
	805	325H	Acquires the allowable motion area pulse setting value by specifying the upper limit pulse	2	4
Base coordinate definition (Base)	850	352H	Defines the Base coordinate system	4	3
	851	353H	Acquires the Base coordinate definition	2	4
Local number setting	900	384H	Sets the Local coordinate number	2	3

Group	Command number	Hexadecimal	Description	Number of Words	
				Command	Response
	901	385H	Acquires the setting status of the Local coordinate system number	1	3
Sense condition setting (Sense)	950	3B6H	Sets the condition for using Sense with command 2002 and 2003	3	3
	951	3B7H	Acquires the condition for using Sense with command 2002 and 2003	1	4
	952	3B8H	Acquires the status of condition satisfaction	1	3
Find condition setting (Find)	1000	3E8H	Sets the condition for using Find with command 2001, 2002, and 2003	3	3
	1001	3E9H	Acquires the condition for using Find with command 2001, 2002, and 2003	1	4
	1002	3EAH	Acquires the status of condition satisfaction	1	2
Till condition setting (Till)	1050	41AH	Sets the condition for using Till with motion commands	3	3
	1051	41BH	Acquires the condition for using Till with motion commands	1	4
	1052	41CH	Acquires the status of condition satisfaction	1	3
CP control (CP)	1100	44CH	Control the CP	2	3
	1101	44DH	Acquires the CP control state	1	3
Power control (Power)	1150	47EH	Controls the Power	2	3
	1151	47FH	Acquires the Power control state	1	3

Group	Command number	Hexadecimal	Description	Number of Words	
				Command	Response
Point editing	1200	4B0H	Sets the current manipulator position to the specified point	2	3
	1201	4B1H	Adjusts two coordinates to the specified point	7	3
	1202	4B2H	Adjusts the specified coordinate to the specified point	5	3
	1203	4B3H	Sets two coordinates to the specified point	7	3
	1204	4B4H	Sets the specified coordinate to the specified point	5	3
	1205	4B5H	Adjusts the coordinate to the specified point	3	3
	1206	4B6H	Sets the hand orientation of the specified point to Righty	2	3
	1207	4B7H	Sets the hand orientation of the specified point to Lefty	2	3
	1208	4B8H	Sets the elbow orientation of the specified point to ABOVE	2	3
	1209	4B9H	Sets the elbow orientation of the specified point to BELOW	2	3
	1210	4BAH	Sets the wrist orientation of the specified point to FLIP	2	3
	1211	4BBH	Sets the wrist orientation of the specified point to NOFLIP	2	3
	1212	4BCH	Sets the j4flag value of the specified point	3	3
	1213	4BDH	Sets the j6flag value of the specified point	3	3
	1214	4BEH	Sets the Local number to the specified point	3	3
	1215	4BFH	Acquires the hand orientation of the specified point	2	3
	1216	4C0H	Acquires the elbow orientation of the specified point	2	3
	1217	4C1H	Acquires the wrist orientation of the specified point	2	3
	1218	4C2H	Acquires the j4flag value of the specified point	2	3
	1219	4C3H	Acquires the j6flag value of the specified point	2	3

Group	Command number	Hexadecimal	Description	Number of Words	
				Command	Response
	1220	4C4H	Acquires the Local number of the specified point	2	3
	1221	4C5H	Sets the coordinate recorded by Find to the specified point	2	3
	1222	4C6H	Acquires the coordinate of the specified point	3	3
	1223	4C7H	Sets the J1flag	3	3
	1224	4C8H	Acquires the status of J1flag	2	3
	1225	4C9H	Sets the J2flag	3	3
	1226	4CAH	Acquires the status of J2flag	2	3
	1227	4CBH	Sets the J1angle attribute of the point	5	3
	1228	4CCH	Acquire the J1angle attribute of the point	2	3
Initial Joint #3 height (Z coordinate value) in Jump command (Limz)	1250	4E2H	Sets the initial Joint #3 height (Z coordinate value) in Jump command	3	3
	1251	4E3H	Acquires the initial Joint #3 height (Z coordinate value) in Jump command	1	3
Parallel processing	1300	514H	Registers the parallel processing list to be used in motion command execution	5	3
	1301	515H	Acquires the setting state of the parallel processing list used in motion command execution	3	5
	1302	516H	Initializes the specified list	2	3
	1303	517H	Sets the parallel processing list to be used in the motion commands	2	3
	1304	518H	Acquires the selective condition of the parallel processing list to be used in the motion commands	1	3
Singularity avoidance	1350	546H	Specifies whether to use LJM automatically in order to avoid singularity (AutoLJM)	2	3
	1352	548H	Sets the singularity avoiding function	2	3
Motor control	1400	578H	Controls ON/OFF of the motor.	2	3

Group	Command number	Hexadecimal	Description	Number of Words	
				Command	Response
	1401	579H	Acquires the status of the motor.	1	3
Reset	1450	5AAH	Resets the controller to an initial status.	1	3

7.2 Motion Commands

Group	Command number	Hexadecimal	Description	Number of Words	
				Command	Response
PTP motion from the current arm position to the specified position (Go)	2000	7D0H	Moves from the current position to the specified position in PTP motion		
			Destination specification = 0 Speed and Accel not specified	3	3
			Destination specification = 1 Speed and Accel not specified	4	
			Destination specification = 2 Speed and Accel not specified	5	
			Destination specification = 0 Speed and Accel specified	4	
			Destination specification = 1 Speed and Accel specified	5	
			Destination specification = 2 Speed and Accel specified	6	
Gate motion PTP motion (Jump)	2001	7D1H	Moves in PTP motion with gate motion		
			Destination specification = 0 Speed and Accel not specified	3	3
			Destination specification = 1 Speed and Accel not specified	4	
			Destination specification = 2 Speed and Accel not specified	5	
			Destination specification 0 Speed and Accel specified	4	
			Destination specification 1 Speed and Accel specified	5	
			Destination specification 2 Speed and Accel specified	6	

<table>
<tr><th rowspan="2">Group</th><th rowspan="2">Command number</th><th rowspan="2">Hexadecimal</th><th rowspan="2">Description</th><th colspan="2">Number of Words</th></tr>
<tr><th>Command</th><th>Response</th></tr>
<tr><td rowspan="3">3D gate motion (2 CP motion and 1 PTP motion) (Jump3)</td><td rowspan="3">2002</td><td rowspan="3">7D2H</td><td colspan="3">Moves the arm with 3D gate motion
This is a combination of two CP motion and one PTP motion.</td></tr>
<tr><td>Speed and Accel not specified</td><td>5</td><td rowspan="2">3</td></tr>
<tr><td>Speed and Accel specified</td><td>6</td></tr>
<tr><td rowspan="3">3D gate motion 3 CP motion (Jump3CP)</td><td rowspan="3">2003</td><td rowspan="3">7D3H</td><td colspan="3">Moves the arm with 3D gate motion
This is a combination of three CP motion.</td></tr>
<tr><td>Speed and Accel not specified</td><td>5</td><td rowspan="2">3</td></tr>
<tr><td>Speed and Accel specified</td><td>6</td></tr>
<tr><td rowspan="7">Linear interpolation motion (Move)</td><td rowspan="7">2005</td><td rowspan="7">7D5H</td><td colspan="3">Moves the arm from the current position to the specified position in a linear interpolation motion</td></tr>
<tr><td>Destination specification = 0
Speed and Accel not specified</td><td>3</td><td rowspan="6">3</td></tr>
<tr><td>Destination specification = 1
Speed and Accel not specified</td><td>4</td></tr>
<tr><td>Destination specification = 2
Speed and Accel not specified</td><td>5</td></tr>
<tr><td>Destination specification 0
Speed and Accel specified</td><td>4</td></tr>
<tr><td>Destination specification 1
Speed and Accel specified</td><td>5</td></tr>
<tr><td>Destination specification 2
Speed and Accel specified</td><td>6</td></tr>
<tr><td rowspan="6">Arc interpolation motion (Arc) (Arc3)</td><td rowspan="3">2006</td><td rowspan="3">7D6H</td><td colspan="3">Moves the arm from the current position to the specified position in Arc interpolation motion on XY plane face</td></tr>
<tr><td>Speed and Accel not specified</td><td>4</td><td rowspan="2">3</td></tr>
<tr><td>Speed and Accel specified</td><td>5</td></tr>
<tr><td rowspan="3">2007</td><td rowspan="3">7D7H</td><td colspan="3">Moves the arm from the current position to the specified position in Arc interpolation motion in 3D</td></tr>
<tr><td>Speed and Accel not specified</td><td>4</td><td rowspan="2">3</td></tr>
<tr><td>Speed and Accel specified</td><td>5</td></tr>
</table>

7.3 Jog & Teach Commands

Group	Command number	Hexadecimal	Description	Number of Words	
				Command	Response
JOG & Teach	2050	802H	Jog motion	5	3
	2051	803H	Teach the current position to the specified point	3	3
	2052	804H	Save the current point setting to the point file	2	3
	2053	805H	Controls the temporary halt and resume of the motor excitation	3	3
	2054	806H	Acquires the motor excitation status	1	3

7.4 Iuput / Output Commands

Group	Command number	Hexadecimal	Description	Number of Words	
				Command	Response
I/O control	2100	834H	Acquires the status of the specified input port in bytes	2	3
	2101	835H	Acquires the status of the specified input port in words	2	3
	2102	836H	Outputs the byte data to the specified byte output port	3	3
	2103	837H	Outputs the word data to the specified word output port	3	3
	2104	838H	Acquires the bit status of the specified input bit port	2	3
	2105	839H	Turns ON the output of the specified bit port	2	3
	2106	83AH	Turns OFF the output of the specified bit port	2	3
Memory I/O control	2107	83BH	Acquires the status of the specified memory I/O port in bytes	2	3
	2108	83CH	Acquires the status of the specified memory I/O port in words	2	3
	2109	83DH	Sets the specified memory I/O port in bytes	3	3
	2110	83EH	Sets the specified memory I/O port in words	3	3
	2111	83FH	Acquires the status of the specified memory I/O bit	2	3
	2112	840H	Turns ON the specified bit of the memory I/O	2	3

Group	Command number	Hexadecimal	Description	Number of Words	
				Command	Response
	2113	841H	Turns OFF the specified bit of the memory I/O	2	3
	2114	842H	Acquires the status of the specified output bit	2	2

7.5 Reference Commands

Group	Command number	Hexadecimal	Description	Number of Words	
				Command	Response
Current position information	2150	866H	Acquires the current position of the manipulator	2	5
Acquisition of the distance between 2 manipulator coordinates	2151	867H	Acquires the distance between 2 manipulator coordinates	3	3
PTP move check	2152	868H	Acquires whether the PTP (point to point) motion from the current position to the target position is possible	2	3
Manipulator type acquisition	2153	869H	Acquires the manipulator type	1	3
Manipulator model name acquisition	2154	86AH	Acquires the manipulator model name	2	3
Controller error	2155	86BH	Acquires the Controller error information	1	2
Control dev ice					
acquisition	2156	86CH	Acquires the control device	1	2
PLC vender type					
acquisition	2157	86DH	Acquires PLC vender type	1	2

8. Basic Command Usage

8.1 Basic Command Usage

This section describes the basic usage of commands.

This function has the following types of commands:

Refer to the following for details.

Command List

- Setting Commands
- Motion Commands
- Jog & Teach Commands
- Iuput and Output Commands
- Reference Commands

Some commands execute the same operation and have different resource sizes. Also, some commands execute multiple functions.

You can select the commands and build a robot control system suitable for system configuration.

8.2 Using Speed and Acceleration Tables

You can set the speed and acceleration at one time by registering the parameters beforehand in a table and specifying a table index at the time of motion command execution. This can save the number of commands to be issued and make the motion faster.

The following items can be set:

- Acceleration and deceleration settings of PTP motion
- Acceleration and deceleration settings of Linear and CP motion
- Acceleration and deceleration settings for Tool orientation change in CP motion
- Speed setting of PTP motion
- Arm speed setting in CP motion
- Tool orientation change speed in CP motion when using ROT

Each item has a table structure. You can register 16 pattern settings. To set parameters, specify positions of the settings in the table using the available options of the motion command and operate the Manipulator.

> ⚠ CAUTION
>
> Registered data in tables will be cleared when the Controller is turned OFF or reset.

8.3 Command Execution Procedure

The command execution procedure has several patterns. For details on execution procesedure, refer to the descriptions of each command.

1. Functions by single command issue.
2. Functions by issuing the same command several times.

3. Functions by issuing several commands.
4. Functions by issuing the same command several times and issuing the other commands.

8.4 Parallel Processing Lists

Some motion commands can control ON/OFF of the specified I/O in parallel with motion based on the specified progress rate. To enable this function, register the parameter lists for parallel processing beforehand, and set the list numbers to be used. There are 16 lists available, and one of them is used to register the processes against progress of 16 lists.

Registration and selection of the lists can be done with commands from No. 1300 to 1304.

⚠ CAUTION

Registered data in lists will be cleared when the Controller is turned OFF or reset.

9. Command Reference

9.1 Acceleration and Deceleration Settings of PTP Motion

These commands are used to set acceleration and deceleration of all PTP motion. Available acceleration/deceleration parameter is an integer equal to or greater than 1. This value indicates the ratio of acceleration to the maximum acceleration (or deceleDDration).

CAUTION

- Setteings will be initialized in the following cases:
  - Controller’s power is turned ON
  - Motor ON is executed
  - Excitation control is executed
  - Reset is executed
  - Halt button or Ctrl+C are pressed
- When executing the setting commands in Low Power mode (Power Low)
  In Low Power mode (Power Low), new values will be saved while the current values will be restrained at low.

9.1.1 Command 0: Sets acceleration and deceleration for PTP motion

Sets acceleration and deceleration for PTP motion.

Command Syntax

<table>
<tr><th></th><th>bit</th><th>Name</th><th>Description</th></tr>
<tr><td rowspan="5">Parameter 1</td><td>15</td><td rowspan="5">accel</td><td rowspan="5">Specifies the ratio (%) to the maximum acceleration using an integer equals to or greater than 1.</td></tr>
<tr><td>14</td></tr>
<tr><td>|</td></tr>
<tr><td>1</td></tr>
<tr><td>0</td></tr>
</table>

<table>
<tr><th></th><th>bit</th><th>Name</th><th>Description</th></tr>
<tr><td rowspan="5">Parameter 2</td><td>15</td><td rowspan="5">decel</td><td rowspan="5">Specifies the ratio (%) to the maximum deceleration using an integer equals to or greater than 1.</td></tr>
<tr><td>14</td></tr>
<tr><td>|</td></tr>
<tr><td>1</td></tr>
<tr><td>0</td></tr>
</table>

Response Syntax

Refer to the following.

Response Codes

Description

Acceleration and deceleration for PTP motion are set by issuing this command.

Example

Set "100" for acceleration and "80" for deceleration.

Command	Response
0000H 0064H 0050H	0000H 0000H 0000H

9.1.2 Command 1: Registers acceleration and deceleration to the accel/decel table

Sets the acceleration and deceleration values in the acceleration/deceleration table for PTP motion.

Command Syntax

	bit	Name	Description
Parameter 1	15	tableNumber	Specifies the registration position in the table using an integer from 0 to 15.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	accel	Specifies the ratio (%) to the maximum acceleration using an integer equals to or greater than 1.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	decel	Specifies the ratio (%) to the maximum deceleration using an integer equals to or greater than 1.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Sets PTP motion acceleration and deceleration in a specified table. The execution of this command does not affect actual settings. The settings are reflected when they are specified as options at execution of the target motion command.

This command is used in combination with the motion commands.

Example

Sets “100” for acceleration and “80” for deceleration to the table 5.

Command	Response
0001H 0005H 0064H 0050H 07D0H 0100H 0000H 0005H	0000H 0000H 0000H *1 0000H 0000H 0000H *2

*1: Registeration to the table

*2: Specifies the table number and executes PTP motion

9.1.3 Command 2: Acquires the currently set acceleration and deceleration values

Acquires the current PTP motion acceleration and deceleration values.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
Response 1	15	accel	Returns the current value as an integer that is equal to or greater than 1.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	decel	Returns the current value as an integer that is equal to or greater than 1.
	14		
	|		
	1		
	0		

Description

Acquires the current PTP motion acceleration and deceleration.

Example

Set “100” for acceleration and “80” for deceleration.

Command	Response
0002H	0002H 0064H 0050H

9.1.4 Command 3: Acquires acceleration and deceleration values from the accel/decel table for PTP motion

Acquires the acceleration and deceleration values from the acceleration/deceleration table for PTP motion.

Command Syntax

	bit	Name	Description
Parameter 1	15	tableNumber	Specifies the registration position in the table using an integer from 0 to 15.
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	tableNumber	Returns the specified table number.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	accel	Returns the current value as an integer that is equal to or greater than 1.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 3	15	decel	Returns the current value as an integer that is equal to or greater than 1.
	14		
	|		
	1		

	bit	Name	Description
	0		

Description

Acquires acceleration and deceleration values from the acceleration/deceleration table for PTP motion.

If the specified table number is out of range or not registered, an error response will be returned.

Example

Sets “100” for acceleration and “80” for deceleration to the table 1.

Command	Response
0003H 0001H	0003H 0001H 0064H 0050H

9.2 Acceleration and Deceleration Settings for Linear and CP Motion

These commands are used to specify acceleration and deceleration for linear and circular interpolation motion. This includes the linear motion and circular interpolation motion from the current arm position to the specified position in an X-Y plane.

⚠ CAUTION

- Setteings will be initialized in the following cases:
  - Controller’s power is turned ON
  - Motor ON is executed
  - Excitation control is executed
  - Reset is executed
  - Halt button or Ctrl+C are pressed
- When executing the setting commands in Low Power mode (Power Low)
  In Low Power mode (Power Low), new values will be saved while the current values will be restrained at low.

9.2.1 Command 50: Sets acceleration and deceleration for linear and CP motion

Sets linear motion acceleration and deceleration.

Command Syntax

	bit	Name	Description
Parameter 1	15	accel High-order word	Specifies the value which is the actual acceleration in linear or CP motion (Unit: mm/sec^2) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	accel Low-order word	Specifies the value which is the actual acceleration in linear or CP motion (Unit: mm/sec^2) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	decel High-order word	Specifies the value which is the actual deceleration in linear or CP motion (Unit: mm/sec^2) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	decel Low-order word	Specifies the value which is the actual deceleration in linear or CP motion (Unit: mm/sec^2) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Acceleration and deceleration are set by issuing this command.

Values should be specified as fixed-point data which validates to three decimal places.

Example

When acceleration is set to “100.123” and deceleration is “200.000”.

Command	Response
0032H 0001H 871BH 0003H 0D40H	0032H 0000H 0000H

9.2.2 Command 51: Sets acceleration setting value

Informs the Controller of acceleration setting value.

Command Syntax

	bit	Name	Description
Parameter 1	15	accel High-order word	Specifies the value which is the actual acceleration in linear or CP motion (Unit: mm/sec^2) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	accel Low-order word	Specifies the value which is the actual acceleration in linear or CP motion (Unit: mm/sec^2) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

This command sets acceleration value when setting acceleration and deceleration separately. This command does not function by itself, but functions in combination with the Command 52.

Setting will be executed by issuing the Command 52 after this command. Acceleration value will be canceled if commands other than the Command 52 are issued.

Setting values should be specified as fixed-point data which validates to three decimal places.

Example

When acceleration is set to “100.123”.

Command	Response
0033H 0001H 871BH	0033H 0000H 0000H

9.2.3 Command 52: Informs the Controller of deceleration setting value and sets acceleration and deceleration

Informs the Controller of deceleration setting value and sets acceleration and deceleration.

Command Syntax

	bit	Name	Description
Parameter 1	15	decel High-order word	Specifies the value which is the actual deceleration in linear or CP motion (Unit: mm/sec^2) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	decel Low-order word	Specifies the value which is the actual deceleration in linear or CP motion (Unit: mm/sec^2) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

This command sets deceleration value when setting acceleration and deceleration separately. This command does not function by itself. Settings of acceleration and deceleration will be executed when acceleration is set by the Command 51 right before this command. If the previous command is not the Command 51, an error response will be returned.

Setting values should be specified as fixed-point data which validates to three decimal places.

Example

When acceleration is set to “100.123” and deceleration is “200.000”.

Command	Response
0033H 0001H 871BH 0034H 0003H 0D40H	0033H 0000H 0000H *1 0034H 0000H 0000H *2

*1 Notifies the acceleration value by the command No. 51.

*2 Notifies the deceleration value by the command No.52. Command sequence is completed and settings of acceleration and deceleration will be executed.

9.2.4 Command 53: Registers acceleration and deceleration to the accel/decel table

Registers acceleration and deceleration for linear and CP motion to the acceleration/deceleration table.

Command Syntax

	bit	Name	Description
Parameter 1	15	tableNumber	Specifies the registration position in the table using an integer from 0 to 15.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	accel High-order word	Specifies the acceleration value which is the actual acceleration (Unit: mm/sec^2) × 1000 and converted to a 32-bi h t integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	accel Low-order word	Specifies the acceleration value which is the actual acceleration (Unit: mm/sec^2) × 1000 and converted to a 32-bi h t integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	decel High-order word	Specifies the deceleration value which is the actual deceleration (Unit: mm/sec^2) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 5	15	decel Low-order word	Specifies the deceleration value which is the actual deceleration (Unit: mm/sec^2) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Registers acceleration and deceleration to specified table numbers. The issue of this command does not affect actual settings. The settings will be reflected when they are specified as options at execution of the target motion command.

This command is used in combination with the motion commands.

Setting values should be specified as fixed-point data which validates to three decimal places.

Example

When registering “100.123” for acceleration and “200.000” for deceleration in the table 15.

Command	Response
0035H 000FH 0001H 871BH 0003H 0D40H	0035H 0000H 0000H

9.2.5 Command 54: Registers acceleration setting value to the accel/decel table

Sets acceleration for linear and CP motion to the acceleration/deceleration table separately.

Command Syntax

<table>
<tr><th></th><th>bit</th><th>Name</th><th>Description</th></tr>
<tr><td rowspan="5">Parameter 1</td><td>15</td><td rowspan="5">tableNumber</td><td rowspan="5">Specifies the registration position in the table using an integer from 0 to 15.</td></tr>
<tr><td>14</td></tr>
<tr><td>|</td></tr>
<tr><td>1</td></tr>
<tr><td>0</td></tr>
</table>

<table>
<tr><th></th><th>bit</th><th>Name</th><th>Description</th></tr>
<tr><td rowspan="5">Parameter 2</td><td>15</td><td rowspan="5">accel High-order word</td><td rowspan="5">Specifies the acceleration value which is the actual acceleration (Unit: mm/sec^2) × 1000 and converted to a 32-bi h t integer.
High-order side 16 bit.</td></tr>
<tr><td>14</td></tr>
<tr><td>|</td></tr>
<tr><td>1</td></tr>
<tr><td>0</td></tr>
</table>

<table>
<tr><th></th><th>bit</th><th>Name</th><th>Description</th></tr>
<tr><td rowspan="3">Parameter 3</td><td>15</td><td rowspan="3">accel Low-order word</td><td rowspan="3">Specifies the acceleration value which is the actual acceleration (Unit: mm/sec^2) × 1000 and converted to a 32-bi h t integer.
Low-order side 16 bit.</td></tr>
<tr><td>14</td></tr>
<tr><td>|</td></tr>
</table>

	bit	Name	Description
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

This command registers acceleration to the acceleration/deceleration table when registering acceleration and deceleration separately.

This command does not function by it self. This is used in combination with the Command 55.

Setting will be executed by issuing the Command 55 after this command. Separate registration will be canceled if commands other than the Command 55 are issued.

The rest is same as the command No.53.

Example

When registering “100.123” for acceleration and “200.000” for deceleration in the table 15.

Command	Response
0036H 000FH 0001H 871BH	0036H 0000H 0000H

9.2.6 Command 55: Registers deceleration setting value to the accel/decel table

Sets deceleration for linear and CP motion to the acceleration/deceleration table separately.

Command Syntax

	bit	Name	Description
Parameter 1	15	tableNumber	Specifies the registration position in the table using an integer from 0 to 15.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	accel High-order word	Specifies the acceleration value which is the actual acceleration (Unit: mm/sec^2) × 1000 and converted to a 32-bi h t integer. High-order side 16 bit.
	14		
	|		

	bit	Name	Description
	1		
	0		

	bit	Name	Description
Parameter 3	15	accel Low-order word	Specifies the acceleration value which is the actual acceleration (Unit: mm/sec^2) × 1000 and converted to a 32-bi h t integer. Low-order side 16 bit.
	14		
	｜		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

This command registers deceleration to the acceleration/deceleration table when registering acceleration and deceleration separately.

This command does not function by it self. This is used in combination with command No. 54.

If the previous command is the command No.54, registeration to the acceleration/deceleration table in combination with the previously specified acceleration will be completed.

If the previous command is not the command No. 54, an error response will be returned.

The rest is same as the command No.53.

Example

When registering “100.123” for acceleration and “200.000” for deceleration in the table 15.

Command	Response
0036H 000FH 0001H 871BH 0037H 000FH 0003H 0D40H	0036H 0000H 0000H 0037H 0000H 0000H

9.2.7 Command 56: Acquires current acceleration and deceleration setting values

Reads the current acceleration and deceleration settings for linear and CP motion.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
Response 1	15	accel High-order word	Returns the acceleration value which h is the actual acceleration (Unit: mm/sec^2) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	accel Low-order word	Returns the acceleration value which h is the actual acceleration (Unit: mm/sec^2) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 3	15	decel High-order word	Returns the deceleration value which is the actu h al deceleration (Unit: mm/sec^2) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 4	15	decel Low-order word	Returns the deceleration value which is the actu h al deceleration (Unit: mm/sec^2) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Description

Acquires current acceleration and deceleration settings.

The value will be returned as fixed-point data which validates to three decimal places.

Example

When acceleration is set to “100.123” and deceleration is “200.000”.

Command	Response
0038H	0038H 0001H 871BH 0003H 0D40H

9.2.8 Command 57: Acquires current acceleration value

Acquires current acceleration and deceleration settings for linear and CP motion separately.

This command acquires the acceleration value.

Command Syntax

No parameter

Response Syntax

<table>
<tr><th></th><th>bit</th><th>Name</th><th>Description</th></tr>
<tr><td rowspan="5">Response 1</td><td>15</td><td rowspan="5">accel High-order word</td><td rowspan="5">Returns the acceleration value which h is the actual acceleration (Unit: mm/sec^2) × 1000 and converted to a 32-bit integer.
High-order side 16 bit.</td></tr>
<tr><td>14</td></tr>
<tr><td>|</td></tr>
<tr><td>1</td></tr>
<tr><td>0</td></tr>
</table>

<table>
<tr><th></th><th>bit</th><th>Name</th><th>Description</th></tr>
<tr><td rowspan="5">Response 2</td><td>15</td><td rowspan="5">accel Low-order word</td><td rowspan="5">Returns the acceleration value which h is the actual acceleration (Unit: mm/sec^2) × 1000 and converted to a 32-bit integer.
Low-order side 16 bit.</td></tr>
<tr><td>14</td></tr>
<tr><td>|</td></tr>
<tr><td>1</td></tr>
<tr><td>0</td></tr>
</table>

Description

Acquires current acceleration setting value.

The value will be returned as fixed-point data which validates to three decimal places.

Example

When acceleration is set to “100.123” and deceleration is “200.000”.

Command	Response
0039H	0039H 0001H 871BH

9.2.9 Command 58: Acquires current deceleration value

Acquires current acceleration and deceleration settings for linear and CP motion separately.

This command acquires deceleration value.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
	15		
	14		
Response 1	|	decel High-order word	Returns the deceleration value which is the actu h al deceleration (Unit: mm/sec^2) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	1		
	0		

	bit	Name	Description
	15		
	14		
Response 2	|	decel Low-order word	Returns the deceleration value which is the actu h al deceleration (Unit: mm/sec^2) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	1		
	0		

Description

Acquires current deceleration setting value.

The value will be returned as fixed-point data which validates to three decimal places.

Example

When acceleration is set to “100.123” and deceleration is “200.000”.

Command	Response
003AH	003AH 0003H 0D40H

9.2.10 Command 59: Acquires the registered values from the accel/decel table

Acquires current acceleration and deceleration settings for linear and CP motion separately.

Acquires both acceleration and deceleration.

Command Syntax

	bit	Name	Description
	15		
	14		
Parameter 1	|	tableNumber	Specifies the registration position in the table using an integer from 0 to 15.
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	tableNumber	Returns the specified table number.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	accel High-order word	Returns the acceleration value which h is the actual acceleration (Unit: mm/sec^2) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 3	15	accel Low-order word	Returns the acceleration value which h is the actual acceleration (Unit: mm/sec^2) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 4	15	decel High-order word	Returns the deceleration value which is the actu h al deceleration (Unit: mm/sec^2) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 5	15	decel Low-order word	Returns the deceleration value which is the actu h al deceleration (Unit: mm/sec^2) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Description

Acquires acceleration and deceleration values from the acceleration/deceleration table for linear and CP motion.

Acceleration and deceleration can be acquired at one time by using this command.

If the specified table number is out of range or not registered, an error response will be returned.

The value will be returned as fixed-point data which validates to three decimal places.

Example

When registering “100.123” for acceleration and “200.000” for deceleration in the table 15.

Command	Response
003BH 000FH	003BH 000FH 0001H 871BH 0003H 0D40H

9.2.11 Command 60: Acquires the registered acceleration value from the accel/decel table

Reads the acceleration value for linear and CP motion from the acceleration/deceleration table separately.

Command Syntax

	bit	Name	Description
Parameter 1	15	tableNumber	Specifies the registration position in the table using an integer from 0 to 15.
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	tableNumber	Returns the specified table number.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	accel High-order word	Returns the acceleration value which h is the actual acceleration (Unit: mm/sec^2) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		

	bit	Name	Description
	0		

	bit	Name	Description
Response 3	15	accel Low-order word	Returns the acceleration value which h is the actual acceleration (Unit: mm/sec^2) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Description

Acquires acceleration and deceleration values from the acceleration/deceleration table for linear and CP motion.

Acceleration value can be acquired by using this command.

If the specified table number is out of range or not registered, an error response will be returned.

The value will be returned as fixed-point data which validates to three decimal places.

Example When registering “100.123” for acceleration and “200.000” for deceleration in the table 15.

Command	Response
003CH 000FH	003CH 000FH 0001H 871BH

9.2.12 Command 61: Acquires the registered deceleration value from the accel/decel table

Reads the deceleration value for linear and CP motion from the acceleration/deceleration table separately.

Command Syntax

	bit	Name	Description
Parameter 1	15	tableNumber	Specifies the registration position in the table using an integer from 0 to 15.
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	tableNumber	Returns the specified table number.
	14		
	|		

	bit	Name	Description
	1		
	0		

	bit	Name	Description
Response 2	15	decel High-order word	Returns the deceleration value which is the actu h al deceleration (Unit: mm/sec^2) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 3	15	decel Low-order word	Returns the deceleration value which is the actu h al deceleration (Unit: mm/sec^2) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Description

Acquires acceleration and deceleration values from the acceleration/deceleration table for linear and CP motion.

Acceleration value can be acquired by using this command.

If the specified table number is out of range or not registered, an error response will be returned.

The value will be returned as fixed-point data which validates to three decimal places.

Example

When “100.123” is registered for acceleration and “200.000” is registered for deceleration in the table 15.

Command	Response
003CH 000FH	003DH 000FH 0003H 0D40H

9.3 Acceleration and Deceleration Settings for Tool Orientation Change in CP Motion

The following commands are used to set and display acceleration and deceleration settings for Tool orientation change in CP motion.

The commands are enabled when ROT option is used in commands No. 2003 (Jump3CP), 2005 (Move), 2006 (Arc), and 2007 (Arc3).

⚠ CAUTION

Setteings will be initialized in the following cases:

- Controller's power is turned ON
- Motor ON is executed
- Excitation control is executed
- Reset is executed
- Halt button or Ctrl+C are pressed

9.3.1 Command 100: Sets the acceleration and deceleration

Sets acceleration and deceleration setting for Tool orientation change in CP motion.

Command Syntax

	bit	Name	Description
Parameter 1	15	accel High-order word	Specifies the acceleration value which is the actual acceleration (Unit: deg/sec^2) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	｜		
	1		
	0		

	bit	Name	Description
Parameter 2	15	accel Low-order word	Specifies the acceleration value which is the actual acceleration (Unit: deg/sec^2) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	｜		
	1		
	0		

	bit	Name	Description
Parameter 3	15	decel High-order word	Specifies the deceleration value which is the actual deceleration (Unit: deg/sec^2) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	｜		
	1		
	0		

	bit	Name	Description
Parameter 4	15	decel Low-order word	Specifies the deceleration value which is the actual deceleration (Unit: deg/sec^2) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Sets acceleration and deceleration for Tool orientation change in CP motion.

Values should be specified as fixed-point data which validates to three decimal places.

Example

When acceleration is set to "100.123" and deceleration is "200.000".

Command	Response
0064H 0001H 871BH 0003H 0D40H	0064H 0000H 0000H

9.3.2 Command 101: Sets the acceleration value of the acceleration and deceleration

Sets acceleration for Tool orientation in CP motion separately.

Command Syntax

	bit	Name	Description
Parameter 1	15	accel High-order word	Specifies the acceleration value which is the actual acceleration (Unit: deg/sec^2) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	accel Low-order word	Specifies the acceleration value which is the actual acceleration (Unit: deg/sec^2) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		

	bit	Name	Description
	0		

Response Syntax

Refer to the following.

Response Codes

Description

This command sets the acceleration value when setting acceleration and deceleration separately. This command is used in combination with Command 102.

To set acceleration and deceleration, execute Commands 101 and 102, in that order. The actual values will be set when Command 102 is executed.

If commands other than Command 102 are issued after this command, setting will be canceled.

Example

When acceleration is set to “100.123” and deceleration is “200.000”.

Command	Response
0065H 0001H 871BH 0066H 0003H 0D40H	0065H 0000H 0000H 0066H 0000H 0000H

9.3.3 Command 102: Sets the deceleration value of the acceleration and deceleration

Sets deceleration for Tool orientation in CP motion separately.

Command Syntax

	bit	Name	Description
Parameter 1	15	decel High-order word	Specifies the deceleration value which is the actual deceleration (Unit: deg/sec^2) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	decel Low-order word	Specifies the deceleration value which is the actual deceleration (Unit: deg/sec^2) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

This command sets the deceleration value when setting acceleration and deceleration separately. This command is used in combination with Command 101.

To set acceleration and deceleration, execute Commands 101 and 102, in that order. The actual values will be set when Command 102 is executed.

If the previous command is not Command 101, an error response will be returned.

Example

When acceleration is set to “100.123” and deceleration is “200.000”.

Command	Response
0065H 0001H 871BH 0066H 0003H 0D40H	0065H 0000H 0000H 0066H 0000H 0000H

9.3.4 Command 103: Registers acceleration and deceleration to the accel/decel table

Sets the acceleration and deceleration settings for Tool orientation change in CP motion in the acceleration/deceleration table.

Command Syntax

	bit	Name	Description
Parameter 1	15	tableNumber	Specifies the registration position in the table using an integer from 0 to 15.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	accel High-order word	Specifies the acceleration value which is the actual acceleration (Unit: deg/sec^2) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	accel Low-order word	Specifies the acceleration value which is the actual acceleration (Unit: deg/sec^2) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	decel High-order word	Specifies the deceleration value which is the actual deceleration (Unit: deg/sec^2) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 5	15	decel Low-order word	Specifies the deceleration value which is the actual deceleration (Unit: deg/sec^2) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Registers both acceleration and deceleration to the specified table.

The issue of this command does not affect actual settings. The settings will be reflected when they are specified as options at execution of the target motion command.

This command is used in combination with the motion commands.

Example

When registering “100.123” for acceleration and “200.000” for deceleration in the table 1.

Command	Response
0067H 0001H 0001H 871BH 0003H 0D40H	0067H 0000H 0000H

9.3.5 Command 104: Registers acceleration value to the accel/decel table

Sets the acceleration for Tool orientation change in CP motion to the acceleration/deceleration table separately.

Command Syntax

	bit	Name	Description
Parameter 1	15	tableNumber	Specifies the registration position in the table using an integer from 0 to 15.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	accel High-order word	Specifies the acceleration value which is the actual acceleration (Unit: deg/sec^2) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	accel Low-order word	Specifies the acceleration value which is the actual acceleration (Unit: deg/sec^2) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

This command registers acceleration to the acceleration/deceleration table when registering acceleration and deceleration separately. This command does not function by itself. This command functions in combination with command No.105. To set acceleration, execute the commands No. 104 and No.105, in that order. Registration will be completed by executing the command No.105.

If commands other than No.105 are issued after this command, setting will be canceled.

Example

When registering “100.123” for acceleration and “200.000” for deceleration in the table 1.

Command	Response
0068H 0001H 0001H 871BH 0069H 0001H 0003H 0D40H	0068H 0000H 0000H 0069H 0000H 0000H

9.3.6 Command 105: Registers deceleration value to the accel/decel table

Sets deceleration for Tool orientation change in CP motion in the acceleration/deceleration table separately.

Command Syntax

	bit	Name	Description
Parameter 1	15	tableNumber	Specifies the registration position in the table using an integer from 0 to 15.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	decel High-order word	Specifies the deceleration value which is the actual deceleration (Unit: deg/sec^2) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	decel Low-order word	Specifies the deceleration value which is the actual deceleration (Unit: deg/sec^2) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

This command registers deceleration to the acceleration/deceleration table when registering acceleration and deceleration separately. This command is used in combination with Command 104.

To set acceleration and deceleration, execute Commands 104 and 105, in that order. Registration will be completed by executing Command 105.

If the previous command is not Command 104, an error response will be returned.

Example

When registering “100.123” for acceleration and “200.000” for deceleration in the table 1.

Command	Response
0068H 0001H 0001H 871BH 0069H 0001H 0003H 0D40H	0068H 0000H 0000H 0069H 0000H 0000H

9.3.7 Command 106: Acquires current acceleration and deceleration setting values

Acquires current acceleration and deceleration values for Tool orientation change in CP motion.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
Response 1	15 14 | 1 0	accel High-order word	Returns the acceleration value which is the actual acceleration (Unit: deg/sec^2) × 1000 and converted to a 32-bit integer. High-order side 16 bit.

	bit	Name	Description
Response 2	15 14 | 1 0	accel Low-order word	Returns the acceleration value which is the actual acceleration (Unit: deg/sec^2) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.

	bit	Name	Description
Response 3	15 14 | 1	decel High-order word	Returns the deceleration value which is the actual deceleration (Unit: deg/sec^2) × 1000 and converted to a 32-bit integer. High-order side 16 bit.

	bit	Name	Description
	0		

	bit	Name	Description
Response 4	15	decel Low-order word	Returns the deceleration value which is the actual deceleration (Unit: deg/sec^2) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Description

Acquires current acceleration and deceleration settings.

The value will be returned as fixed-point data which validates to three decimal places.

Example

When acceleration is set to “100.123” and deceleration is “200.000”.

Command	Response
006AH	006AH 0001H 871BH 0003H 0D40H

9.3.8 Command 107: Acquires current acceleration value

Acquires current acceleration value for Tool orientation change in CP motion separately.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
Response 1	15	accel High-order word	Returns the acceleration value which is the actual acceleration (Unit: deg/sec^2) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	accel Low-order word	Returns the acceleration value which is the actual acceleration (Unit: deg/sec^2) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		

	bit	Name	Description
	1		
	0		

Description

This command acquires the acceleration value when acquiring acceleration and deceleration for Tool orientation change in CP motion separately.

The value will be returned as fixed-point data which validates to three decimal places.

Example

When acceleration is set to “100.123” and deceleration is “200.000”.

Command	Response
006BH	006BH 0001H 871BH

9.3.9 Command 108: Acquires current deceleration value

Acquires current deceleration value for Tool orientation change in CP motion separately.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
Response 1	15	decel High-order word	Returns the deceleration value which is the actual deceleration (Unit: deg/sec^2) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	decel Low-order word	Returns the deceleration value which is the actual deceleration (Unit: deg/sec^2) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Description

This command acquires deceleration value when acquiring acceleration and deceleration for Tool orientation change in CP motion separately.

The value will be specified as fixed-point data which validates to three decimal places.

Example

When acceleration is set to “100.123” and deceleration is “200.000”.

Command	Response
006CH	006CH 0003H 0D40H

9.3.10 Command 109: Acquires the registered value from the accel/decel table

Acquires the values for Tool orientation change in CP motion from the acceleration/deceleration table.

Command Syntax

	bit	Name	Description
Parameter 1	15 14 | 1 0	tableNumber	Specifies the registration position in the table using an integer from 0 to 15.

Response Syntax

	bit	Name	Description
Response 1	15 14 | 1 0	tableNumber	Returns the specified table number.

	bit	Name	Description
Response 2	15 14 | 1 0	accel High-order word	Returns the acceleration value which is the actual acceleration (Unit: deg/sec^2) × 1000 and converted to a 32-bit integer. High-order side 16 bit.

	bit	Name	Description
Response 3	15	accel Low-order word	Returns the acceleration value which is the actual acceleration (Unit: deg/sec^2) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 4	15	decel High-order word	Returns the deceleration value which is the actual deceleration (Unit: deg/sec^2) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 5	15	decel Low-order word	Returns the deceleration value which is the actual deceleration (Unit: deg/sec^2) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Description

This command acquires registered values for Tool orientation change in CP motion from the specified position in the acceleration/deceleration table.

Acceleration and deceleration values can be acquired by using this command.

If the specified table number is out of range or not registered, an error response will be returned.

The value will be returned as fixed-point data which validates to three decimal places.

Example

When registering “100.123” for acceleration and “200.000” for deceleration in the table 1.

Command	Response
006DH 0001H	006DH 0001H 0001H 871BH 0003H 0D40H

9.3.11 Command 110: Acquires the registered acceleration value from the accel/decel table

Acquires acceleration for Tool orientation change in CP motion from the acceleration/deceleration table.

Command Syntax

	bit	Name	Description
Parameter 1	15	tableNumber	Specifies the registration position in the table using an integer from 0 to 15.
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	tableNumber	Returns the specified table number.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	accel High-order word	Returns the acceleration value which is the actual acceleration (Unit: deg/sec^2) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 3	15	accel Low-order word	Returns the acceleration value which is the actual acceleration (Unit: deg/sec^2) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Description

This command acquires registered values for Tool orientation change in CP motion from the specified position in the acceleration/deceleration table.

Acceleration value can be acquired by using this command.

If the specified table number is out of range or not registered, an error response will be returned.

The value will be specified as fixed-point data which validates to three decimal places.

Example

When registering “100.123” for acceleration and “200.000” for deceleration in the table 1.

Command	Response
006EH 0001H	006EH 0001H 0001H 871BH

9.3.12 Command 111: Acquires the registered deceleration value from the accel / decel table

Acquires deceleration for Tool orientation change in CP motion from the acceleration/deceleration table.

Command Syntax

	bit	Name	Description
Parameter 1	15	tableNumber	Specifies the registration position in the table using an integer from 0 to 15.
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	tableNumber	Returns the specified table number.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	decel High-order word	Returns the deceleration value which is the actual deceleration (Unit: deg/sec^2) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 3	15	decel	Returns the deceleration value which is the actual deceleration (Unit: deg/sec^2) × 1000 and converted to a 32-bit integer.
	14		
	|		

	bit	Name	Description
	1	Low-order word	Low-order side 16 bit.
	0		

Description

This command acquires registered values for Tool orientation change in CP motion from the specified position in the acceleration/deceleration table.

Deceleration value can be acquired by using this command.

If the specified table number is out of range or not registered, an error response will be returned.

The value will be specified as fixed-point data which validates to three decimal places.

Example

When registering “100.123” for acceleration and “200.000” for deceleration in the table 1.

Command	Response
006FH 0001H	006FH 0001H 0003H 0D40H

9.4 Speed Setting of PTP Motion

These commands are used to specify the speed to all PTP motion commands. Speed setting should be specified by the percentage (Unit: %) of the maximum speed indicated by an integer from 1 to 100. The manipulator moves at the maximum speed when “100” is specified.

Depart speed and approach speed are only applicable for the gate-motion PTP motion (command No.2001, Jump).

⚠ CAUTION

Setteings will be initialized in the following cases:

- Controller’s power is turned ON
- Motor ON is executed
- Excitation control is executed
- Reset is executed
- Halt button or Ctrl+C are pressed

Setting value becomes lower than the defalt value in Low Power mode. Even when the value greater than the default is input by commands, the default value will be set. Setting value is set as motion speed in High Power mode. If greater motion speed is required, set the mode to High Power by Power High command and close the safety door. The value will be changed to the defalt if the safety door is open.

9.4.1 Command 150: Sets the speed

Sets speed for PTP motion.

Command Syntax

	bit	Name	Description
Parameter 1	15	speed	Specifies the percentage (%) of the maximum speed indicated by an integer from 1 to 100.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	departSpeed	Specifies the departing motion speed in gate-motion PTP motion by an integer from 1 to 100. (Unit: %)
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	approachSpeed	Specifies the approaching motion speed in gate-motion PTP motion by an integer from 1 to 100. (Unit: %)
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Sets speed, depart speed, and approach speed for PTP motion.

Example

When setting speed as 100, depart speed as 80, and approach speed as 50.

Command	Response
0096H 0064H 0050H 0032H	0096H 0000H 0000H

9.4.2 Command 151: Registers to the speed table

Registers a speed value in the speed table for PTP motion.

Command Syntax

	bit	Name	Description
Parameter 1	15	tableNumber	Specifies the registration position in the table using an integer from 0 to 15.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	speed	Specifies the percentage (%) of the maximum speed indicated by an integer from 1 to 100.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	departSpeed	Specifies the departing motion speed in gate-motion PTP motion by an integer from 1 to 100. (Unit: %)
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	approachSpeed	Specifies the approaching motion speed in gate-motion PTP motion by an integer from 1 to 100. (Unit: %)
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Registers speed, depart speed, and approach speed for PTP motion to the specified table.

If the specified table number is out of range, an error response will be returned.

Example

When registering speed as “100”, depart speed as “80”, and approach speed as “50” to the table 1.

Command	Response
0097H 0001H 0064H 0050H 0032H	0097H 0000H 0000H

9.4.3 Command 152: Acquires current speed setting value

Acquires the current speed setting values for PTP motion.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
Response 1	15	speed	Specifies the percentage (%) of the maximum speed indicated by an integer from 1 to 100.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	departSpeed	Specifies the departing motion speed in gate-motion PTP motion by an integer from 1 to 100. (Unit: %)
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 3	15	approachSpeed	Specifies the approaching motion speed in gate-motion PTP motion by an integer from 1 to 100. (Unit: %)
	14		
	|		
	1		
	0		

Description

Acquires current values of speed, depart speed, and approach speed.

Example

When setting speed as 100, depart speed as 80, and approach speed as 50.

Command	Response
0098H	0098H 0064H 0050H 0032H

9.4.4 Command 153: Acquires the setting value from the speed table

Acquires speed values from the speed table for PTP motion.

Command Syntax

	bit	Name	Description
Parameter 1	15	tableNumber	Specifies the registration position in the table using an integer from 0 to 15.
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	tableNumber	Returns the specified table number in an integer.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	speed	Returns the percentage (%) of the maximum speed indicated by an integer from 1 to 100.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 3	15	departSpeed	Returns the departing motion speed in gate-motion PTP motion by an integer from 1 to 100. (Unit: %)
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 4	15	approachSpeed	Returns the approaching motion speed in gate-motion PTP motion by an integer from 1 to 100. (Unit: %)
	14		
	|		
	1		
	0		

Description

Acquires speed values from the speed table for PTP motion.

If the specified table number is out of range or not registered, an error response will be returned.

Example

When registering speed as “100”, depart speed as “80”, and approach speed as “50” to the table 1.

Command	Response
0099H 0001H	0099H 0001H 0064H 0050H 0032H

9.5 Arm Speed Setting of CP Motion

These commands are used to set Arm speed setting in CP motion such as Move, Arc, Arc3, Jump3, and Jump3CP.

SpeedS specifies speed in CP motion (Move and Arc) execution.

SpeedS value specifies the manipulator speed. The unit is mm/sec. Default values vary according to the manipulator types. For default values of SpeedS, refer to each model’s manipulator manual. The default values are automatically set when the Controller’s power is turned ON.

⚠ CAUTION

Setteings will be initialized in the following cases:

- Controller’s power is turned ON
- Motor ON is executed
- Excitation control is executed
- Reset is executed
- Halt button or Ctrl+C are pressed

In Low Power mode, the lower speed between the default value and the setting value will be effective for SpeedS. If the greater speed setting is specified in the command window or during the program, default speed will be set.

SpeedS setting value will be set as motion speed in High Power mode. If greater motion speed is required, set the mode to High Power by Power High command and close the safety door. SpeedS value will be changed to the defalt if the safety door is open.

9.5.1 Command 200: Sets the speed, depart speed, and approach speed settings

Sets Arm speed for CP motion.

Command Syntax

	bit	Name	Description
Parameter 1	15	speed High-order word	Specifies the value which increased the speed (integer, unit: mm/sec) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	｜		
	1		
	0		

	bit	Name	Description
Parameter 2	15	speed Low-order word	Specifies the value which increased the speed (integer, unit: mm/sec) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	｜		
	1		
	0		

	bit	Name	Description
Parameter 3	15	departSpeed High-order word	Specifies the value indicating the depart speed for Jump3 (Unit: mm/sec) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	｜		
	1		
	0		

	bit	Name	Description
Parameter 4	15	departSpeed Low-order word	Specifies the value indicating the depart speed for Jump3 (Unit: mm/sec) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	｜		
	1		
	0		

	bit	Name	Description
Parameter 5	15	approachSpeed High-order word	Specifies the value indicating the approach speed for Jump3 (Unit: mm/sec) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 6	15	approachSpeed Low-order word	Specifies the value indicating the approach speed for Jump3 (Unit: mm/sec) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Sets Arm speed for CP motion.

Example

When setting speed as 100.001, depart speed as 50.002, and approach speed as 60.003.

Command	Response
00C8H 0001H 86A1H 0000H C352H 0000H EA63H	00C8H 0000H 0000H

9.5.2 Command 201: Sets the setting values of speed and depart

speed to the Controller Sets Arm speeds for CP motion separately.

Sets speed and depart speed setting values.

Command Syntax

	bit	Name	Description
Parameter 1	15	speed High-order word	Specifies the value which increased the speed (integer, unit: mm/sec) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		

	bit	Name	Description
	0		

	bit	Name	Description
Parameter 2	15	speed Low-order word	Specifies the value which increased the speed (integer, unit: mm/sec) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	｜		
	1		
	0		

	bit	Name	Description
Parameter 3	15	departSpeed High-order word	Specifies the value indicating the depart speed for Jump3 (Unit: mm/sec) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	｜		
	1		
	0		

	bit	Name	Description
Parameter 4	15	departSpeed Low-order word	Specifies the value indicating the depart speed for Jump3 (Unit: mm/sec) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	｜		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

This command sets speed and depart speed when setting arm speeds for CP motion separately.

This command functions in combination with Command 202.

To set setting values, execute the Command 201 and 202, in that order. The settings will be effective after issuing Command 202.

If commands other than Command 202 are issued after this command, setting will be canceled.

The rest is same as the Command 200.

Example

When setting speed as 100.001, depart speed as 50.002, and approach speed as 60.003.

Command	Response
00C9H 0001H 86A1H 0000H C352H 00CAH 0000H EA63H	00C9H 0000H 0000H 00CAH 0000H 0000H

9.5.3 Command 202: Notifies and sets the approach speed setting value

Sets Arm speeds for CP motion separately.

Sets the approach speed.

Command Syntax

	bit	Name	Description
Parameter 1	15	approachSpeed High-order word	Specifies the value indicating the approach speed for Jump3 (Unit: mm/sec) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	approachSpeed Low-order word	Specifies the value indicating the approach speed for Jump3 (Unit: mm/sec) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

This command sets approach speed when setting arm speeds for CP motion separately.

This command functions in combination with Command 202.

To set setting values, execute the Command 201 and 202, in that order. The settings will be effective after issuing Command 202. If the last command is not Command 201, an error response will be returned.

The rest is same as the Command 200.

Example

When setting speed as 100.001, depart speed as 50.002, and approach speed as 60.003.

Command	Response
00C9H 0001H 86A1H 0000H C352H 00CAH 0000H EA63H	00C9H 0000H 0000H 00CAH 0000H 0000H

9.5.4 Command 203: Registers to the speed table

Registers speeds for CP motion to the Arm speed table.

Command Syntax

	bit	Name	Description
Parameter 1	15 14 | 1 0	tableNumber	Specifies the registration position in the table using an integer from 0 to 15.

	bit	Name	Description
Parameter 2	15 14 | 1 0	speed High-order word	Specifies the value which increased the speed (integer, unit: mm/sec) × 1000 and converted to a 32-bit integer. High-order side 16 bit.

	bit	Name	Description
Parameter 3	15 14 | 1 0	speed Low-order word	Specifies the value which increased the speed (integer, unit: mm/sec) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.

	bit	Name	Description
Parameter 4	15 14 | 1 0	departSpeed High-order word	Specifies the value indicating the depart speed for Jump3 (Unit: mm/sec) × 1000 and converted to a 32-bit integer. High-order side 16 bit.

	bit	Name	Description
Parameter 5	15	departSpeed Low-order word	Specifies the value indicating the depart speed for Jump3 (Unit: mm/sec) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 6	15	approachSpeed High-order word	Specifies the value indicating the approach speed for Jump3 (Unit: mm/sec) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 7	15	approachSpeed Low-order word	Specifies the value indicating the approach speed for Jump3 (Unit: mm/sec) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Registers speed, depart speed, and approach speed to the specified table.

The issue of this command does not affect actual settings. The settings will be reflected when they are specified as options at execution of the target motion command.

This command is used in combination with the motion commands.

Example

When registering speed as “100.001”, depart speed as “50.002”, and approach speed as “60.003” to the table 1.

Command	Response
00CBH 0001H 0001H 86A1H 0000H C352H 0000H EA63H	00CBH 0000H 0000H

9.5.5 Command 204: Registers speed and depart speed to the speed table

Registers speeds for CP motion to the Arm speed table separately.

Registers speed setting value and depart speed value.

Command Syntax

	bit	Name	Description
Parameter 1	15 14 | 1 0	tableNumber	Specifies the registration position in the table using an integer from 0 to 15.

	bit	Name	Description
Parameter 2	15 14 | 1 0	speed High-order word	Specifies the value which increased the speed (integer, unit: mm/sec) × 1000 and converted to a 32-bit integer. High-order side 16 bit.

	bit	Name	Description
Parameter 3	15 14 | 1 0	speed Low-order word	Specifies the value which increased the speed (integer, unit: mm/sec) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.

	bit	Name	Description
Parameter 4	15 14 | 1 0	departSpeed High-order word	Specifies the value indicating the depart speed for Jump3 (Unit: mm/sec) × 1000 and converted to a 32-bit integer. High-order side 16 bit.

	bit	Name	Description
Parameter 5	15	departSpeed Low-order word	Specifies the value indicating the depart speed for Jump3 (Unit: mm/sec) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

This command registers speed and depart speed to the speed table when registering arm speeds for CP motion separately.

This command functions in combination with Command 205.

To set speeds, execute Commands 204 and 205, in that order. Registration will be completed by executing Command 205.

If commands other than Command 205 are issued after this command, setting will be canceled.

Example

When registering speed as "100.001", depart speed as "50.002", and approach speed as "60.003" to the table 1.

Command	Response
00CCH 0001H 0001H 86A1H 0000H C352H 00CDH 0001H 0000H EA63H	00CCH 0000H 0000H 00CDH 0000H 0000H

9.5.6 Command 205: Registers approach speed to the speed table

Registers speeds for CP motion to the Arm speed table separately.

Registers approach speed.

Command Syntax

	bit	Name	Description
Parameter 1	15	tableNumber	Specifies the registration position in the table using an integer from 0 to 15.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	approachSpeed High-order word	Specifies the value indicating the approach speed for Jump3 (Unit: mm/sec) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	approachSpeed Low-order word	Specifies the value indicating the approach speed for Jump3 (Unit: mm/sec) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

This command registers speed and approach speed to the speed table when registering arm speeds for CP motion separately.

This command functions in combination with Command 204.

To set setting values, execute the Command 204 and 205, in that order. Registration will be completed by executing Command 205.

If the previous command is not Command 204, an error response will be returned.

Example

When registering speed as “100.001”, depart speed as “50.002”, and approach speed as “60.003” to the table 1.

Command	Response
00CCH 0001H 0001H 86A1H 0000H C352H 00CDH 0001H 0000H EA63H	00CCH 0000H 0000H 00CDH 0000H 0000H

9.5.7 Command 206: Acquires current speed, depart speed, and approach speed

Acquires Arm speed settings for CP motion.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
Response 1	15	speed High-order word	Returns the value which increased the speed (integer, unit: mm/sec) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	speed Low-order word	Returns the value which increased the speed (integer, unit: mm/sec) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 3	15	departSpeed High-order word	Returns the value indicating the depart speed for Jump3 (Unit: mm/sec) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 4	15	departSpeed Low-order word	Returns the value indicating the depart speed for Jump3 (Unit: mm/sec) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 5	15	approachSpeed High-order word	Returns the value indicating the approach speed for Jump3 (Unit: mm/sec) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 6	15	approachSpeed Low-order word	Returns the value indicating the approach speed for Jump3 (Unit: mm/sec) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Description

Acquires current Arm speed settings for CP motion.

Example

When setting speed as 100.001, depart speed as 50.002, and approach speed as 60.003.

Command	Response
00CEH	00CEH 0001H 86A1H 0000H C352H 0000H EA63H

9.5.8 Command 207: Acquires the setting values of current speed and depart speed

Acquires Arm speed settings for CP motion separately.

Acquires speed setting value and depart speed value.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
Response 1	15	speed High-order word	Returns the value which increased the speed (integer, unit: mm/sec) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	speed Low-order word	Returns the value which increased the speed (integer, unit: mm/sec) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 3	15	departSpeed High-order word	Returns the value indicating the depart speed for Jump3 (Unit: mm/sec) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 4	15	departSpeed Low-order word	Returns the value indicating the depart speed for Jump3 (Unit: mm/sec) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Description

This command acquires speed and depart speed when acquiring arm speeds for CP motion separately.

Example

When setting speed as 100.001, depart speed as 50.002, and approach speed as 60.003.

Command	Response
00CFH	00CFH 0001H 86A1H 0000H C352H

9.5.9 Command 208: Acquires the set value of current approach speed

Acquires Arm speed settings for CP motion separately.

Acquires the approach speed value.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
Response 1	15	approachSpeed High-order word	Returns the value indicating the approach speed for Jump3 (Unit: mm/sec) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	approachSpeed Low-order word	Returns the value indicating the approach speed for Jump3 (Unit: mm/sec) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Description

This command acquires approach speed when acquiring arm speeds for CP motion separately.

Example

When setting speed as 100.001, depart speed as 50.002, and approach speed as 60.003.

Command	Response
00CFH	00D0H 0000H EA63H

9.5.10 Command 209: Acquires the setting value from the speed table

Acquires registered values from the Arm speed table for CP motion.

Command Syntax

	bit	Name	Description
Parameter 1	15	tableNumber	Specifies the registration position in the table using an integer from 0 to 15.
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	tableNumber	Returns the specified table number in an integer.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	speed High-order word	Returns the value which increased the speed (integer, unit: mm/sec) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 3	15	speed Low-order word	Returns the value which increased the speed (integer, unit: mm/sec) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 4	15	departSpeed High-order word	Returns the value indicating the depart speed for Jump3 (Unit: mm/sec) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 5	15	departSpeed Low-order word	Returns the value indicating the depart speed for Jump3 (Unit: mm/sec) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 6	15	approachSpeed High-order word	Returns the value indicating the approach speed for Jump3 (Unit: mm/sec) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 7	15	approachSpeed Low-order word	Returns the value indicating the approach speed for Jump3 (Unit: mm/sec) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Description

Acquires registered values from the specified position of the arm speed table for CP motion.

Speed, depart speed, and approach speed can be acquired by using this command.

If the specified table number is out of range or not registered, an error response will be returned.

The value will be returned as fixed-point data which validates to three decimal places.

Example

When registering speed as “100.001”, depart speed as “50.002”, and approach speed as “60.003” to the table 1.

Command	Response
00D1H 0001H	00D1H 00001H 0001H 86A1H 0000H C352H 0000H EA63H

9.5.11 Command 210: Registers speed and depart speed to the speed table

Acquires registered values from the Arm speed table for CP motion separately.

Command Syntax

	bit	Name	Description
Parameter 1	15	tableNumber	Specifies the registration position in the table using an integer from 0 to 15.
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	tableNumber	Returns the specified table number.
	14		
	|		
	1		

	bit	Name	Description
	0		

	bit	Name	Description
Response 2	15	speed High-order word	Returns the value which increased the speed (integer, unit: mm/sec) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 3	15	speed Low-order word	Returns the value which increased the speed (integer, unit: mm/sec) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 4	15	departSpeed High-order word	Returns the value indicating the depart speed for Jump3 (Unit: mm/sec) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 5	15	departSpeed Low-order word	Returns the value indicating the depart speed for Jump3 (Unit: mm/sec) × 1000 and converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Description

Acquires registered values from the specified position of the arm speed table for CP motion.

Speed and depart speed can be acquired by using this command.

If the specified table number is out of range or not registered, an error response will be returned.

The value will be returned as fixed-point data which validates to three decimal places.

Example

When registering speed as “100.001”, depart speed as “50.002”, and approach speed as “60.003” to the table 1.

Command	Response
00D2H 0001H	00D2H 00001H 0001H 86A1H 0000H C352H

9.5.12 Command 211: Acquires the approach speed from the speed table

Acquires registered values from the Arm speed table for CP motion separately.

Command Syntax

	bit	Name	Description
Parameter 1	15	tableNumber	Specifies the registration position in the table using an integer from 0 to 15.
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	tableNumber	Returns the specified table number.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	approachSpeed High-order word	Returns the value indicating the approach speed for Jump3 (Unit: mm/sec) × 1000 and converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 3	15	approachSpeed	Returns the value indicating the approach speed for Jump3 (Unit: mm/sec) × 1000 and converted to a 32-bit integer.
	14		
	|		

	bit	Name	Description
	1	Low-order word	Low-order side 16 bit.
	0		

Description

Acquires registered values from the specified position of the arm speed table for CP motion.

Registered approach speed can be acquired by using this command.

If the specified table number is out of range or not registered, an error response will be returned.

The value will be returned as fixed-point data which validates to three decimal places.

Example

When registering speed as “100.001”, depart speed as “50.002”, and approach speed as “60.003” to the table 1.

Command	Response
00D3H 0001H	00D3H 00001H 0000H EA63H

9.6 Speed Setting for Tool Orientation Change in CP Motion When Using ROT

These commands are used to set and display the speed setting for Tool orientation change in CP motion when using ROT.

The commands are available when ROT decoration parameter is specified in motion commands Move, Arc, Arc3, and Jump3CP.

⚠ CAUTION

Setteings will be initialized in the following cases:

- Controller’s power is turned ON
- Motor ON is executed
- Excitation control is executed
- Reset is executed
- Halt button or Ctrl+C are pressed

9.6.1 Command 250: Sets the speed

Sets the speed setting for Tool orientation change in CP motion when using ROT.

Command Syntax

	bit	Name	Description
Parameter 1	15	speed	Specifies the Tool orientation change speed in CP motion (Integer larger than 0.1. Unit: deg/sec) as the value × 1000 converted to a 32-bit integer.
	14		
	︱		

	bit	Name	Description
	1	High-order word	High-order side 16 bit.
	0		

	bit	Name	Description
Parameter 2	15	speed Low-order word	Specifies the Tool orientation change speed in CP motion (Integer larger than 0.1. Unit: deg/sec) as the value × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Sets the speed setting for Tool orientation change in CP motion when using ROT.

The value will be specified as fixed-point data which validates to three decimal places.

Example

When setting “1000” as the speed setting value.

Command	Response
00FAH 000FH 4240H	00FAH 0000H 0000H

9.6.2 Command 251: Registers to the speed table

Registers the speed setting to the Tool orientation change speed table.

Command Syntax

	bit	Name	Description
Parameter 1	15	tableNumber	Specifies the registration position in the table using an integer from 0 to 15.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	speed High-order word	Specifies the Tool orientation change speed in CP motion (Integer larger than 0.1. Unit: deg/sec) as the value × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	speed Low-order word	Specifies the Tool orientation change speed in CP motion (Integer larger than 0.1. Unit: deg/sec) as the value × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Registers the speed setting to the specified table.

The issue of this command does not affect actual settings. The settings will be reflected when they are specified as options at execution of the target motion command.

This command is used in combination with the motion commands.

Example

When registering “1000” for the speed setting value in the table 1.

Command	Response
00FBH 00001H 000FH 4240H	00FBH 0000H 0000H

9.6.3 Command 252: Acquires current speed setting value

Acquires the speed setting for Tool orientation change in CP motion when using ROT.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
Response 1	15	speed High-order word	Returns the Tool orientation change speed in CP motion (Integer larger than 0.1. Unit: deg/sec) as the value × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	speed Low-order word	Returns the Tool orientation change speed in CP motion (Integer larger than 0.1. Unit: deg/sec) as the value × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Description

Acquires the speed setting for Tool orientation change in CP motion when using ROT.

The value will be specified as fixed-point data which validates to three decimal places.

Example

When setting “1000” as the speed setting value.

Command	Response
00FCH	00FCH 000FH 4240H

9.6.4 Command 253: Acquires the setting value from the speed table

Acquires the speed setting from the Tool orientation change speed table.

Command Syntax

	bit	Name	Description
Parameter 1	15	tableNumber	Specifies the registration position in the table using an integer from 0 to 15.
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	tableNumber	Specifies the registration position in the table using an integer from 0 to 15.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	speed High-order word	Returns the Tool orientation change speed in CP motion (Integer larger than 0.1. Unit: deg/sec) as the value × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 3	15	speed Low-order word	Returns the Tool orientation change speed in CP motion (Integer larger than 0.1. Unit: deg/sec) as the value × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Description

Acquires the speed setting from the specified position in the Tool orientation change speed table.

Registered speed setting value can be acquired by using this command.

If the specified table number is out of range or not registered, an error response will be returned.

The value will be returned as fixed-point data which validates to three decimal places.

Example

When registering “1000” for the speed setting value in the table 1.

Command	Response
00FDH 0001H	00FDH 00001H 000FH 4240H

9.7 Parameter Setting for Speed and Accel/Decel Offset in PTP Motion

These commands are used to set the parameters for offsetting the speed and accel/decel in PTP motion.

Specify the parameter to operate the maximum acceleration and deceleration in PTP motion. For Weight command, set the weight of the Hand and a work piece.

Arm length designation is only necessary for the SCARA robots (including RC series). The length is a distance from the center of the Joint #2 to the center of the Joint #3. This is invalid for the models other than the SCARA robots (including RS series).

If the equivalent weight calculated by the setting value exceeds the maximum weight capacity, an error will occur.

Robot parameter data is stored to the memory card in the Controller. Therefore, execution of the command writes to the memory card. Frequent writing to the memory card affects its product life. It is recommended to minimize the execution of the command.

Potential errors

- If the value exceeds the maximum allowable load
  When the equivalent weight calculated from the value entered exceeds the maximum load weight, an error will occur.
- Potential Damage to the Manipulator Arm
  Note that if the hand weight for Weight is significantly less than the actual weight, exesive acceleration and deceleration values will be set and may cause damage to the manipulator.

> ⚠ CAUTION
>
> Weight values are not changed by turning main power Off

9.7.1 Command 253: Acquires the setting value from the speed table

These commands are used to set the parameters for offsetting the speed and accel/decel in PTP motion.

Sets the hand weight and the arm length.

Command Syntax

	bit	Name	Description
Parameter 1	15	handWeight High-order word	Specifies the Hand weight to be added to the Arm as the value × 1000 and convering it to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	handWeight Low-order word	Specifies the Hand weight to be added to the Arm as the value × 1000 and convering it to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	armLength High-order word	Specifies the length from the rotational center of Arm #2 to the center of the gravity of Arm #3 (Unit: mm) as the value × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	armLength Low-order word	Specifies the length from the rotational center of Arm #2 to the center of the gravity of Arm #3 (Unit: mm) as the value × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Sets the parameter setting for speed and accel/decel offset in PTP motion by specifying the hand weight and the arm length.

Example

When setting 5.12 Kg for the hand weight, and 120.001 for the arm length.

Command	Response
012CH 0000H 1400H 0001H D4C1H	012CH 0000H 0000H

9.7.2 Command 301: Sets the parameter for offsetting the speed and accel/decel in PTP motion without an arm length specified

These commands are used to set the parameters for offsetting the speed and accel/decel in PTP motion.

Sets the Hand weight.

Command Syntax

	bit	Name	Description
Parameter 1	15	handWeight High-order word	Specifies the Hand weight to be added to the Arm as the value × 1000 and convering it to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		

	bit	Name	Description
	0		

	bit	Name	Description
Parameter 2	15	handWeight Low-order word	Specifies the Hand weight to be added to the Arm as the value × 1000 and convering it to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Sets only the hand weight of the parameter setting for speed and accel/decel offset in PTP motion.

Example

When setting 5.12Kg for the hand weight.

Command	Response
012DH 0000H 1400H	012DH 0000H 0000H

9.7.3 Command 302: Acquires the parameter setting value for offsetting the speed and accel/decel in PTP motion

Acquires the parameter setting for offsetting the speed and accel/decel in PTP motion.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
Response 1	15	handWeight High-order word	Specifies the Hand weight to be added to the Arm as the value × 1000 and convering it to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	handWeight Low-order word	Specifies the Hand weight to be added to the Arm as the value × 1000 and convering it to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 3	15	armLength High-order word	Specifies the length from the rotational center of Arm #2 to the center of the gravity of Arm #3 (Unit: mm) as the value × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 4	15	armLength Low-order word	Specifies the length from the rotational center of Arm #2 to the center of the gravity of Arm #3 (Unit: mm) as the value × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Description

Acquires the parameter setting for offsetting the speed and accel/decel in PTP motion. This command acquires the hand weight and the arm length.

The value will be specified as fixed-point data which validates to three decimal places.

Example

When setting 5.12 Kg for the hand weight, and 120.001 for the arm length.

Command	Response
012EH	012EH 0000H 1400H 0001H D4C1H

9.8 Load Inertia and Eccentricity Setting

These commands are used to specify the moment of inertia around the end effector. By using the commads, acceleration/deceleration and servo gain of the end effector can be offset properly. Also, you can specify the distacnce from the center of the end effector to the gravity center of the hand and the work piece by using the eccentricity parameter.

Robot parameter data is stored to the memory card in the Controller. Therefore, execution of the command writes to the memory card. Frequent writing to the memory card affects its product life. It is recommended to minimize the execution of the command.

9.8.1 Command 350: Sets the load inertia and eccentricity

Sets the load inertia and eccentricity.

Command Syntax

	bit	Name	Description
Parameter 1	15	loadInertia High-order word	Specifies the moment of inertia around the center of the end effector including the hand and the work piece (real number, Unit: kg·m^2) as the value × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	loadInertia Low-order word	Specifies the moment of inertia around the center of the end effector including the hand and the work piece (real number, Unit: kg·m^2) as the value × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	eccentricity High-order word	Returns the distance from the center of the end effector to the gravity center of the hand and the work piece by specifying the value × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	eccentricity Low-order word	Returns the distance from the center of the end effector to the gravity center of the hand and the work piece by specifying the value × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Setting value should be specified as fixed-point data which validates to three decimal places.

Example

When setting 5.12 Kg^2 for the load inertia and 120.001 mm for the eccentricity.

Command	Response
015EH 0000H 1400H 0001H D4C1H	015EH 0000H 0000H

9.8.2 Command 351: Sets the load inertia

Sets the load inertia.

Command Syntax

	bit	Name	Description
Parameter 1	15	loadInertia High-order word	Specifies the moment of inertia around the center of the end effector including the hand and the work piece (real number, Unit: kg·m^2) as the value × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	loadInertia Low-order word	Specifies the moment of inertia around the center of the end effector including the hand and the work piece (real number, Unit: kg·m^2) as the value × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

This command is used to set the load inertia when setting the load inertia and the eccentricity separately.

This command must be used in combination with Command 352.

To set the load inertia and the eccentricity, execute Command 351 and 352, in that order. The settings will be effective after issuing command No. 352.

If commands other than Command 352 are issued after this command, setting will be canceled.

Example

When setting 5.12 Kg^2 for the load inertia and 120.001 mm for the eccentricity.

Command	Response
015FH 0000H 1400H 0160H 0001H D4C1H	015FH 0000H 0000H 0160H 0000H 0000H

9.8.3 Command 352: Sets the eccentricity

Sets the eccentricity.

Command Syntax

	bit	Name	Description
Parameter 1	15	eccentricity High-order word	Returns the distance from the center of the end effector to the gravity center of the hand and the work piece by specifying the value × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	eccentricity Low-order word	Returns the distance from the center of the end effector to the gravity center of the hand and the work piece by specifying the value × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

This command is used to set the eccentricity when setting the load inertia and the eccentricity separately.

This command must be used in combination with Command 352.

To set the load inertia and the eccentricity, execute Command 351 and 352, in that order. The settings will be effective after issuing command No. 352.

If the last command is not the command No. 351, an error response will be returned.

Example

When setting 5.12 Kg^2 for the load inertia and 120.001 mm for the eccentricity.

Command	Response
015FH 0000H 1400H 0160H 0001H D4C1H	015FH 0000H 0000H 0160H 0000H 0000H

9.8.4 Command 353: Acquires the setting values of load inertia and eccentricity

Acquires the load inertia and the eccentricity.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
Response 1	15	loadInertia High-order word	Specifies the moment of inertia around the center of the end effector including the hand and the work piece (real number, Unit: $kg \cdot m^2$) as the value × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	loadInertia Low-order word	Specifies the moment of inertia around the center of the end effector including the hand and the work piece (real number, Unit: $kg \cdot m^2$) as the value × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 3	15	eccentricity High-order word	Returns the distance from the center of the end effector to the gravity center of the hand and the work piece by specifying the value × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 4	15	eccentricity Low-order word	Returns the distance from the center of the end effector to the gravity center of the hand and the work piece by specifying the value × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Description

Acquires the current load inertia and the eccentricity.

The values will be returned as fixed-point data which validates to three decimal places.

Example

When setting 5.12 Kg^2 for the load inertia and 120.001 mm for the eccentricity.

Command	Response
0161H	0161H 0000H 1400H 0001H D4C1H

9.8.5 Command 354: Acquires the setting values of load inertia

Acquires the load inertia.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
Response 1	15	loadInertia High-order word	Specifies the moment of inertia around the center of the end effector including the hand and the work piece (real number, Unit: $kg \cdot m^2$) as the value × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	loadInertia Low-order word	Specifies the moment of inertia around the center of the end effector including the hand and the work piece (real number, Unit: $kg \cdot m^2$) as the value × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Description

This command is used to acquire the load inertia when acquiring the current load inertia and the eccentricity separately.

The value will be returned as fixed-point data which validates to three decimal places.

Example

When setting 5.12 Kg^2 for the load inertia and 120.001 mm for the eccentricity.

Command	Response
0162H	0162H 0000H 1400H

9.8.6 Command 355: Acquires the setting value of the eccentricity

Acquires the eccentricity.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
Response 1	15	eccentricity High-order word	Returns the distance from the center of the end effector to the gravity center of the hand and the work piece by specifying the value × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	eccentricity Low-order word	Returns the distance from the center of the end effector to the gravity center of the hand and the work piece by specifying the value × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Description

This command is used to acquire the eccentricity when acquiring the current load inertia and the eccentricity separately.

The value will be returned as fixed-point data which validates to three decimal places.

Example

When setting 5.12 Kg^2 for the load inertia and 120.001 mm for the eccentricity.

Command	Response

0163H	0163H 0001H D4C1H

9.9 Arch Parameter Setting

These commands are used to set arch parameters for Jump, Jump3, and Jump3CP commands.

They define values in the Arch table which are necessary for Jump motion commands (2001, 2002, and 2003).

For details of Arch, refer to the following.

"SPEL+ Language Reference - Arch"

9.9.1 Command 400: Sets the arch parameter

Sets Arch parameters (depart distance and approach distance).

Command Syntax

	bit	Name	Description
Parameter 1	15	archNumber	Specifies the arch number by an integer from 0 to 6. Valid values are integers from 0 to 6.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	departDistance High-order word	Specifies the depart distance as the value (Unit: mm) × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	departDistance Low-order word	Specifies the depart distance as the value (Unit: mm) × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	approachDistance High-order word	Specifies the approach distance after the completion of horizontal movement as the value (Unit: mm) × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 5	15	approachDistance Low-order word	Specifies the approach distance after the completion of horizontal movement as the value (Unit: mm) × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Sets Arch parameters (depart distance and approach distance).

The value will be specified as fixed-point data which validates to three decimal places.

* Approach distance for Jump command (2001): approach distance (vertical distance from the target position) after the completion of horizontal movement.

* Approach distance for Jump3 command (2002) and Jump3CP command (2003): approach distance after the completion of span motion.

Example

When setting 10.123 mm for the depart distance and 20.123 mm for the approach distance in the Arch number 3.

Command	Response
0190H 0003H 0000H 278BH 0000H 4E9BH	0190H 0000H 0000H

9.9.2 Command 401: Sets the depart distance of the arch parameter

Sets Arch depart distance.

Command Syntax

	bit	Name	Description
Parameter 1	15	archNumber	Specifies the arch number by an integer from 0 to 6. Valid values are integers from 0 to 6.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	departDistance High-order word	Specifies the depart distance as the value (Unit: mm) × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	departDistance Low-order word	Specifies the depart distance as the value (Unit: mm) × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

This command is used to set the depart distance when setting Arch parameters separately.

This command must be used in combination with Command 402.

To set the parameters, execute Command 401 and 402, in that order. The settings will be effective after issuing Command 402.

If commands other than Command 402 are issued after this command, setting will be canceled.

Example

When setting 10.123 mm for the depart distance and 20.123 mm for the approach distance in the Arch number 3.

Command	Response
0191H 0003H 0000H 278BH	0191H 0000H 0000H

9.9.3 Command 402: Sets the approach distance of the arch parameter

Sets Arch approach distance.

Command Syntax

	bit	Name	Description
Parameter 1	15	archNumber	Specifies the arch number by an integer from 0 to 6. Valid values are integers from 0 to 6.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	approachDistance High-order word	Specifies the approach distance after the completion of horizontal movement as the value (Unit: mm) × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	approachDistance Low-order word	Specifies the approach distance after the completion of horizontal movement as the value (Unit: mm) × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

This command is used to set the approach distance when setting Arch parameters separately.

This command must be used in combination with Command 402.

To set the parameters, execute Command 401 and 402, in that order. The settings will be effective after issuing Command 402.

If the last command is not the command No. 401, an error response will be returned.

Example

When setting 10.123 mm for the depart distance and 20.123 mm for the approach distance in the Arch number 3.

Command	Response
0192H 0003H 0000H 4E9BH	0192H 0000H 0000H

9.9.4 Command 403: Acquires the arch parameter

Acquires Arch parameter setting values.

Acquires the depart distance and the approach distance.

Command Syntax

	bit	Name	Description
Parameter 1	15 14 ｜ 1 0	archNumber	Specifies the arch number by an integer from 0 to 6. Valid values are integers from 0 to 6.

Response Syntax

	bit	Name	Description
Response 1	15 14 ｜ 1 0	archNumber	Returns the arch number by an integer from 0 to 6. Returns the specified table number.

	bit	Name	Description
Response 2	15 14 ｜ 1 0	departDistance High-order word	Specifies the depart distance as the value (Unit: mm) × 1000 converted to a 32-bit integer. High-order side 16 bit.

	bit	Name	Description
Response 3	15 14 ｜ 1	departDistance Low-order word	Specifies the depart distance as the value (Unit: mm) × 1000 converted to a 32-bit integer. Low-order side 16 bit.

	bit	Name	Description
	0		

	bit	Name	Description
Response 4	15	approachDistance High-order word	Specifies the approach distance after the completion of horizontal movement as the value (Unit: mm) × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 5	15	approachDistance Low-order word	Specifies the approach distance after the completion of horizontal movement as the value (Unit: mm) × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Description

Acquires the Arch parameter setting values (depart distance and approach distance) from th specified arch table.

The value will be specified as fixed-point data which validates to three decimal places.

Example

When setting 10.123 mm for the depart distance and 20.123 mm for the approach distance in the Arch number 3.

Command	Response
0193H 0003H	0190H 0003H 0000H 278BH 0000H 4E9BH

9.9.5 Command 404: Acquires the depart distance setting value

Acquires Arch parameter setting values separately.

Acquires the depart distance.

Command Syntax

	bit	Name	Description
Parameter 1	15	archNumber	Specifies the arch number by an integer from 0 to 6. Valid values are integers from 0 to 6.
	14		
	|		
	1		

	bit	Name	Description
	0		

Response Syntax

	bit	Name	Description
Response 1	15	archNumber	Returns the arch number by an integer from 0 to 6. Returns the specified table number.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	departDistance High-order word	Specifies the depart distance as the value (Unit: mm) × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 3	15	departDistance Low-order word	Specifies the depart distance as the value (Unit: mm) × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Description

This command is used to set the depart distance when setting Arch parameters separately.

The value will be specified as fixed-point data which validates to three decimal places.

Example

When setting 10.123 mm for the depart distance and 20.123 mm for the approach distance in the Arch number 3.

Command	Response
0194H 0003H	0194H 0003H 0000H 278BH

9.9.6 Command 405: Acquires the approach distance setting value

Acquires Arch parameter setting values separately.

Acquires the approach distance.

Command Syntax

	bit	Name	Description
Parameter 1	15 14 | 1 0	archNumber	Specifies the arch number by an integer from 0 to 6. Valid values are integers from 0 to 6.

Response Syntax

	bit	Name	Description
Response 1	15 14 | 1 0	archNumber	Returns the arch number by an integer from 0 to 6. Returns the specified table number.

	bit	Name	Description
Response 2	15 14 | 1 0	approachDistance High-order word	Specifies the approach distance after the completion of horizontal movement as the value (Unit: mm) × 1000 converted to a 32-bit integer. High-order side 16 bit.

	bit	Name	Description
Response 3	15 14 | 1 0	approachDistance Low-order word	Specifies the approach distance after the completion of horizontal movement as the value (Unit: mm) × 1000 converted to a 32-bit integer. Low-order side 16 bit.

Description

This command is used to acquire the approach distance when acquiring Arch parameters separately.

The value will be specified as fixed-point data which validates to three decimal places.

Example

When setting 10.123 mm for the depart distance and 20.123 mm for the approach distance in the Arch number 3.

Command	Response
01954H 0003H	0195H 0003H 0000H 4E9BH

9.10 Setting of Positioning Error Ranges

These commands are used to specify the allowable positioning error for detecting completion of any given move for each joint.

This positioning completion check begins after the CPU has completed sending the target position pulse to the servo system. Due to servo delay, the manipulator will not yet have reached the target position. This check continues to be executed every few milliseconds until each joint has arrived within the specified range setting. Positioning is considered complete when all axes have arrived within the specified ranges. Once positioning is complete program control is passed to the next statement, however, servo system keeps the control of the manipulator target position.

When relatively large ranges are used with command, the positioning will be confirmed relatively early in the move, and executes the next statement.

The default settings depend on the manipulator type. Refer to your manipulator manual for details.

- Cycle Times and the Fine Command
  The Fine value does not affect the acceleration or deceleration control of the manipulator arm. However, smaller Fine values can cause the system to run slower because it may take the servo system extra time (a few milliseconds) to get within the acceptable position range. Once the arm is located within the acceptable position range (defined by the Fine instruction), the CPU executes the next user instruction. (Note that all activated axes must be in position before the CPU executes the next user instruction.)
- Initialization (by Motor On, SLock, SFree)
  Any time the following commands are used the Fine value is initialized to default values:
  - SLock, SFree, Motor instructions
    Make sure that you reset Fine values after one of the above commands execute.

9.10.1 Command 450: Executes the settings of all joints

This command specifies the allowable positioning error for detecting completion of any given move for each joint.

Command Syntax

*Axis 5 and 6 are not necessary for the 4-axis robots.

	bit	Name	Description
Parameter 1	15	axis1	Integer ranging from (0-65535) which represents the allowable positioning error
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	axis2	Integer ranging from (0-65535) which represents the allowable positioning error
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	axis3	Integer ranging from (0-65535) which represents the allowable positioning error
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	axis4	Integer ranging from (0-65535) which represents the allowable positioning error
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 5	15	axis5	Integer ranging from (0-65535) which represents the allowable positioning error
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 6	15	axis6	Integer ranging from (0-65535) which represents the allowable positioning error
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

This command specifies the allowable positioning error for detecting completion of any given move for each joint.

- 4-axis manipulator: specify the parameters from axis1 to axis4.
- 6-axis manipulator: specify the parameters from axis1 to axis6.

Example

6-axis manipulator

- Axis #1: 100
- Axis #2: 200
- Axis #3: 300
- Axis #4: 400
- Axis #5: 500
- Axis #6: 600

Command	Response
01C2H 0064H 00C8H 012CH 0190H 01F4H 0258H	01C2H 0000H 0000H

9.10.2 Command 451: Sets the setting values of Joint #1, #2, and #3

Specifies the allowable positioning error for detecting completion of any given move for each joint separately.

Sets axis1 to axis3.

Command Syntax

	bit	Name	Description
Parameter 1	15	axis1	Integer ranging from (0-65535) which represents the allowable positioning error
	14		
	1		
	0		

	bit	Name	Description
Parameter 2	15	axis2	Integer ranging from (0-65535) which represents the allowable positioning error
	14		
	1		
	0		

	bit	Name	Description
Parameter 3	15	axis3	Integer ranging from (0-65535) which represents the allowable positioning error
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

This command specifies Axis #1, #2, and #3 to specify the allowable positioning error for detecting completion of any given move.

This command functions in combination with Command 451.

To set parameters, execute Command 451 and 452, in that order. The settings will be effective after issuing Command 452.

If commands other than Command 452 are issued after this command, setting will be canceled.

The rest is same as Command 450.

Example

6-axis manipulator

- Axis #1: 100
- Axis #2: 200
- Axis #3: 300
- Axis #4: 400
- Axis #5: 500
- Axis #6: 600

Command	Response
01C3H 0064H 00C8H 012CH	01C3H 0000H 0000H

9.10.3 Command 452: Sets the setting values of Joint #4, #5, and #6

Specifies the allowable positioning error for detecting completion of any given move for each joint separately.

Sets axis4 to axis6.

Command Syntax

*Axis 2 and 3 are not necessary for the 4-axis robots.

	bit	Name	Description
Parameter 1	15	axis4	Integer ranging from (0-65535) which represents the allowable positioning error
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	axis5	Integer ranging from (0-65535) which represents the allowable positioning error
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	axis6	Integer ranging from (0-65535) which represents the allowable positioning error
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

This command specifies Axis #4, #5, and #6 to specify the allowable positioning error for detecting completion of any given move.

For 4-axis manipulators, axis5 and axis6 are not necessary.

This command functions in combination with Cmmand 451.

To set parameters, execute Command 451 and 452, in that order. The settings will be effective after issuing Command 452.

If the last command is not Command 451, an error response will be returned.

The rest is same as Command 450.

Example

6-axis manipulator

- Axis #1: 100
- Axis #2: 200
- Axis #3: 300
- Axis #4: 400
- Axis #5: 500
- Axis #6: 600

Command	Response
01C4H 0190H 01F4H 0258H	01C4H 0000H 0000H

9.10.4 Command 453: Acquires the setting values of all joints

Acquires setting values of the allowable positioning error for detecting completion of any given move for each joint.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
Response 1	15	axis1	Integer ranging from (0-65535) which represents the allowable positioning error
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	axis2	Integer ranging from (0-65535) which represents the allowable positioning error
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 3	15	axis3	Integer ranging from (0-65535) which represents the allowable positioning error
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 4	15	axis4	Integer ranging from (0-65535) which represents the allowable positioning error
	14		
	｜		
	1		
	0		

	bit	Name	Description
Response 5	15	axis5	Integer ranging from (0-65535) which represents the allowable positioning error
	14		
	｜		
	1		
	0		

	bit	Name	Description
Response 6	15	axis6	Integer ranging from (0-65535) which represents the allowable positioning error
	14		
	｜		
	1		
	0		

* For 4-axis manipulators, Parameter 2 and 3 are not returned.

Description

This command acquires setting values of all axes for specifying the allowable positioning error for detecting completion collectively.

However, values for axis5 and axis6 are not returned if the manipulator is the 4-axis manipulator.

Example

6-axis manipulator

- Axis #1: 100
- Axis #2: 200
- Axis #3: 300
- Axis #4: 400
- Axis #5: 500
- Axis #6: 600

Command	Response
01C5H	01C5H 0064H 00C8H 012CH 0190H 01F4H 0258H

9.10.5 Command 454: Acquires the setting values of Joint #1, #2, and #3

Acquires values for specifying the allowable positioning error for detecting motion completion separately.

Acquires Axis #1, #2, and #3.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
Response 1	15	axis1	Integer ranging from (0-65535) which represents the allowable positioning error.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	axis2	Integer ranging from (0-65535) which represents the allowable positioning error.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 3	15	axis3	Integer ranging from (0-65535) which represents the allowable positioning error.
	14		
	|		
	1		
	0		

Description

This command acquires setting values of Axis #1, #2, and #3 for specifying the allowable positioning error for detecting completion when acquiring the setting values separately.

Example

6-axis manipulator

- Axis #1: 100
- Axis #2: 200
- Axis #3: 300

- Axis #4: 400
- Axis #5: 500
- Axis #6: 600

Command	Response
01C6H	01C6H 0064H 00C8H 012CH

9.10.6 Command 455: Acquires the setting values of Joint #4, #5, and #6

Acquires values for specifying the allowable positioning error for detecting motion completion separately.

Acquires Axis #4, #5, and #6.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
Response 1	15	axis4	Integer ranging from (0-65535) which represents the allowable positioning error.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	axis5	Integer ranging from (0-65535) which represents the allowable positioning error.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 3	15	axis6	Integer ranging from (0-65535) which represents the allowable positioning error.
	14		
	|		
	1		
	0		

Description

This command acquires setting values of Axis #4, #5, and #6 for specifying the allowable positioning error for detecting completion when acquiring the setting values separately.

However, values for axis5 and axis6 are not returned if the manipulator is a 4-axis manipulator.

Example

6-axis manipulator

- Axis #1: 100
- Axis #2: 200
- Axis #3: 300
- Axis #4: 400
- Axis #5: 500
- Axis #6: 600

Command	Response
01C7H	01C7H 0190H 01F4H 0258H

9.11 Tool Selection

This command selects the tool specified by the tool number (toolNum). When the tool number is 0, no tool is selected and all motion are done with respect to the center of the end effector joint. However, when Tool entry 1, 2, or 3 is selected, motion is done with respect to the end of the tool as defined with the tool definition.

- Power Off and Its Effect on the Tool Selection
  Power Off and Its Effect on the Tool Selection.
- Life of Memory Card
  Robot parameter data is stored to the memory card in the Controller. Therefore, execution of the command writes to the memory card. Frequent writing to the memory card affects its product life. It is recommended to minimize the execution of the command.

9.11.1 Command 500: Selects the tool

Selects the current tool.

Command Syntax

	bit	Name	Description
Parameter 1	15	toolNum	Integer from 0-15 representing which of 16 tool definitions to use.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Selects the tool.

Example

When selecting the tool 5.

Command	Response
01F4H 0005H	01F4H 0000H 0000H

9.11.2 Command 501: Acquires the tool selection status

Acquires the current tool.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
Response 1	15	toolNumber	Integer from 0-15 representing the current tool number among 16 tool definitions.
	14		
	|		
	1		
	0		

Description

Returns the current tool number.

Example

When selecting the tool 5.

Command	Response
01F5H	01F5H 0005H

9.11.3 Command 502: Defines tool coordinate system

Defines tool coordinate system.

Command Syntax

	bit	Name	Description
Parameter 1	15	toolNumber	Integer from 0-15 representing which of 16 tool definitions to use.
	14		
	|		

	bit	Name	Description
	1		
	0		

	bit	Name	Description
Parameter 2	15	pointNumber	Specifies the point number to use to define the tool.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Defines tool coordinate system by using a point.

Example

When defining tool 5 by using P1:

Command	Response
01F6H 0005H 0001H	01F6H 0000H 0000H

9.12 Pallet Definition

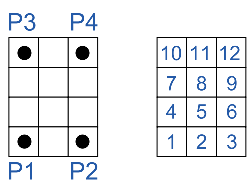
A pallet is defined by teaching points P1, P2 and P3 as a minimum to the manipulator, and by specifying the number of points from P1 to P2 and from P2 to P3.

If the pallet is a well ordered rectangular shape, only 3 of the 4 corner points need to be specified. However, in most situations, it is recommended to use 4 corner points to define the pallet.

To define a pallet, first teach either 3 or 4 corner points. Then, define the pallet as follows:

4-point definition: P1, P2, P3 (and P4) are shown below. There are 3 positions from P1-P2 and 4 positions from P1-P3. This makes a pallet which has 12 positions total. To define this pallet the syntax is as follows:

```
Pallet 1, P1, P2, P3, P4, 3, 4
```



9.12.1 Command 550: Defines the pallet by specifying 4 points

Defines a pallet by specifying 4 points.

Command Syntax

	bit	Name	Description
Parameter 1	15	palletNumber	Specifies the pallet number by an integer from 0 to 15.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	P1	Specifies the point variable to use to define the pallet (standard 3-point definition).
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	P2	Specifies the point variable to use to define the pallet (standard 3-point definition).
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	P3	Specifies the point variable to use to define the pallet (standard 3-point definition).
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 5	15	P4	Use this parameter with the Point number 1 through 3 when defining the pallet by 4-point definition.
	14		
	|		

	bit	Name	Description
	1		
	0		

	bit	Name	Description
Parameter 6	15	columns	Integer ranging from 1 to 32767 which represents the number of points on the P1-to-P2 side of the pallet. (columns × rows < 32767)
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 7	15	rows	Integer ranging from 1 to 32767 which represents the number of points on the P1-to-P3 side of the pallet. (columns × rows < 32767)
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Defines a pallet by specifying 4 points.

Example

When defining the pallet 3 with 4 points (P1, P2, P3, and P4) and deviding P1-to-P2 side into 10 and P1-to-P3 side into 15.

Command	Response
0226H 0003H 0001H 0002H 0003H 0004H 000AH 000FH	0226H 0000H 0000H

9.12.2 Command 551: Defines the pallet by specifying 3 points

Defines a pallet by specifying 3 points.

Command Syntax

<table>
<tr><th></th><th>bit</th><th>Name</th><th>Description</th></tr>
<tr><td rowspan="5">Parameter 1</td><td>15</td><td rowspan="5">palletNumber</td><td rowspan="5">Specifies the pallet number by an integer from 0 to 15.</td></tr>
<tr><td>14</td></tr>
<tr><td>|</td></tr>
<tr><td>1</td></tr>
<tr><td>0</td></tr>
</table>

<table>
<tr><th></th><th>bit</th><th>Name</th><th>Description</th></tr>
<tr><td rowspan="5">Parameter 2</td><td>15</td><td rowspan="5">P1</td><td rowspan="5">Specifies the point variable to use to define the pallet (standard 3-point definition).</td></tr>
<tr><td>14</td></tr>
<tr><td>|</td></tr>
<tr><td>1</td></tr>
<tr><td>0</td></tr>
</table>

<table>
<tr><th></th><th>bit</th><th>Name</th><th>Description</th></tr>
<tr><td rowspan="5">Parameter 3</td><td>15</td><td rowspan="5">P2</td><td rowspan="5">Specifies the point variable to use to define the pallet (standard 3-point definition).</td></tr>
<tr><td>14</td></tr>
<tr><td>|</td></tr>
<tr><td>1</td></tr>
<tr><td>0</td></tr>
</table>

<table>
<tr><th></th><th>bit</th><th>Name</th><th>Description</th></tr>
<tr><td rowspan="5">Parameter 4</td><td>15</td><td rowspan="5">P3</td><td rowspan="5">Specifies the point variable to use to define the pallet (standard 3-point definition).</td></tr>
<tr><td>14</td></tr>
<tr><td>|</td></tr>
<tr><td>1</td></tr>
<tr><td>0</td></tr>
</table>

<table>
<tr><th></th><th>bit</th><th>Name</th><th>Description</th></tr>
<tr><td rowspan="5">Parameter 5</td><td>15</td><td rowspan="5">columns</td><td rowspan="5">Integer ranging from 1 to 32767 which represents the number of points on the P1-to-P2 side of the pallet.
(columns × rows < 32767)</td></tr>
<tr><td>14</td></tr>
<tr><td>|</td></tr>
<tr><td>1</td></tr>
<tr><td>0</td></tr>
</table>

	bit	Name	Description
Parameter 6	15	rows	Integer ranging from 1 to 32767 which represents the number of points on the P1-to-P3 side of the pallet. (columns × rows < 32767)
	14		
	⏐		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Defines a pallet by specifying 3 points.

Example

When defining the pallet 3 by three points (P1, P2, and P3) and dividing P1-to-P2 side into 10 and P1-to-P3 side into 15.

Command	Response
0227H 0003H 0001H 0002H 0003H 000AH 000FH	0227H 0000H 0000H

9.12.3 Command 552: Limits the numbers of points and divisions to define the pallet

Defines a pallet by putting the restrictions on the number of points and divisions.

Command Syntax

	bit	Name	Description
Parameter 1	15	palletNumber	Specifies the pallet number by an integer from 0 to 15.
	14		
	⏐		
	1		
	0		

	bit	Name	Description
Parameter 2	15	P1	Specifies the point number by an integer from 0 to 255.
	⏐		
	8		
	7	P2	Specifies the point number by an integer from 0 to 255.
	⏐		

	bit	Name	Description
	0		

<table>
<tr><th></th><th>bit</th><th>Name</th><th>Description</th></tr>
<tr><td rowspan="6">Parameter 3</td><td>15</td><td rowspan="3">P3</td><td rowspan="3">Specifies the point number by an integer from 0 to 255.</td></tr>
<tr><td>|</td></tr>
<tr><td>8</td></tr>
<tr><td>7</td><td rowspan="3">P4</td><td rowspan="3">Specifies the point number by an integer from 0 to 255.
*When P4 is not used, set the same number as P3.</td></tr>
<tr><td>|</td></tr>
<tr><td>0</td></tr>
</table>

<table>
<tr><th></th><th>bit</th><th>Name</th><th>Description</th></tr>
<tr><td rowspan="6">Parameter 4</td><td>15</td><td rowspan="3">columns</td><td rowspan="3">Integer ranging from 1 to 255 which represents the number of points on the P1-to-P2 side of the pallet.</td></tr>
<tr><td>|</td></tr>
<tr><td>8</td></tr>
<tr><td>7</td><td rowspan="3">rows</td><td rowspan="3">Integer ranging from 1 to 255 which represents the number of points on the P1-to-P3 side of the pallet.</td></tr>
<tr><td>|</td></tr>
<tr><td>0</td></tr>
</table>

Response Syntax

Refer to the following.

Response Codes

Description

This command restrains the setting range of point numbers and division numbers to save the number of words to be used.

Setting range of each parameter is restricted to the numbers from 1 to 255.

When defining the pallet by 3 points, give P4 the same number as P3.

Example

When the pallet 3 is defined by 4-point definition:

P1=255, P2=254, P3=253, P4=252

columns=252, rows=251

Command	Response
0228H 0003H 00FFH 00FEH 00FDH 00FCH 00FBH 00FAH	0228H 0000H 0000H

9.12.4 Command 553: Selects the data type and defines the pallet by split

Selects the data type and defines the pallet by dividing it.

Command Syntax

	bit	Name	Description
Parameter 1	15	palletNumber	Specifies the pallet number by an integer from 0 to 15.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	data	Select the types of data 1 and data 2. Data 1= P1 / Data 2 = P2 Data 1= P3 / Data 2 = P4 Data 1 = columns 1 / Data 2 = rows 2 Data 1= P3 / Data 2 = No data
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	data1	Information selected in Parameter 2.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	data2	Information selected in Parameter 2.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Specifies the data type and defines the pallet by dividing it. This command can define a pallet while saving the number of words to be used.

For the following order and combinations, the command needs to be executed several times.

(3-point specification)

1. Set “0” for data, P1 for data1, and P2 for data2.
2. Set “3” for data and specify P3 for data1.
3. Set “2” for data, “columns” for data1, and “rows” for data2.

(4-point specification)

1. Set “0” for data, P1 for data1, and P2 for data2.
2. Set “1” for data, P3 for data1, and P4 for data2.
3. Set “2” for data, “columns” for data1, and “rows” for data2.

Actual pallet definition is executed upon receiving data 2 for both 3- and 4-point specifications.

If the command is not executed in the above order, an error response will return and the pallet definition will be canceled.

Example

When the pallet 3 is defined by 4-point definition:

P1=255, P2=254, P3=253, P4=252

columns=252, rows=251

Command	Response
0229H 0003H 0000H 00FFH 00FEH 0229H 0003H 0001H 00FDH 00FCH 0229H 0003H 0001H 00FBH 00FAH	0229H 0000H 0000H 0229H 0000H 0000H 0229H 0000H 0000H

9.12.5 Command 554: Acquires the content of 4-point pallet definition

Copies the coordinate of a 4-point definition of the specified pallet to the specified point variable.

Command Syntax

	bit	Name	Description
Parameter 1	15	palletNumber	Specifies the pallet number by an integer from 0 to 15.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	P1	Returns the point variable to copy the P1 coordinate of the pallet definition (standard 4-point definition).
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	P2	Returns the point variable to copy the P2 coordinate of the pallet definition (standard 4-point definition).
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	P3	Returns the point variable to copy the P3 coordinate of the pallet definition (standard 4-point definition).
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 5	15	P4	Returns the point variable to copy the P4 coordinate of the pallet definition (standard 4-point definition).
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	columns	Integer ranging from 1 to 32767 which represents the number of points on the P1-to-P2 side of the pallet. (columns × rows < 32767)
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	rows	Integer ranging from 1 to 32767 which represents the number of points on the P1-to-P3 side of the pallet. (columns × rows < 32767)
	14		
	|		
	1		
	0		

Description

Copies the coordinate of a 4-point definition of the specified pallet to the specified point variable.

If the specified pallet is not registered or defined by 3 points, an error response will be returned.

Example

When copying the coordinate of a 4-point definition of pallet 3 to the following specified point variable:

P1=10, P2=20, P3=30, P4=40

columns=10, rows=15

Command	Response
022AH 0003H 000AH 0014H 001EH 0028H	022AH 000AH 000FH

9.12.6 Command 555: Acquires the content of 3-point pallet definition

Copies the coordinate of a 3-point definition of the specified pallet to the specified point variable.

Command Syntax

	bit	Name	Description
Parameter 1	15	palletNumber	Specifies the pallet number by an integer from 0 to 15.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	P1	Returns the point variable to copy the P1 coordinate of the pallet definition (standard 3-point definition).
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	P2	Returns the point variable to copy the P2 coordinate of the pallet definition (standard 3-point definition).
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	P3	Returns the point variable to copy the P3 coordinate of the pallet definition (standard 3-point definition).
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	columns	Integer ranging from 1 to 32767 which represents the number of points on the P1-to-P2 side of the pallet. (columns × rows < 32767)
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	rows	Integer ranging from 1 to 32767 which represents the number of points on the P1-to-P3 side of the pallet. (columns × rows < 32767)
	14		
	|		
	1		
	0		

Description

Copies the coordinate of a 3-point definition of the specified pallet to the specified point variable.

If the specified pallet is not registered or defined by 4 points, an error response will be returned.

Example

When copying the coordinate of a 3-point definition of pallet 3 to the following specified point variable:

P1=10, P2=20, P3=30

columns=10, rows=15

Command	Response
022BH 0003H 000AH 0014H 001EH	022BH 000AH 000FH

9.12.7 Command 556: Limits the number of points and division and

acquires the pallet definition Copies the coordinate of the specified pallet definition (with restrictions) to the specified point variable.

Command Syntax

	bit	Name	Description
Parameter 1	15	palletNumber	Specifies the pallet number by an integer from 0 to 15.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	P1	Integer ranging from 0 to 255 which represents the point variable to copy the P1 coordinate of the pallet definition.
	|		
	8		
	7	P2	Integer ranging from 0 to 255 which represents the point variable to copy the P2 coordinate of the pallet definition.
	|		
	0		

	bit	Name	Description
Parameter 3	15	P3	Integer ranging from 0 to 255 which represents the point variable to copy the P3 coordinate of the pallet definition.
	|		
	8		
	7	P4	Integer ranging from 0 to 255 which represents the point variable to copy the P4 coordinate of the pallet definition. * If the specified pallet is defined by 3-point definition, the P3 coordinate of the pallet definition is copied.
	|		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	columns	Integer ranging from 1 to 255 which represents the number of points on the P1-to-P2 side of the pallet.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	rows	Integer ranging from 1 to 255 which represents the number of points on the P1-to-P3 side of the pallet.
	14		
	|		
	1		
	0		

Description

Copies the coordinate of the specified pallet definition (with restrictions in Command 552) to the specified point variable collectively.

If the specified pallet is not registered, or point numbers and division numbers are out of range, an error response will be returned.

If the specified pallet is defined by 3-point definition, the P3 coordinate of the pallet definition is copied to P4 as well.

Example

When copying the coordinate of a 4-point definition of pallet 3 to the following specified point variable:

P1=10, P2=20, P3=30, P4=40

columns=10, rows=15

Command	Response
022CH 0003H 0A14H 1E28H	022CH 000AH 000FH

When copying the coordinate of a 3-point definition of pallet 3 to the following specified point variable:

P1=10, P2=20, P3=30

columns=10, rows=15

Command	Response
022CH 0003H 0A14H 1E28H	022CH 000AH 000FH

9.12.8 Command 557: Selects the data type and acquires the details of pallet definition

Acquires the details of a pallet definition for the specified pallet by specifying the data type.

Command Syntax

	bit	Name	Description
Parameter 1	15 14 | 1 0	palletNumber	Specifies the pallet number by an integer from 0 to 15.

	bit	Name	Description
Parameter 2	15 14 | 1 0	data	Select the types of data 1 and data 2. 0: Data 1= P1 / Data 2 = P2 1: Data 1= P3 / Data 2 = P4 2: Data 1 = columns 1 / Data 2 = rows 2 3: Data 1= P3 / Data 2 = No data

	bit	Name	Description
Parameter 3	15 14 | 1 0	Data1	Returns as follows depending on the value of data selection. 0: Point variable to copy the P1 coordinate 1: Point variable to copy the P3 coordinate 2: No data 3: Point variable to copy the P3 coordinate

	bit	Name	Description
Parameter 4	15 14 | 1 0	Data2	Returns as follows depending on the value of data selection. 0: Point variable to copy the P2 coordinate 1: Point variable to copy the P4 coordinate 2: No data 3: No data

Response Syntax

	bit	Name	Description
Response 1	15 14 ｜ 1 0	data	Returns the types of data 1 and data 2. 0: Data 1= P1 / Data 2 = P2 1: Data 1= P3 / Data 2 = P4 2: Data 1= columns 1 / Data 2 = rows 2 3: Data 1= P3 / Data 2 = No data

	bit	Name	Description
Response 2	15 14 ｜ 1 0	Data1	Returns as follows depending on the value of data selection. 0: Point variable which is a copy of the P1 coordinate 1: Point variable which is a copy of the P3 coordinate 2: columns 3: Point variable which is a copy of the P3 coordinate

	bit	Name	Description
Response 3	15 14 ｜ 1 0	Data2	Returns as follows depending on the value of data selection. 0: Point variable which is a copy of the P2 coordinate 1: Point variable which is a copy of the P4 coordinate 2: rows 3: No data

Description

This command acquires the details of pallet definition for the specified pallet separately. Acquires data by selecting its type.

Data selection can be in a random order.

An error response will be returned in following cases:

- The specified pallet is not defined.
- The specified pallet is defined by 3-point definition, while “1” is selected in Data selection.
- The specified pallet is defined by 4-point definition, while “3” is selected in Data selection.

Example

When copying the coordinate of a 4-point definition of pallet 3 to the following specified point variable:

P1=10, P2=20, P3=30, P4=40

columns=10, rows=15

Command	Response

022DH 0003H 0000H 000AH 0014H 022DH 0003H 0001H 001EH 0028H 022DH 0003H 0002H 0000H 0000H	022DH 0001H 000AH 0014H 022DH 0002H 001EH 0028H 022DH 0003H 000AH 000FH

When copying the coordinate of a 3-point definition of pallet 3 to the following specified point variable:

P1=10, P2=20, P3=30

columns=10, rows=15

Command	Response
022DH 0003H 0000H 000AH 0014H 022DH 0003H 0003H 001EH 022DH 0003H 0002H	022DH 0000H 000AH 0014H 022DH 0003H 001EH 022DH 0003H 000AH 000FH

9.12.9 Command 558: Acquires the point number set to the specified pallet

Acquires the number of points for the specified pallet.

Command Syntax

	bit	Name	Description
Parameter 1	15	palletNumber	Specifies the pallet number by an integer from 0 to 15.
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	Number of points	0 = not defined 3 = 3-point definition 4 = 4-point definition
	14		
	|		
	1		
	0		

Description

Acquires whether the specified pallet is defined by 3-point or 4-point definition.

This command also acquires whether the pallet is defined or not.

Example

When the pallet 3 is defined by 4-point definition:

P1=1, P2=2, P3=3, P4=4

columns=10, rows=15

Command	Response
022EH 0003H	022EH 0004H

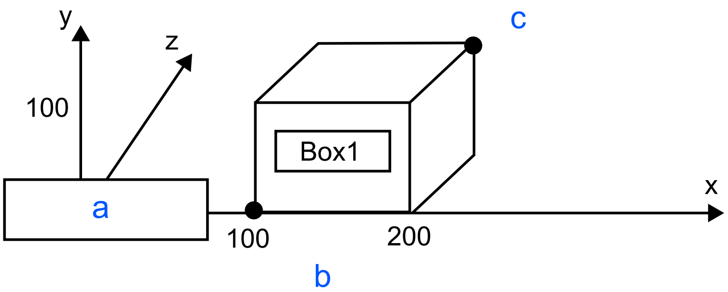
When the specified pallet is not defined.

Command	Response
022EH 0001H	022EH 0000H

9.13 Approach Check Area Settings

These commands set and acquire the approach check area (Box). The approach check area is for checking approaches of the robot end effector in the approach check area. The position of the end effector is calculated by the current tool. The approach check area is set on the base coordinate system of the manipulator and is between the specified maximum and minimum X, Y, and Z.

When the approach check area is used, the system detects approaches in any motor power status during the controller is ON.



Symbol	Description
a	Manipulator
b	Lower limit of axes X, Y, Z
c	Upper limit of axes X, Y, Z

Lower limit of axes X, Y, Z is (100, 0, 0) and upper limit is (200, 100, 100)

Robot parameter data is stored to the memory card in the Controller. Therefore, execution of the command writes to the memory card. Frequent writing to the memory card affects its product life. It is recommended to minimize the execution of the command.

- Turning Off Approach Check Area by coordinate axis
  You can turn off the approach check area of each coordinate axis. To turn off only the Z axis, define the lower limit position and the upper limit position of the Z axis to be 0.
- Default values of Approach Check Area
  The default values for the Box statement are "0, 0, 0, 0, 0, 0". (Approach Check Area Checking is turned off.)
- Tool selection
  The approach check is executed for the current tool. When you change the tool, the approach check may display the tool approach from inside to outside of the area or the other way although the robot is not operating.

9.13.1 Command 600: Specifies the lower and upper positions to define the approach check area

Specifies the upper limit and lower limit positions for the specified approach check area.

Command Syntax

	bit	Name	Description
Parameter 1	15	areaNum	Specifies the area number to be set by an integer from 1 to 15.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	Axis selection	Specifies the axis. 0 = X axis 1 = Y axis 2 = Z axis
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	Lower limit position High-order word	Specifies the lower limit coordinate of the specified axis as the real number × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	Lower limit position Low-order word	Specifies the lower limit coordinate of the specified axis as the real number × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 5	15	Upper limit position High-order word	Specifies the upper limit coordinate of the specified axis as the actual value × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 6	15	Upper limit position Low-order word	Specifies the upper limit coordinate of the specified axis as the actual value × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Sets the approach check area for each axis by specifying the lower limit position and the upper limit position.

Setting will be completed by issuing the command to all axes, in order of X, Y, and Z.

If order of axes is not proper or another command is executed during the execution of this command, values received at that point will be canceled and an error response will be returned.

Example

When setting the Area 1:

	X axis	Y axis	Z axis
Lower limit position	0.000	100.000	0.000
Upper limit position	200.000	100.000	100.000

Command	Response
0258H 0001H 0000H 0000H 0000H 0003H 0D40H 0258H 0001H 0001H 0001H 86A0H 0001H 86A0H 0258H 0001H 0002H 0000H 0000H 0001H 86A0H	0258H 0000H 0000H 0258H 0000H 0000H 0258H 0000H 0000H

9.13.2 Command 601: Sets the lower limit position

Command Syntax

	bit	Name	Description
Parameter 1	15	areaNum	Specifies the area number to be set by an integer from 1 to 15.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	Axis selection	Specifies the axis. 0 = X axis 1 = Y axis 2 = Z axis
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	Lower limit position High-order word	Specifies the lower limit coordinate of the specified axis as the real number × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	Lower limit position Low-order word	Specifies the lower limit coordinate of the specified axis as the real number × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Sets the lower limit position of the approach check area for the selected axis.

The setting will be effective after issuing the command for all axes, in order of X, Y, and Z.

If the order of axes is not proper or another command is executed during the execution of this command, values received at that point will be canceled and an error response will be returned.

This command must be used in combination with Command 601.

Settings will be effective after specifying the lower limit position with Command 601, and then specifying the upper limit position with Command 602.

Example

When setting the Area 1:

	X axis	Y axis	Z axis
Lower limit position	0.000	100.000	0.000
Upper limit position	200.000	100.000	100.000

Command	Response
0259H 0001H 0000H 0000H 0000H 0259H 0001H 0001H 0001H 86A0H 0259H 0001H 0002H 0000H 0000H 025AH 0001H 0000H 0003H 0D40H 025AH 0001H 0001H 0001H 86A0H 025AH 0001H 0002H 0001H 86A0H	0259H 0000H 0000H 0259H 0000H 0000H 0259H 0000H 0000H 025AH 0000H 0000H 025AH 0000H 0000H 025AH 0000H 0000H

9.13.3 Command 602: Sets the upper limit position

Specifies the upper limit position for the specified approach check area.

Command Syntax

	bit	Name	Description
Parameter 1	15	areaNum	Specifies the area number to be set by an integer from 1 to 15.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	Axis selection	Specifies the axis. 0 = X axis 1 = Y axis 2 = Z axis
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	Upper limit position High-order word	Specifies the upper limit coordinate of the specified axis as the actual value × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	Upper limit position Low-order word	Specifies the upper limit coordinate of the specified axis as the actual value × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Sets the upper limit position of the approach check area for the selected axis.

The setting will be effective after issuing the command for all axes, in order of X, Y, and Z.

If the order of axes is not proper or another command is executed during the execution of this command, values received at that point will be canceled and an error response will be returned.

This command must be used in combination with Command 601.

Settings will be effective after specifying the lower limit position with Command 601, and then specifying the upper limit position with Command 602.

Example

When setting the Area 1:

	X axis	Y axis	Z axis
Lower limit position	0.000	100.000	0.000
Upper limit position	200.000	100.000	100.000

Command	Response

0259H 0001H 0000H 0000H 0000H 0259H 0001H 0001H 0001H 86A0H 0259H 0001H 0002H 0000H 0000H 025AH 0001H 0000H 0003H 0D40H 025AH 0001H 0001H 0001H 86A0H 025AH 0001H 0002H 0001H 86A0H	0259H 0000H 0000H 0259H 0000H 0000H 0259H 0000H 0000H 025AH 0000H 0000H 025AH 0000H 0000H 025AH 0000H 0000H

9.13.4 Command 603: Specifies the lower and upper limit positions and acquires the setting values of the approach check area

Acquires the lower limit and upper limit positions of the specified approach check area.

Command Syntax

<table>
<tr><th></th><th>bit</th><th>Name</th><th>Description</th></tr>
<tr><td rowspan="5">Parameter 1</td><td>15</td><td rowspan="5">areaNum</td><td rowspan="5">Specifies the area number to be set by an integer from 1 to 15.</td></tr>
<tr><td>14</td></tr>
<tr><td>|</td></tr>
<tr><td>1</td></tr>
<tr><td>0</td></tr>
</table>

<table>
<tr><th></th><th>bit</th><th>Name</th><th>Description</th></tr>
<tr><td rowspan="5">Parameter 2</td><td>15</td><td rowspan="5">Axis selection</td><td rowspan="5">Specifies the axis.
0 = X axis
1 = Y axis
2 = Z axis</td></tr>
<tr><td>14</td></tr>
<tr><td>|</td></tr>
<tr><td>1</td></tr>
<tr><td>0</td></tr>
</table>

Response Syntax

<table>
<tr><th></th><th>bit</th><th>Name</th><th>Description</th></tr>
<tr><td rowspan="5">Response 1</td><td>15</td><td rowspan="5">areaNum</td><td rowspan="5">Returns the specified area number.</td></tr>
<tr><td>14</td></tr>
<tr><td>|</td></tr>
<tr><td>1</td></tr>
<tr><td>0</td></tr>
</table>

	bit	Name	Description
Response 2	15	Axis selection	Returns the specified axis. 0 = X axis 1 = Y axis 2 = Z axis
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 3	15	Lower limit position High-order word	Returns the lower limit coordinate of the specified axis as the actual value × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 4	15	Lower limit position Low-order word	Returns the lower limit coordinate of the specified axis as the actual value × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 5	15	Upper limit position High-order word	Returns the upper limit coordinate of the specified axis as the actual value × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 6	15	Upper limit position Low-order word	Returns the upper limit coordinate of the specified axis as the actual value × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Description

Acquires the lower and upper limit positions of the specified axis for the specified area number.

The value will be returned as fixed-point data which validates to three decimal places.

Example

When setting the Area 1:

	X axis	Y axis	Z axis
Lower limit position	0.000	100.000	0.000
Upper limit position	200.000	100.000	100.000

Command	Response
025BH 0001H 0000H 025BH 0001H 0001H 025BH 0001H 0002H	025BH 0001H 0000H 0000H 0000H 0003H 0D40H 025BH 0001H 0001H 0001H 86A0H 0001H 86A0H 025BH 0001H 0002H 0000H 0000H 0001H 86A0H

9.13.5 Command 604: Specifies the lower limit position and acquires the setting value of the approach check area

Acquires the approach check area lower limit position.

Command Syntax

	bit	Name	Description
Parameter 1	15	areaNum	Specifies the area number to be set by an integer from 1 to 15.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	Axis selection	Specifies the axis. 0 = X axis 1 = Y axis 2 = Z axis
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	areaNum	Returns the specified area number.
	14		

	|		
	1		
	0		

	bit	Name	Description
Response 2	15 14 | 1 0	Axis selection	Returns the specified axis. 0 = X axis 1 = Y axis 2 = Z axis

	bit	Name	Description
Response 3	15 14 | 1 0	Lower limit position High-order word	Returns the lower limit coordinate of the specified axis as the actual value × 1000 converted to a 32-bit integer. High-order side 16 bit.

	bit	Name	Description
Response 4	15 14 | 1 0	Lower limit position Low-order word	Returns the lower limit coordinate of the specified axis as the actual value × 1000 converted to a 32-bit integer. Low-order side 16 bit.

Description

Acquires the lower limit position of the specified axis for the specified area number.

The value will be returned as fixed-point data which validates to three decimal places.

Example

When setting the Area 1:

	X axis	Y axis	Z axis
Lower limit position	0.000	100.000	0.000
Upper limit position	200.000	100.000	100.000

Command	Response

025CH 0001H 0000H	025CH 0001H 0000H 0000H 0000H
025CH 0001H 0001H	025CH 0001H 0001H 0001H 86A0H
025CH 0001H 0002H	025CH 0001H 0002H 0000H 0000H
025DH 0001H 0000H	025DH 0001H 0000H 0003H 0D40H
025DH 0001H 0001H	025DH 0001H 0001H 0001H 86A0H
025DH 0001H 0002H	025DH 0001H 0002H 0001H 86A0H

9.13.6 Command 605: Specifies the upper limit position and acquires the setting value of the approach check area

Acquires the approach check area upper limit position.

Command Syntax

	bit	Name	Description
Parameter 1	15	areaNum	Specifies the area number to be set by an integer from 1 to 15.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	Axis selection	Specifies the axis. 0 = X axis 1 = Y axis 2 = Z axis
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	areaNum	Returns the specified area number.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	Axis selection	Returns the specified axis. 0 = X axis 1 = Y axis 2 = Z axis
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 3	15	Upper limit position High-order word	Returns the upper limit coordinate of the specified axis as the actual value × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 4	15	Upper limit position High-order word	Returns the upper limit coordinate of the specified axis as the actual value × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Description

Acquires the upper limit position of the specified axis for the specified area number.

The value will be returned as fixed-point data which validates to three decimal places.

Example

When setting the Area 1:

	X axis	Y axis	Z axis
Lower limit position	0.000	100.000	0.000
Upper limit position	200.000	100.000	100.000

Command	Response

025CH 0001H 0000H 025CH 0001H 0001H 025CH 0001H 0002H	025CH 0001H 0000H 0000H 0000H 025CH 0001H 0001H 0001H 86A0H 025CH 0001H 0002H 0000H 0000H
025DH 0001H 0000H 025DH 0001H 0001H 025DH 0001H 0002H	025DH 0001H 0000H 0003H 0D40H 025DH 0001H 0001H 0001H 86A0H 025DH 0001H 0002H 0001H 86A0H

9.14 Approach Check Plane Settings

The approach check plane is used for checking whether the robot end effector is in one of the two areas divided by a plane. The position of the end effector is calculated by the current tool. The approach check plane is set using the XY plane of the base coordinate system. The approach check plane detects the end effector when it approaches the area on the + Z side of the approach check plane.

When the approach check plane is used, the system detects approaches in any motor power status while the controller is ON.

Specifies a coordinate system to create the approach check plane using the point data representing the translation and rotation based on the base coordinate system, and sets the approach check plane.

Robot parameter data is stored to the memory card in the Controller. Therefore, execution of the command writes to the memory card. Frequent writing to the memory card affects its product life. It is recommended to minimize the execution of the command.

- Tool selection
  The approach check is executed for the current tool. When you change the tool, the approach check may display the tool approach from inside to outside of the plane or the other way although the manipulator is not operating.

9.14.1 Command 650: Set the approach check plane

Defines an approach check plane.

Command Syntax

	bit	Name	Description
Parameter 1	15	PlaneNum	Specifies the approach check plane number. Approach check plane can be defined by an integer from 1 to 15. Up to 15 approach check planes can be defined.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	Coordinate selection	Specifies the coordinate. 0 = X 1 = Y 2 = Z 3 = U 4 = V 5 = W
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	pCoordinateData High-order word	Specifies the coordinate system of the approach check plane directory by a point data. Specifies the coordinate (real number) as the value × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	pCoordinateData Low-order word	Specifies the coordinate system of the approach check plane directory by a point data. Specifies the coordinate (real number) as the value × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Sets the approach check plane for the specified plane number for each coordinate.

Setting will be completed by issuing the command to all coordinates, in order of X, Y, Z, U, V, and W.

If the order of coordinates is not proper or another command is executed during the execution of this command, values received at that point will be canceled and an error response will be returned.

- 4-axis manipulator: set the coordinates X, Y, Z, and U.
- 6-axis manipulator: set the coordinates X, Y, Z, U, V, and W.

Example

6-axis manipulator: when setting the following to PlaneNum 1

X	100.123
Y	200.123
Z	300.123
U	400.123
V	500.123
W	600.123

Command	Response

028AH 0001H 0000H 0001H 871BH 028AH 0001H 0001H 0003H 0DBBH 028AH 0001H 0002H 0004H 945BH 028AH 0001H 0003H 0006H 1AFBH 028AH 0001H 0004H 0007H A19BH 028AH 0001H 0005H 0009H 283BH	028AH 0000H 0000H 028AH 0000H 0000H 028AH 0000H 0000H 028AH 0000H 0000H 028AH 0000H 0000H 028AH 0000H 0000H

9.14.2 Command 651: Acquires the setting value of the approach check plane

Acquires an approach check plane definition.

Command Syntax

	bit	Name	Description
Parameter 1	15	PlaneNum	Specifies the approach check plane number. Approach check plane can be defined by an integer from 1 to 15. Up to 15 approach check planes can be defined.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	Coordinate selection	Specifies the coordinate. 0=X 1=Y 2=Z 3=U 4=V 5=W
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	PlaneNum	Returns the plane number of the specified approach check plane.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	Coordinate selection	Returns the specified coordinate. 0 = X 1 = Y 2 = Z
	14		

	bit	Name	Description
	｜		3 = U 4 = V 5 = W
	1		
	0		

	bit	Name	Description
Response 3	15	pCoordinateData High-order word	Specifies the coordinate (real number) as the value × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	｜		
	1		
	0		

	bit	Name	Description
Response 4	15	pCoordinateData Low-order word	Specifies the coordinate (real number) as the value × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	｜		
	1		
	0		

Description

Acquires the approach check plane of the specified plane number for each coordinate.

The value will be returned as fixed-point data which validates to three decimal places.

Example

6-axis manipulator: when setting the following to PlaneNum 1

X	100.123
Y	200.123
Z	300.123
U	400.123
V	500.123
W	600.123

Command	Response

028BH 0001H 0000H	028BH 0001H 0000H 0001H 871BH
028BH 0001H 0001H	028BH 0001H 0001H 0003H 0DBBH
028BH 0001H 0002H	028BH 0001H 0002H 0004H 945BH
028BH 0001H 0003H	028BH 0001H 0003H 0006H 1AFBH
028BH 0001H 0004H	028BH 0001H 0004H 0007H A19BH
028BH 0001H 0005H	028BH 0001H 0005H 0009H 283BH

9.15 Local Coordinate System Definition

These commands are used to define a local coordinate system.

Define a local coordinate system by specifying the origin and axis rotation angles with respect to the base coordinate system.

9.15.1 Command 700: Sets the definition of Local coordinate system

Defines a local coordinate system.

Command Syntax

	bit	Name	Description
Parameter 1	15	localNumber	Specifies the local coordinate system number. Local coordinate system can be defined by an integer from 1 to 15. Up to 15 coordinate systems can be defined.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	Coordinate selection	Specifies the coordinate. 0 = X 1 = Y 2 = Z 3 = U 4 = V 5 = W
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	pCoordinateData High-order word	Specifies the origin and the direction of the local coordinate system directory by a point data. Specifies the coordinate (real number) as the value × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	pCoordinateData Low-order word	Specifies the origin and the direction of the local coordinate system directory by a point data. Specifies the coordinate (real number) as the value × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Sets the local coordinate system of the specified coordinate number by each coordinate.

The setting will be effective after issuing the command for all coordinates, in order of X, Y, Z, U, V, and W.

If the order of coordinates is not proper or another command is executed during the execution of this command, values received at that point will be canceled and an error response will be returned.

- 4-axis manipulator: set the coordinates X, Y, Z, and U.
- 6-axis manipulator: set the coordinates X, Y, Z, U, V, and W.

Example

6-axis manipulator: when setting the following to PlaneNum 1

X	100.123
Y	200.123
Z	300.123
U	400.123
V	500.123
W	600.123

Command	Response
02BCH 0001H 0000H 0001H 871BH 02BCH 0001H 0001H 0003H 0DBBH 02BCH 0001H 0002H 0004H 945BH 02BCH 0001H 0003H 0006H 1AFBH 02BCH 0001H 0004H 0007H A19BH 02BCH 0001H 0005H 0009H 283BH	02BCH 0000H 0000H 02BCH 0000H 0000H 02BCH 0000H 0000H 02BCH 0000H 0000H 02BCH 0000H 0000H 02BCH 0000H 0000H

9.15.2 Command 701: Acquires the definition of Local coordinate system

Acquires a Local coordinate definition.

Command Syntax

	bit	Name	Description
Parameter 1	15	localNumber	Specifies the local coordinate system number. Local coordinate system can be defined by an integer from 1 to 15. Up to 15 coordinate systems can be defined.
	14		
	｜		
	1		
	0		

	bit	Name	Description
Parameter 2	15	Coordinate selection	Specifies the coordinate. 0=X 1=Y 2=Z 3=U 4=V 5=W
	14		
	｜		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	localNumber	Returns the specified number.
	14		
	｜		
	1		
	0		

	bit	Name	Description
Response 2	15	Coordinate selection	Specifies the coordinate. 0=X 1=Y 2=Z 3=U 4=V 5=W
	14		
	｜		
	1		
	0		

	bit	Name	Description
Response 3	15	pCoordinateData High-order word	Returns the coordinate (real number) as the value ×1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	｜		
	1		

	bit	Name	Description
	0		

	bit	Name	Description
Response 4	15	pCoordinateData Low-order word	Returns the coordinate (real number) as the value × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Description

Acquires the local coordinate system of the specified coordinate number by each coordinate.

The value will be returned as fixed-point data which validates to three decimal places.

Example

6-axis manipulator: when setting the following to PlaneNum 1

X	100.123
Y	200.123
Z	300.123
U	400.123
V	500.123
W	600.123

Command	Response
02BDH 0001H 0000H 02BDH 0001H 0001H 02BDH 0001H 0002H 02BDH 0001H 0003H 02BDH 0001H 0004H 02BDH 0001H 0005H	02BDH 0001H 0000H 0001H 871BH 02BDH 0001H 0001H 0003H 0DBBH 02BDH 0001H 0002H 0004H 945BH 02BDH 0001H 0003H 0006H 1AFBH 02BDH 0001H 0004H 0007H A19BH 02BDH 0001H 0005H 0009H 283BH

9.16 Motion Range Area Settings

These commands are used to specify the motion range area.

Many robot systems allow users to define joint limits, but these commands allow both joint limits and motion limits to be defined. In effect, this allows users to create a work envelope for their application.

The motion range established applies to motion command target positions only, and not to motion paths from starting position to target position. Therefore, the arm may move outside the XYLim range during motion.

Robot parameter data is stored to the memory card in the Controller. Therefore, execution of the command writes to the memory card. Frequent writing to the memory card affects its product life. It is recommended to minimize the execution of the command.

- Turning Off Motion Range Checking
  There are many applications which do not require Motion Range area setting. For that reason, there is a simple method to turn this setting off.
  To turn off the setting, set the parameters (X axis lower limit / upper limit, Y axis lower limit / upper limit positions) to 0.
- Default Motion Range Limit Values
  The default values are “0, 0, 0, 0”. (Motion Range Limit Checking is OFF.)

9.16.1 Command 750: Set the allowable motion area by specifying the lower and upper limit positions

Specifies the motion range area upper limit and lower limit positions.

Command Syntax

	bit	Name	Description
Parameter 1	15	coordinateSelection	Specifies the coordinate. 0 = X 1 = Y 2 = Z
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	lowerLimit High-order word	Specifies the lower limit coordinate where the Manipulator may travel as the actual value × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	lowerLimit Low-order word	Specifies the lower limit coordinate where the Manipulator may travel as the actual value × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	upperLimit High-order word	Specifies the upper limit coordinate where the Manipulator may travel as the actual value × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 5	15	upperLimit Low-order word	Specifies the upper limit coordinate where the Manipulator may travel as the actual value × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax Refer to the following.

Response Codes

Description

Sets the motion range area by specifying the lower limit position and the upper limit position for the selected coordinate.

The setting will be effective after issuing the command for all coordinates, in order of X, Y, and Z.

If the order of coordinates is not proper or another command is executed during the execution of this command, values received at that point will be canceled and an error response will be returned.

Example

When setting with the following coordinates.

	X axis	Y axis	Z axis
Lower limit position	10.000	20.000	30.000
Upper limit position	200.000	100.000	100.000

Command	Response
02EEH 0000H 0000H 000AH 0001H 871BH 02EEH 0001H 0000H 0014H 0003H 0DBBH 02EEH 0002H 0000H 001EH 0004H 945BH	02EEH 0000H 0000H 02EEH 0000H 0000H 02EEH 0000H 0000H

9.16.2 Command 751: Sets the lower limit position

Specifies the motion range area lower limit position.

Command Syntax

	bit	Name	Description
Parameter 1	15	coordinateSelection	Specifies the coordinate. 0 = X 1 = Y 2 = Z
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	lowerLimit High-order word	Specifies the lower limit coordinate where the Manipulator may travel as the actual value × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	lowerLimit Low-order word	Specifies the lower limit coordinate where the Manipulator may travel as the actual value × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Sets the motion range area by specifying the lower limit position for the selected coordinate.

The setting will be effective after issuing the command for all coordinates, in order of X, Y, and Z.

If the order of coordinates is not proper or another command is executed during the execution of this command, values received at that point will be canceled and an error response will be returned.

This command must be used in combination with Command 752.

The setting will be executed by specifying the lower limit position with Command 751, and then specifying the upper limit position with Command 752.

Example

When setting with the following coordinates.

	X axis	Y axis	Z axis

Lower limit position	10.000	20.000	30.000
Upper limit position	200.000	100.000	100.000

Command	Response
02EFH 0000H 0000H 000AH 02EFH 0001H 0000H 0014H 02EFH 0002H 0000H 001EH 02F0H 0000H 0001H 871BH 02F0H 0001H 0003H 0DBBH 02F0H 0002H 0004H 945BH	02EFH 0000H 0000H 02EFH 0000H 0000H 02EFH 0000H 0000H 02F0H 0000H 0000H 02F0H 0000H 0000H 02F0H 0000H 0000H

9.16.3 Command 752: Sets the upper limit position

Specifies the motion range area upper limit position.

Command Syntax

	bit	Name	Description
Parameter 1	15	coordinateSelection	Specifies the coordinate. 0 = X 1 = Y 2 = Z
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	upperLimit High-order word	Specifies the upper limit coordinate where the Manipulator may travel as the actual value × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	upperLimit Low-order word	Specifies the upper limit coordinate where the Manipulator may travel as the actual value × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Sets the motion range area by specifying the upper limit position for the selected coordinate.

The setting will be effective after issuing the command for all coordinates, in order of X, Y, and Z.

If the order of coordinates is not proper or another command is executed during the execution of this command, values received at that point will be canceled and an error response will be returned.

This command must be used in combination with Command 751.

The setting will be effective after specifying the lower limit position with Command 751, and then specifying the upper limit position with Command 752.

9.16.4 Command 753: Acquires the setting value of the allowable motion area by specifying the lower and upper limit positions

Acquires the motion range area upper limit and lower limit positions.

Command Syntax

	bit	Name	Description
Parameter 1	15	coordinateSelection	Specifies the coordinate. 0 = X 1 = Y 2 = Z
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	coordinateSelection	Returns the specified coordinate. 0 = X 1 = Y 2 = Z
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	lowerLimit High-order word	Returns the lower limit coordinate where the Manipulator may travel as the actual value × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		

	bit	Name	Description
	0		

	bit	Name	Description
Response 3	15	lowerLimit Low-order word	Returns the lower limit coordinate where the Manipulator may travel as the actual value × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 4	15	upperLimit High-order word	Returns the upper limit coordinate where the Manipulator may travel as the actual value × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 5	15	upperLimit Low-order word	Returns the upper limit coordinate where the Manipulator may travel as the actual value ×1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Description

Acquires the motion range area by returning the upper limit position and lower limit position for the selected coordinate.

The values will be returned as fixed-point data which validates to three decimal places.

Example

When setting with the following coordinates.

	X axis	Y axis	Z axis
Lower limit position	10.000	20.000	30.000
Upper limit position	200.000	100.000	100.000

Command	Response

02F1H 0000H 02F1H 0001H 02F1H 0002H	02F1H 0000H 0000H 000AH 0001H 871BH 02F1H 0001H 0000H 0014H 0003H 0DBBH 02F1H 0002H 0000H 001EH 0004H 945BH

9.16.5 Command 754: Acquires the setting value of the allowable motion area by specifying the lower limit position

Acquires the motion range area lower limit position.

Command Syntax

	bit	Name	Description
Parameter 1	15	coordinateSelection	Specifies the coordinate. 0 = X 1 = Y 2 = Z
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	coordinateSelection	Returns the specified coordinate. 0=X 1=Y 2=Z
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	lowerLimit High-order word	Returns the lower limit coordinate where the Manipulator may travel as the actual value × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 3	15	lowerLimit Low-order word	Returns the lower limit coordinate where the Manipulator may travel as the actual value × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		

	bit	Name	Description
	0		

Description

Acquires the lower limit position of the motion range area for the selected coordinate.

The value will be returned as fixed-point data which validates to three decimal places.

Example

When setting with the following coordinates.

	X axis	Y axis	Z axis
Lower limit position	10.000	20.000	30.000
Upper limit position	200.000	100.000	100.000

Command	Response
02F2H 0000H 02F2H 0001H 02F2H 0002H	02F2H 0000H 0000H 000AH 02F2H 0001H 0000H 0014H 02F2H 0002H 0000H 001EH

9.16.6 Command 755: Acquires the setting value of the allowable motion area by specifying the upper limit position

Acquires the motion range area upper limit position.

Command Syntax

	bit	Name	Description
Parameter 1	15	coordinateSelection	Specifies the coordinate. 0 = X 1 = Y 2 = Z
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	coordinateSelection	Returns the specified coordinate. 0=X 1=Y 2=Z
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	upperLimit High-order word	Returns the upper limit coordinate where the Manipulator may travel as the actual value × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 3	15	upperLimit Low-order word	Returns the upper limit coordinate where the Manipulator may travel as the actual value × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Description

Acquires the upper limit position of the motion range area for the selected coordinate.

The value will be returned as fixed-point data which validates to three decimal places.

Example

When setting with the following coordinates.

	X axis	Y axis	Z axis
Lower limit position	10.000	20.000	30.000
Upper limit position	200.000	100.000	100.000

Command	Response
02F3H 0000H 02F3H 0001H 02F3H 0002H	02F3H 0000H 0001H 871BH 02F3H 0001H 0003H 0DBBH 02F3H 0002H 0004H 945BH

9.17 Pulse Value Setting for Allowable Motion Area of Specified Joint

These commands define the motion range for the specified joint with upper and lower limits in encoder pulse counts. While the Range command requires range settings for all six joints, the JRange command can set each joint's working limits individually. This reduces the number of parameters required.

Robot parameter data is stored on the memory card in the Controller. Therefore, execution of the command writes to the memory card. Frequent writing to the memory card affects its product life. It is recommended to minimize the execution of the command.

- Lower Limits Must Not Exceed Upper Limits:
  The lower limit defined in the command must not exceed the upper limit. A lower limit in excess of the upper limit will cause an error, making it impossible to execute a motion command.

- Factors to Change the Setting Values:
  Once values are set, they will be kept until the user modifies the values by commands. Turning controller power off will not change the values.

- Maximum and Minimum Working Ranges:
  Refer to the specifications in the Manipulator manual for maximum working ranges for each manipulator model since these vary from model to model.

9.17.1 Command 800: Sets the allowable motion area pulse value by specifying the upper and lower limit pulses

Defines the lower limit and the upper limit of the permissible working range for the specified joint in pulses.

Command Syntax

<table>
<tr><th></th><th>bit</th><th>Name</th><th>Description</th></tr>
<tr><td rowspan="5">Parameter 1</td><td>15</td><td rowspan="5">jointNumber</td><td rowspan="5">Specifies the joint number by an integer from 1 to 6.</td></tr>
<tr><td>14</td></tr>
<tr><td>|</td></tr>
<tr><td>1</td></tr>
<tr><td>0</td></tr>
</table>

<table>
<tr><th></th><th>bit</th><th>Name</th><th>Description</th></tr>
<tr><td rowspan="5">Parameter 2</td><td>15</td><td rowspan="5">lowerLmit High-order side</td><td rowspan="5">Integer in complement form representing the lower limit pulse of the motion range for the specified joint.
High-order side 16 bit.</td></tr>
<tr><td>14</td></tr>
<tr><td>|</td></tr>
<tr><td>1</td></tr>
<tr><td>0</td></tr>
</table>

<table>
<tr><th></th><th>bit</th><th>Name</th><th>Description</th></tr>
<tr><td rowspan="5">Parameter 3</td><td>15</td><td rowspan="5">lowerLmit Low-order side</td><td rowspan="5">Integer in complement form representing the lower limit pulse of the motion range for the specified joint.
Low-order side 16 bit.</td></tr>
<tr><td>14</td></tr>
<tr><td>|</td></tr>
<tr><td>1</td></tr>
<tr><td>0</td></tr>
</table>

	bit	Name	Description
Parameter 4	15	upperLmit High-order side	Integer in complement form representing the upper limit pulse of the motion range for the specified joint. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 5	15	upperLmit Low-order side	Integer in complement form representing the upper limit pulse of the motion range for the specified joint. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Defines the allowable motion range for the specified joint with upper and lower limits in encoder pulse counts.

The pulse value should be specified in 32-bit two’s complement.

Example

When setting – 6000 for the lower limit pulse of the Joint #1 and 7000 for the upper limit pulse.

Command	Response
0320H 0001H FFFFH E890H 0000H 1B58H	0320H 0000H 0000H

9.17.2 Command 801: Sets the lower limit pulse value

Defines the lower limit for the permissible working range of the specified joint in pulses.

Command Syntax

	bit	Name	Description
Parameter 1	15	jointNumber	Specifies the joint number by an integer from 1 to 6.
	14		
	|		
	1		

	bit	Name	Description
	0		

	bit	Name	Description
Parameter 2	15	lowerLmit High-order side	Integer in complement form representing the lower limit pulse of the motion range for the specified joint. High-order side 16 bit.
	14		
	｜		
	1		
	0		

	bit	Name	Description
Parameter 3	15	lowerLmit Low-order side	Integer in complement form representing the lower limit pulse of the motion range for the specified joint. Low-order side 16 bit.
	14		
	｜		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

This command specifies the lower limit pulse when setting the pulses separately.

This command functions in combination with Command 801.

To set pulses, execute Command 801 and Command 802, in that order. The settings will be effective after issuing Command 802.

If commands other than Command 802 are issued after this command, setting will be canceled.

Example

When setting – 6000 for the lower limit pulse of the Joint #1 and 7000 for the upper limit pulse.

Command	Response
0321H 0001H FFFFH E890H 0322H 0001H 0000H 1B58H	0321H 0000H 0000H 0322H 0000H 0000H

9.17.3 Command 802: Sets the upper limit pulse value

Defines the upper limit of the permissible working range of the specified joint in pulses.

Command Syntax

	bit	Name	Description
Parameter 1	15	jointNumber	Specifies the joint number by an integer from 1 to 6.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	upperLmit High-order side	Integer in complement form representing the upper limit pulse of the motion range for the specified joint. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	upperLmit Low-order side	Integer in complement form representing the upper limit pulse of the motion range for the specified joint. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

This command specifies the lower limit pulse when setting the pulses separately.

This command functions in combination with Command 801.

To set pulses, execute Command 801 and Command 802, in that order. The settings will be effective after issuing Command 802.

If the last command is not the command No. 801, an error response will be returned.

Example

When setting – 6000 for the lower limit pulse of the Joint #1 and 7000 for the upper limit pulse.

Command	Response

0321H 0001H FFFFH E890H 0322H 0001H 0000H 1B58H	0321H 0000H 0000H 0322H 0000H 0000H

9.17.4 Command 803: Acquires the allowable motion area pulse setting value by specifying the lower and upper limit pulses

Acquires the permissible working range of the specified joint in pulses.

Command Syntax

	bit	Name	Description
Parameter 1	15	jointNumber	Specifies the joint number by an integer from 1 to 6.
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	jointNumber	Specifies the joint number by an integer from 1 to 6.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	lowerLmit High-order side	Integer in complement form representing the lower limit pulse of the motion range for the specified joint. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 3	15	lowerLmit Low-order side	Integer in complement form representing the lower limit pulse of the motion range for the specified joint. Low-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 4	15	upperLmit High-order side	Integer in complement form representing the upper limit pulse of the motion range for the specified joint. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 5	15	upperLmit Low-order side	Integer in complement form representing the upper limit pulse of the motion range for the specified joint. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Description

Acquires the current lower and upper limit pulses of the permissible motion range of the specified joint.

The pulse values are returned in 32-bit two's complement format.

Example

When setting – 6000 for the lower limit pulse of the Joint #1 and 7000 for the upper limit pulse.

Command	Response
0323H 0001H	0323H 000 1 H FFFFH E890H 0000H 1B58H

9.17.5 Command 804: Acquires the allowable motion area pulse setting value by specifying the lower limit pulse

Acquires the lower limit of the permissible working range of the specified joint in pulses.

Command Syntax

	bit	Name	Description
Parameter 1	15	jointNumber	Specifies the joint number by an integer from 1 to 6.
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	jointNumber	Specifies the joint number by an integer from 1 to 6.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	lowerLmit High-order side	Integer in complement form representing the lower limit pulse of the motion range for the specified joint. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 3	15	lowerLmit Low-order side	Integer in complement form representing the lower limit pulse of the motion range for the specified joint. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Description

Acquires the current lower limit pulse of the permissible motion range of the specified joint.

The pulse value is returned in 32-bit two’s complement format.

Example

When setting – 6000 for the lower limit pulse of the Joint #1 and 7000 for the upper limit pulse.

Command	Response
0324H 0001H	0324H 0001H FFFFH E890H

9.17.6 Command 804: Acquires the allowable motion area pulse setting value by specifying the lower limit pulse

Acquires the upper limit of the motion range area setting in pulses.

Command Syntax

	bit	Name	Description
Parameter 1	15	jointNumber	Specifies the joint number by an integer from 1 to 6.
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	jointNumber	Specifies the joint number by an integer from 1 to 6.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	upperLmit High-order side	Integer in complement form representing the upper limit pulse of the motion range for the specified joint. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 3	15	upperLmit Low-order side	Integer in complement form representing the upper limit pulse of the motion range for the specified joint. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Description

Acquires the current upper limit pulse of the permissible motion range of the specified joint.

The pulse value is returned in 32-bit two’s complement format.

Example

When setting – 6000 for the lower limit pulse of the Joint #1 and 7000 for the upper limit pulse.

Command	Response

0325H 0001H	0325H 0001H 0000H 1B58H

9.18 Base Coordinate System Definition

Defines the base coordinate system.

Manipulators have the base coordinate system which cannot be modified. This coordinate system is called “robot coordinate system”. In contrast, the base coordinate system which can change its origin coordinate and be the basis of general local coordinate systems is called “base coordinate system”.

By specifying the origin and the rotation angle of the base coordinate system in relation to the robot absolute coordinate system, you can define the local coordinate system.

To reset the Base coordinate system to default, set “0” to all coordinates. This will make the base coordinate system the same as the robot absolute coordinate system.

Robot parameter data is stored to the memory card in the Controller. Therefore, execution of the command writes to the memory card. Frequent writing to the memory card affects its product life. It is recommended to minimize the execution of the command.

Changing the base coordinate system affects all local definitions

When base coordinates are changed, all local coordinate systems must be re-defined.

9.18.1 Command 850: Defines the Base coordinate system

Defines the base coordinate system.

Command Syntax

	bit	Name	Description
Parameter 1	15	coordinateSelection	Specifies the coordinate. 0=X 1=Y 2=Z 3=U 4=V 5=W
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	specifiedCoordinate High-order word	Specifies the coordinate value (real number) as the value × 1000 converted to a 32-bit integer. X, Y, Z = mm U, V, W = deg High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	specifiedCoordinate Low-order word	Specifies the coordinate value (real number) as the value × 1000 converted to a 32-bit integer. X, Y, Z = mm U, V, W = deg Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Defines the base coordinate system by each coordinate.

If order of coordinates is not proper or another command is executed during the execution of this command, values received at that point will be canceled and an error response will be returned.

- 4-axis manipulator: set the coordinates X, Y, Z, and U.
- 6-axis manipulator: set the coordinates X, Y, Z, U, V, and W.

The value will be returned as fixed-point data which validates to three decimal places.

Also, if the setting value is a negative number, specify the value in 32-bit two's complement.

Example

When defining the origin coordinate of the base coordinate system as X=100 mm and Y=100 mm.

Command	Response
0352H 0000H 0001H 86A0H	0352H 0000H 0000H
0352H 0001H 0001H 86A0H	0352H 0000H 0000H
0352H 0002H 0000H 0000H	0352H 0000H 0000H
0352H 0003H 0000H 0000H	0352H 0000H 0000H
0352H 0004H 0000H 0000H	0352H 0000H 0000H
0352H 0005H 0000H 0000H	0352H 0000H 0000H

9.18.2 Command 851: Acquires the Base coordinate definition

Acquires the base coordinate system definition.

Command Syntax

	bit	Name	Description
	15	coordinateSelection	Specifies the coordinate. 0=X 1=Y 2=Z 3=U
	14		
	|		

	bit	Name	Description
	1		4=V 5=W
	0		

Response Syntax

	bit	Name	Description
Response 1	15	coordinateSelection	Specifies the coordinate. 0=X 1=Y 2=Z 3=U 4=V 5=W
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	specifiedCoordinate High-order word	Specifies the coordinate value (real number) as the value × 1000 converted to a 32-bit integer. X, Y, Z = mm U, V, W = deg High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 3	15	specifiedCoordinate Low-order word	Specifies the coordinate value (real number) as the value × 1000 converted to a 32-bit integer. X, Y, Z = mm U, V, W = deg Low-order side 16 bit.
	14		
	|		
	1		
	0		

Description

Acquires the base coordinate system definition by each coordinate.

The value will be specified as fixed-point data which validates to three decimal places.

Also, if the setting value is a negative number, specify the value in 32-bit two's complement.

Example

When defining the origin coordinate of the base coordinate system as X=100 mm and Y=100 mm.

Acquires X and Y axes.

Command	Response

0353H 0000H 0353H 0001H	0353H 0000H 0001H 86A0H 0353H 0001H 0001H 86A0H

9.19 Local number setting

These commands are used to set the local number for a point at motion command execution.

By specifying the valid local number using this command, points will function as local coordinates in subsequent motion commands.

Available numbers are from 1 to 15. Specifying “0” disables the setting.

This setting cannot be kept when the Controller’s power is turned off. Default is “0” (invalid).

⚠ CAUTION

Once the local numbers are specified, all points function as specified local coordinates.

9.19.1 Command 900: Sets the Local coordinate number

Specifies the local number to be used.

Command Syntax

	bit	Name	Description
Parameter 1	15	localNumber	Specifies the local coordinate number to use. 0 = use no local coordinate 1 – 15 = use the specified local coordinate
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Specifies the local number to be used.

Specifying the number other than 0 makes the coordinate function in the specified local coordinate.

Example

When setting the local coordinate number 1.

Command	Response
0384H 0001H	0384H 0000H 0000H

9.19.2 Command 901: Acquires the setting status of the Local coordinate system number

Acquires the current local setting.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
Response 1	15	localNumber	Specifies the local coordinate number to use. 0 = use no local coordinate 1 – 15 = use the specified local coordinate
	14		
	|		
	1		
	0		

Description

Acquires the current local setting.

Example

When setting the local coordinate number 1.

Command	Response
0385H	0385H 0001H

9.20 Sense Condition Settings

These commands are used to specify and display an input condition that, if satisfied, completes the Jump, Jump3, and Jump3CP in progress by stopping the robot above the target position.

Sense is used to stop approach motion during a Jump, Jump3, and Jump3CP instructions.

Settable condition is ON/OFF of one bit I/O.

- Jump with Sense Modifier
  Checks if the current Sense condition is satisfied. If satisfied, the Jump instruction completes with the manipulator stopped above the target position. That is, when the Sense Condition is True, the manipulator arm remains just above the target position without executing approach motion. When the Sense condition is False, the manipulator arm completes the full Jump instruction motion through to the target position.

- Jump, Jump3, Jump3CP with Sense Modifier
  Checks if the current Sense condition is satisfied. If satisfied, the Jump, Jump3, and Jump3CP instructions complete with the manipulator stopped above the target position.

- Sense Setting at Main Power On
  Default value in this interface is not registered. If the motion command is issued while Sense is specified with being undefined, an error response will be returned and the command will not be executed.

9.20.1 Command 950: Sets the condition for using Sense with command 2002 and 2003

Sets the Sense condition.

Command Syntax

	bit	Name	Description
Parameter 1	15	I/O number (bit)	Specifies the bit I/O number to be used to the input condition.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	reserved	Specify “0”.
	|		
	2		
	1	I/O type	0 = I/O 1 = memory I/O
	0	logic	Specifies the logic to satisfy the condition 0 or 1

Response Syntax

Refer to the following.

Response Codes

Description

Specifies the bit I/O number to be used for the input condition and the logic to meet the condition.

Example

When setting the condition under the timing when port number 100 turns ON.

Command	Response
03B6H 0064H 0001H	03B6H 0000H 0000H

9.20.2 Command 951: Acquires the condition for using Sense with command 2002 and 2003

Acquires the Sense condition.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
Response 1	15	registrationStatus	Returns the registration status. 0 = not registered 1 = registered
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	I/O number (bit)	Returns the bit I/O number. 0 = not registered
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 3	15	reserved	Returns “0”.
	|		
	2		
	1	I/O type	0 = I/O 1 memory I/O
	0	logic	Returns the logic to conclude the condition. 0 = OFF (not registered) 1 = ON

Description

Acquires the sense condition.

Example

When setting the condition under the timing when port number 100 turns ON.

Command	Response
03B7H	03B7H 0001H 0064H 0001H

When not registered.

Command	Response
03B7H	03B7H 0000H 0000H 0000H

9.20.3 Command 952: Acquires the status of condition satisfaction

Acquires whether the Sense condition is detected or not.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
Response 1	15	status	0 = not satisfied 1 = satisfied
	14		
	|		
	1		
	0		

Description

Acquires whether the Sense condition is detected when the motion command is executed with the Sense option specified.

This command is available when the Sense condition is set.

Example

When the Sense condition is satisfied.

Command	Response
03B8H	03B8H 0001H

9.21 Find Setting

Specifies the condition to store coordinates during motion.

Settable condition is ON/OFF of one bit I/O.

Coordinates can be saved when the condition is satisfied while the Find option is specified at motion command execution.

After the motion command with option, command to acquire the condition satisfaction status is prepared. If the condition is met, the manipulator can move to the coordinate position of the condition satisfaction by setting the saved coordinate to the point by point edit command and executing the motion command.

Example: when executing the PTP motion to P0 by Find specification and move to the saved coordinate in PTP motion.

- Move to P0 as Local coordinate 1.
- Set the save coordinate to P1.
- Specify P1 to the destination and move to the saved point by Go command.

Command		Description
No.	Code	
900	0384H 0001H	Sets the destination of the motion command as Local coordinate 1 by Local number setting command.

Command		Description
No.	Code	
1000	03E8H 0000H 0001H	Sets the condition as I/O number = 0, logic = ON by Find condition setting command.
2000	07D0H 8000H 0000H	Specifies the Find option for Go command and move to P0.
1002	03EAH	Acquires the status by an acquisition command for Find condition satisfaction.
1221	04C5H 0001H	Sets the coordinate acquired by the point edit command to P1.
900	0384H 0000H	Disables the option which sets the destination of the motion command as Local coordinate 1 by Local number setting command.
2000	07D0H 0000H 0001H	Executes the motion with P1 as the destination of Go command.

CAUTION

- Coordinates which Find saves are the robot coordinates. To execute the movement to the acquired coordinate, use the robot coordinate.
- Execute the motion command with Local number setting (900) disabled.

9.21.1 Command 1000: Sets the condition for using Find with command 2001, 2002, and 2003

Specifies the condition to store coordinates during motion.

Command Syntax

	bit	Name	Description
Parameter 1	15	I/O number (bit)	Specifies the bit I/O number to be used to the input condition.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	reserved	Specify “0”
	|		
	2		
	1	I/O type	0 = I/O 1 = memory I/O

Response Syntax

Refer to the following.

Response Codes

Description

Specifies the bit I/O number to be used for the input condition and the logic to meet the condition.

Example

When setting the condition under the timing when port number 100 turns ON.

Command	Response
03E8H 0064H 0001H	03E8H 0000H 0000H

9.21.2 Command 1001: Acquires the condition for using Find with command 2001, 2002, and 2003

Acquires the condition to store coordinates during motion.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
Response 1	15	registrationStatus	Returns the registration status. 0 = not registered 1 = registered
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	I/O number (bit)	Returns the bit I/O number. 0 = not registered
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 3	15	reserved	Returns “0”
	|		
	2		

	bit	Name	Description
	1	I/O type	0 = I/O 1 = memory I/O
	0	logic	Returns the logic to conclude the condition. 0 = OFF 1 = ON

Description

Acquires the condition.

Example

When setting the condition under the timing when port number 100 turns ON.

Command	Response
03E9H	03E9H 0001H 0064H 0001H

When not registered.

Command	Response
03E9H	03E9H 0000H 0000H 0000H

9.21.3 Command 1002: Acquires the status of condition satisfaction

Acquires the status whether the Find condition is met and the coordinate is saved.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
Response 1	15 14 | 1 0	status	Returns the status whether the condition is met during the execution of motion command specified by Find and the coordinate is saved. 0 = condition not met 1 = condition is met and the coordinate is saved

Description

Acquires the status of condition satisfaction during the execution of motion command specified with Find.

Example

When the condition is met and the coordinate is stored.

Command	Response

03EAH	03EAH 0001H

When the condition is not met.

Command	Response
03EAH	03EAH 0000H

9.22 Till Condition Setting

These commands are used to specify and display an input condition that, if satisfied, completes the motion command (Jump, Go, Move, etc.) in progress by decelerating and stopping the robot at an intermediate position.

Settable condition is ON/OFF of one bit I/O.

Command to confirm whether the condition is satisfied after executing the motion command which specified Till option is also provided.

- Till Setting at Main Power On
  Default value in this interface is not registered. If the motion command is issued while Till is specified with being undefined, an error response will be returned and the command will not be executed.

9.22.1 Command 1050: Sets the condition for using Till with motion commands

Specifies the condition to terminate the process during the motion command execution.

Command Syntax

	bit	Name	Description
Parameter 1	15	I/O number (bit)	Specifies the bit I/O number to be used to the input condition.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	reserved	Specify “0”
	|		
	2		
	1	I/O type	0 = I/O 1 = memory I/O
	0	logic	Specifies the logic to satisfy the condition 0 or 1

Response Syntax

Refer to the following.

Response Codes

Description

Specifies the bit I/O number to be used for the input condition and the logic to meet the condition.

Example

When setting the condition under the timing when port number 100 turns ON.

Command	Response
041AH 0064H 0001H	041AH 0000H 0000H

9.22.2 Command 1051: Acquires the condition for using Till with motion commands

Acquires the condition to terminate the process during the motion command execution.

Command Syntax

No parameter

Response Syntax

<table>
<tr><th></th><th>bit</th><th>Name</th><th>Description</th></tr>
<tr><td rowspan="5">Response 1</td><td>15</td><td rowspan="5">registrationStatus</td><td rowspan="5">Returns the registration status.
0 = not registered
1 = registered</td></tr>
<tr><td>14</td></tr>
<tr><td>｜</td></tr>
<tr><td>1</td></tr>
<tr><td>0</td></tr>
</table>

<table>
<tr><th></th><th>bit</th><th>Name</th><th>Description</th></tr>
<tr><td rowspan="5">Response 2</td><td>15</td><td rowspan="5">I/O number (bit)</td><td rowspan="5">Returns the bit I/O number.
0 = not registered</td></tr>
<tr><td>14</td></tr>
<tr><td>｜</td></tr>
<tr><td>1</td></tr>
<tr><td>0</td></tr>
</table>

<table>
<tr><th></th><th>bit</th><th>Name</th><th>Description</th></tr>
<tr><td rowspan="4">Response 3</td><td>15</td><td rowspan="3">reserved</td><td rowspan="3">Returns “0”</td></tr>
<tr><td>｜</td></tr>
<tr><td>2</td></tr>
<tr><td>1</td><td>I/O type</td><td>0 = I/O
1 = memory I/O</td></tr>
</table>

	0	logic	Returns the logic to conclude the condition. 0 = OFF 1 = ON

Description

Acquires the condition.

Example

When setting the condition under the timing when port number 100 turns ON.

Command	Response
041BH	041BH 0001H 0064H 0001H

When not registered.

Command	Response
041BH	041BH 0000H 0000H 0000H

9.22.3 Command 1052: Acquires the status of condition satisfaction

Acquires the status of condition detection during the motion command executed by Till.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
Response 1	15	status	Returns the status whether the condition is met during the motion command executed which specified Till. 0 = condition not met 1 = satisfied
	14		
	|		
	1		
	0		

Description

Acquires the status of condition satisfaction during the execution of motion command executed by Till.

Example

When the condition is met and the coordinate is stored.

Command	Response
041CH	041CH 0001H

When the condition is not met.

Command	Response

041CH	041CH 0000H

9.23 CP Control

These commands are used to set CP (Continuous Path) motion.

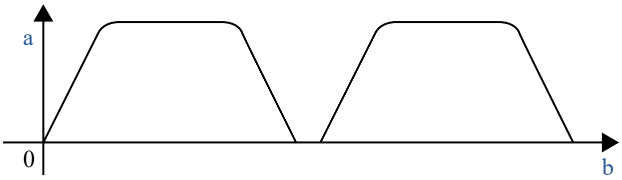
CP (Continuous Path) motion can be used for the following commands:

Arc, Arc3, Go, Jump, Jump3, Jump3CP, Move

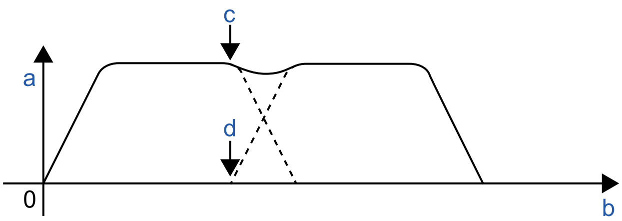
When CP is On, each motion command executes the next statement as deceleration starts. Continuous path motion will continue regardless of whether the CP parameter is specified in each motion command or not.

When CP is Off, this function is active only when the CP parameter is specified in each motion command.

- Normal Motion



- Path Motion



Symbol	Description
a	speed
b	time
c	Start deceleration
d	Start acceleration

When CP is On, path motion will continue without full deceleration between two CP motion (Arc, Arc3, Jump3, Jump3CP, Move), or two PTP motion (Go, Jump). In contrast, full deceleration will occur between a CP motion and a PTP motion.

In the following cases, CP is Off.

- Controller startup
- Reset
- All task stop
- Switching the Auto / Programming operation mode
- Motor On
- SFree, SLock are executed

9.23.1 Command 1100: Control the CP

Sets CP (Continuous Path) motion.

Command Syntax

	bit	Name	Description
Parameter 1	15	control	Specify whether to enable or disable the path motion. 1 = enable 0 = disable
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Specify whether to enable or disable the path motion.

Example

When the path motion is enabled.

Command	Response
044CH 0001H	044CH 0000H 0000H

9.23.2 Command 1101: Acquires the CP control state

Acquires the current CP motion setting.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
Response 1	15	status	Returns whether the path motion is enabled or disabled. 1 = enable 0 = disable
	14		
	|		
	1		
	0		

Description

Acquires the current path motion setting.

Example

When the path motion is enabled.

Command	Response
044DH	044DH 0001H

9.24 Power Control

These commands are used to switch Power Mode to high or low and display the current status.

mode	Description
Low	When Power is set to Low, Low Power Mode is On. This means that the manipulator runs slow (below 250 mm/sec) and the servo stiffness is set light so as to remove servo power if the robot bumps into an object.
High	When Power is set to High, Low Power Mode is Off. This means that the manipulator runs at full speed with the full servo stiffness.

The following operations switch the mode to low power mode. In this case, speed and acceleration settings will be limited to default values. For details of the default values, refer to the specification in each manipulator manual.

Refer to the following.

"User's Guide - Safety"

- Conditions to Cause Power Low
  - Controller's power is turned ON
  - Motor On is executed
  - SFree, SLock, and Brake are executed
  - Reset and Reset Error are executed
  - All tasks are aborted by STOP button or Quit All.
- Values Limited
  - Speed
  - Accel
  - SpeedS
  - AccelS
- Low Power Mode (Power Low) and Its Effect on Max Speed:
  In low power mode, motor power is limited, and effective motion speed setting is lower than the default value. If a higher speed is specified from the Command window (directly) or in a program in Low Power mode, the speed is set to the default value. If a higher speed motion is required, set Power High.
- High Power Mode (Power High) and Its Effect on Max Speed:
  In high power mode, higher speeds than the default value can be set.

9.24.1 Command 1150: Controls the Power

Sets the power mode.

Command Syntax

	bit	Name	Description
Parameter 1	15	control	Sets the power mode to High or Low. 1 = High
	14		

	bit	Name	Description
	|		0 = Low
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Sets the power mode to High or Low.

Example

When the power mode is High.

Command	Response
047EH 0001H	047EH 0000H 0000H

9.24.2 Command 1151: Acquires the Power control state

Acquires the status of power mode.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
Response 1	15	control	Returns the current status. 1 = Power High 0 = Power Low
	14		
	|		
	1		
	0		

Description

Returns the current status of power mode.

Example

When the power mode is High.

Command	Response
047FH	047FH 0001H

9.25 Point Editing

Edits the specified point (coordinate, flag) or acquires the status of the point (coordinate, flag).

The commands can edit the points as follows:

- Sets the current manipulator position to the specified point.
- Offsets the coordinate value of the specified point.
- Sets the coordinate value to the specified point.
- Sets the point to the specified point
- Sets and acquires the Hand orientation of the specified point.
- Sets and acquires the Elbow orientation of the specified point.
- Sets and acquires the Wrist orientation of the specified point.
- Sets and acquires j4flag of the specified point.
- Sets and acquires j6flag of the specified point.
- Sets and acquires the Local number of the specified point.
- Sets the coordinate stored by Find to the specified point.
- Acquires the coordinate of the specified point.

9.25.1 Command 1200: Sets the current manipulator position to the specified point

Sets the current manipulator position to the point.

Command Syntax

	bit	Name	Description
Parameter 1	15	pointNumber	Specifies the point number.
	14		
	⏐		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Sets the current manipulator position to the specified point.

Example

When setting the current position to P1.

Command	Response
04B0H 0001H	04B0H 0000H 0000H

9.25.2 Command 1201: Adjusts two coordinates to the specified point

Offsets the specified coordinate value and sets it to the coordinate of specified axes.

Specifies two axes.

Command Syntax

	bit	Name	Description
Parameter 1	15	pointNumber	Specifies the point number.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	toolOffset	Specify whether to offset in tool offset or not. 0: Normal 1: Tool offset
	14	reserved	Specify “0”
	|		
	7		
	6	coordinate 2 specification	Specifies the second coordinate axis. 0: X axis 1: Y axis 2: Z axis 3: U axis 4: V axis 5: W axis
	5		
	4		
	3	reserved	Specify “0”
	2	coordinate 1 specification	Specifies the first coordinate axis. 0: X axis 1: Y axis 2: Z axis 3: U axis 4: V axis 5: W axis
	1		
	0		

	bit	Name	Description
Parameter 3	15	coordinate1 High-order side	Specifies the coordinate value (real number) as the value × 1000 converted to a 32-bit integer. X, Y, Z = mm U, V, W = deg
	14		
	|		
	1		

	bit	Name	Description
	0		High-order side 16 bit.

	bit	Name	Description
Parameter 4	15	coordinate1 Low-order side	Specifies the coordinate value (real number) as the value × 1000 converted to a 32-bit integer. X, Y, Z = mm U, V, W = deg Low-order side 16 bit.
	14		
	¦		
	1		
	0		

	bit	Name	Description
Parameter 5	15	coordinate1 High-order side	Specifies the coordinate value (real number) as the value × 1000 converted to a 32-bit integer. X, Y, Z = mm U, V, W = deg High-order side 16 bit.
	14		
	¦		
	1		
	0		

	bit	Name	Description
Parameter 6	15	coordinate1 Low-order side	Specifies the coordinate value (real number) as the value × 1000 converted to a 32-bit integer. X, Y, Z = mm U, V, W = deg Low-order side 16 bit.
	14		
	¦		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Offsets the specified coordinate value and sets it to the coordinate of specified axes.

Setting value should be specified as fixed-point data which validates to three decimal places.

Also, if the setting value is a negative number, specify the value in 32-bit two’s complement.

When tool offset is selected in the 15th bit of Parameter 2, offsetting will be done by tool coordinate system.

Example

When offsetting 20 mm in X-axis direction and -100.003 mm in Y-axis direction for P1.

Specify X axis direction to Coordinate 1 and Y axis to Coordinate 2.

Command	Response
04B1H 0010H 0000H 4E20H FFFEH 795DH	04B1H 0000H 0000H

When offsetting 20 mm in X-axis direction and -100.003 mm in Y-axis direction by tool offset.

Specify X axis direction to Coordinate 1 and Y axis to Coordinate 2.

Command	Response
04B1H 8010H 0000H 4E20H FFFEH 795DH	04B1H 0000H 0000H

* Select tool offset in the 15th bit of Parameter 2.

9.25.3 Command 1202: Adjusts the specified coordinate to the specified point

Offsets the specified coordinate value and sets it to the coordinate of specified axes.

Specifies one axis.

Command Syntax

	bit	Name	Description
Parameter 1	15	pointNumber	Specifies the point number.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	toolOffset	Specifies whether to offset in tool offset or not. 0: Normal 1: Tool offset
	14	reserved	Specify “0”
	|		
	3		
	2	coordinate 1 specification	Specifies the first coordinate axis. 0: X axis 1: Y axis 2: Z axis 3: U axis 4: V axis 5: W axis
	1		
	0		

	bit	Name	Description
Parameter 3	15	coordinate1 High-order side	Specifies the coordinate value (real number) as the value × 1000 converted to a 32-bit integer. X, Y, Z = mm U, V, W = deg High-order side 16 bit.
	14		
	︱		
	1		
	0		

	bit	Name	Description
Parameter 4	15	coordinate1 Low-order side	Specifies the coordinate value (real number) as the value × 1000 converted to a 32-bit integer. X, Y, Z = mm U, V, W = deg Low-order side 16 bit.
	14		
	︱		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Offsets the specified coordinate value and sets it to the coordinate of specified axes.

Setting value should be specified as fixed-point data which validates to three decimal places.

Also, if the setting value is a negative number, specify the value in 32-bit two's complement.

When tool offset is selected in the 15th bit of Parameter 2, offsetting will be done by tool coordinate system.

Example

When offsetting 20 mm in X-axis direction for P1.

Command	Response
04B2H 0000H 0000H 4E20H	04B2H 0000H 0000H

When offsetting −100.003 mm in Y-axis direction for P1 by tool offset.

Command	Response
04B2H 8001H FFFEH 795DH	04B2H 0000H 0000H

* Select tool offset in the 15th bit of Parameter 2.

9.25.4 Command 1203: Sets two coordinates to the specified point

Sets the specified coordinate value to the coordinate of specified axes.

Specifies two axes.

Command Syntax

	bit	Name	Description
Parameter 1	15	pointNumber	Specifies the point number.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	reserved	Specify “0”
	|		
	7		
	6	coordinate 2 specification	Specifies the second coordinate axis. 0: X axis 1: Y axis 2: Z axis 3: U axis 4: V axis 5: W axis
	5		
	4		
	3	reserved	Specify “0”
	2	coordinate 1 specification	Specifies the first coordinate axis. 0: X axis 1: Y axis 2: Z axis 3: U axis 4: V axis 5: W axis
	1		
	0		

	bit	Name	Description
Parameter 3	15	coordinate1 High-order side	Specifies the coordinate value (real number) as the value × 1000 converted to a 32-bit integer. X, Y, Z = mm U, V, W = deg High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	coordinate1 Low-order side	Specifies the coordinate value (real number) as the value × 1000 converted to a 32-bit integer. X, Y, Z = mm U, V, W = deg Low-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 5	15	coordinate1 High-order side	Specifies the coordinate value (real number) as the value × 1000 converted to a 32-bit integer. X, Y, Z = mm U, V, W = deg High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 6	15	coordinate1 Low-order side	Specifies the coordinate value (real number) as the value × 1000 converted to a 32-bit integer. X, Y, Z = mm U, V, W = deg Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Sets the specified coordinate value to the coordinate of specified axes.

Setting value should be specified as fixed-point data which validates to three decimal places.

Also, if the setting value is a negative number, specify the value in 32-bit two’s complement.

Example

When offsetting 20 mm in X-axis direction and −100.003 mm in Y-axis direction for P1.

Specify X axis direction to Coordinate 1 and Y axis to Coordinate 2.

Command	Response
04B3H 0010H 0000H 4E20H FFFEH 795DH	04B3H 0000H 0000H

9.25.5 Command 1204: Sets the specified coordinate to the specified point

Sets the specified coordinate value to the coordinate of specified axes.

Specifies one axis.

Command Syntax

	bit	Name	Description
Parameter 1	15	pointNumber	Specifies the point number.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	reserved	Specify “0”
	|		
	3		
	2	coordinate 1 specification	Specifies the first coordinate axis. 0: X axis 1: Y axis 2: Z axis 3: U axis 4: V axis 5: W axis
	1		
	0		

	bit	Name	Description
Parameter 3	15	coordinate1 High-order side	Specifies the coordinate value (real number) as the value × 1000 converted to a 32-bit integer. X, Y, Z = mm U, V, W = deg High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	coordinate1 Low-order side	Specifies the coordinate value (real number) as the value × 1000 converted to a 32-bit integer. X, Y, Z = mm U, V, W = deg Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Sets the specified coordinate value to the coordinate of specified axes.

Setting value should be specified as fixed-point data which validates to three decimal places.

Also, if the setting value is a negative number, specify the value in 32-bit two’s complement.

Example

When setting -100.003 mm to Y axis of P1.

Command	Response
04B4H 0001H FFFEH 795DH	04B4H 0000H 0000H

9.25.6 CCommand 1205: Adjusts the coordinate to the specified point

Copies the specified point to the other point.

Command Syntax

	bit	Name	Description
Parameter 1	15	copyDestination pointNumber	Specifies the point number of the copy destination.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	copySource pointNumber	Specifies the point number of the copy source.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Copies the content of the point specified in Parameter 2 to the point specified in Parameter 1.

This command can be used to copy the point as a point for work piece and specify the offset point as the destination of the motion command while keeping the copy source point data.

Example When copying Point 2 to Point 1.

Command	Response
04B5H 0001H 0002H	04B5H 0000H 0000H

9.25.7 Command 1206: Sets the hand orientation of the specified point to Righty

Sets the hand orientation of the specified point to Righty.

Command Syntax

	bit	Name	Description
Parameter 1	15	pointNumber	Specifies the point number.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Sets the hand orientation of the specified point to Righty.

Example

When setting the hand orientation of the specified point to Righty.

Command	Response
04B6H 000AH	04B6H 0000H 0000H

9.25.8 Command 1207: Sets the hand orientation of the specified point to Lefty

Sets the hand orientation of the specified point to Lefty.

Command Syntax

	bit	Name	Description
Parameter 1	15	pointNumber	Specifies the point number.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Sets the hand orientation of the specified point to Lefty.

Example

When setting the hand orientation of P10 to Righty.

Command	Response
04B7H 000AH	04B7H 0000H 0000H

9.25.9 Command 1208: Sets the elbow orientation of the specified point to ABOVE

Sets the elbow orientation of the specified point to ABOVE.

Command Syntax

	bit	Name	Description
Parameter 1	15	pointNumber	Specifies the point number.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Sets the elbow orientation of the specified point to ABOVE.

Example

When setting the elbow orientation of P10 to ABOVE.

Command	Response
04B8H 000AH	04B8H 0000H 0000H

9.25.10 Command 1209: Sets the elbow orientation of the specified point to BELOW

Sets the elbow orientation of the specified point to BELOW.

Command Syntax

	bit	Name	Description
Parameter 1	15	pointNumber	Specifies the point number.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Sets the elbow orientation of the specified point to BELOW.

Example

When setting the elbow orientation of P10 to BELOW.

Command	Response
04B9H 000AH	04B8H 0000H 0000H

9.25.11 Command 1210: Sets the wrist orientation of the specified point to FLIP

Sets the wrist orientation of the specified point to FLIP.

Command Syntax

	bit	Name	Description
Parameter 1	15	pointNumber	Specifies the point number.
	14		
	|		
	1		

	bit	Name	Description
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Sets the wrist orientation of the specified point to FLIP.

Example

When setting the wrist orientation of P10 to FLIP.

Command	Response
04BAH 000AH	

9.25.12 Command 1211: Sets the wrist orientation of the specified point to NOFLIP

Sets the wrist orientation of the specified point to NOFLIP.

Command Syntax

	bit	Name	Description
Parameter 1	15	pointNumber	Specifies the point number.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Sets the wrist orientation of the specified point to NOFLIP.

Example

When setting the wrist orientation of P10 to NOFLIP.

Command	Response
04BBH 000AH	04BBH 0000H 0000H

9.25.13 Command 1212: Sets the j4flag value of the specified point

Specifies j4flag of the specified point.

Command Syntax

	bit	Name	Description
Parameter 1	15	pointNumber	Specifies the point number.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	flagValue	Specifies the flag value. 0: J4F0 1: J4F1
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description Specifies j4flag of the specified point.

Example

When setting J4F1 to P10.

Command	Response
04BCH 000AH 0001H	04BCH 0000H 0000H

9.25.14 Command 1213: Sets the j6flag value of the specified point

Specifies j6flag of the specified point.

Command Syntax

	bit	Name	Description
Parameter 1	15	pointNumber	Specifies the point number.
	14		
	|		

	bit	Name	Description
	1		
	0		

	bit	Name	Description
Parameter 2	15	flagValue	Specifies the flag value. 0: J6F0 | 127: J6F127
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Specifies j6flag of the specified point.

Example

When setting J6F127 to P10.

Command	Response
04BDH 000AH 007FH	04BDH 0000H 0000H

9.25.15 Command 1214: Sets the Local number to the specified point

Specifies the Local number to the specified point.

Command Syntax

	bit	Name	Description
Parameter 1	15	pointNumber	Specifies the point number.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	localCoordinate conversion	Specify whether to convert the local coordinate. 0 = not convert 1 = convert
	14		
	|		
	4	reserved	Specify “0”
	3	localNumber	Specifies the local number by a value from 1 to 15.
	2		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Sets the Local number to the specified point.

Difference by specifying the local coordinate conversion.

- Selecting “not convert”: the coordinate becomes local.
- Selecting “convert”: the coordinate will be converted to the local coordinate.

Example

When setting the local number 15 without converting P1 to the local coordinate.

Command	Response
04BEH 0001H 000FH	04BEH 0000H 0000H

9.25.16 Command 1215: Acquires the hand orientation of the specified point

Acquires the hand orientation of the specified point

Command Syntax

	bit	Name	Description
Parameter 1	15	pointNumber	Specifies the point number.
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	handOrientation	Returns the current hand orientation. 0 = Lefty 1 = Righty
	14		
	|		
	1		
	0		

Description

Acquires the hand orientation of the specified point.

Example

When the hand orientation of P0 is Righty.

Command	Response
04BFH 0000H	04BFH 0001H

9.25.17 Command 1216: Acquires the elbow orientation of the specified point

Acquires the elbow orientation of the specified point.

Command Syntax

	bit	Name	Description
Parameter 1	15	pointNumber	Specifies the point number.
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	elbowOrientation	Returns the current elbow orientation. 0 = Above 1 = Below
	14		
	|		
	1		
	0		

Description

Acquires the elbow orientation of the specified point.

Example

When the elbow orientation of P0 is Below.

Command	Response
04C0H 0000H	04C0H 0001H

9.25.18 Command 1217: Acquires the wrist orientation of the specified point

Acquires the wrist orientation of the specified point.

Command Syntax

	bit	Name	Description
Parameter 1	15	pointNumber	Specifies the point number.
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	wristOrientation	Returns the current wrist orientation. 0 = NoFlip 1 = Flip
	14		
	|		
	1		
	0		

Description

Acquires the wrist orientation of the specified point.

Example When the wrist orientation of P0 is Flip.

Command	Response
04C1H 0000H	04C1H 0001H

9.25.19 Command 1218: Acquires the j4flag value of the specified point

Acquires the j4flag value of the specified point.

Command Syntax

	bit	Name	Description
Parameter 1	15	pointNumber	Specifies the point number.
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	J4flag	Returns the setting value of j4flag. 0 = J4F0 1 = J4F1
	14		
	|		
	1		
	0		

Description

Acquires the j4flag value of the specified point.

Example

When j4flag is J4F1.

Command	Response
04C2H 0000H	04C2H 0001H

9.25.20 Command 1219: Acquires the j6flag value of the specified point

Acquires the j6flag value of the specified point.

Command Syntax

	bit	Name	Description
Parameter 1	15	pointNumber	Specifies the point number.
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	j6flag	Returns the setting value of j6flag. 0 = J6F0 | 127 = J6F127
	14		
	|		
	1		
	0		

Description Acquires the j6flag value of the specified point.

Example When j6flag is J6F127.

Command	Response
04C3H 0000H	04C3H 007FH

9.25.21 Command 1220: Acquires the Local number of the specified point

Acquires the local number of the specified point.

Command Syntax

	bit	Name	Description
Parameter 1	15	pointNumber	Specifies the point number.
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	localNumber	Returns the local number “0” means that the local number is not set.
	14		
	|		
	1		
	0		

Description

Acquires the local number of the specified point.

Example

When the local number 15 is set to P0.

Command	Response

04C4H 0000H	04C4H 000FH

9.25.22 Command 1221: Sets the coordinate recorded by Find to the specified point

Sets the coordinate recorded by Find to the specified point.

Command Syntax

	bit	Name	Description
Parameter 1	15	pointNumber	Specifies the point number.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

This command is available only when the condition is satisfied in the execution of command which specified Find. Check the status of condition by command No. 1002 and execute this command only when the condition is satisfied.

Refer to the following for details.
Setting Commands - Find Condition Setting

Example

When setting the coordinate to P100.

Command	Response
04C5H 0064H	04C5H 0000H 0000H

9.25.23 Command 1222: Acquires the coordinate of the specified point

Acquires the coordinate of the specified point.

Command Syntax

	bit	Name	Description
Parameter 1	15	pointNumber	Specifies the point number.
	14		
	|		
	1		

	bit	Name	Description
	0		

	bit	Name	Description
Parameter 2	15	axisSelection	Select the axis to acquire the coordinate. 0: X axis 1: Y axis 2: Z axis 3: U axis 4: V axis 5: W axis
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	coordinate High-order side	Specifies the coordinate value (real number) as the value × 1000 converted to a 32-bit integer. X, Y, Z = mm U, V, W = deg High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	coordinate Low-order side	Specifies the coordinate value (real number) as the value × 1000 converted to a 32-bit integer. X, Y, Z = mm U, V, W = deg Low-order side 16 bit.
	14		
	|		
	1		
	0		

Description

Acquires the coordinate of the specified point.

The value will be returned as fixed-point data which validates to three decimal places.

Also, if the setting value is a negative number, the value is returned in 32-bit two’s complement.

Example

When acquring the Y axis when P1 is X: 0.000 Y: 495.336 Z: 246.281 U: 90.000

Command	Response
04C6H 0001H	04C6H 0007H 8EE8H

9.25.24 Command 1223: Sets the J1flag

Sets the J1flag attribute for the specified point.

Available for 6-axis manipulators.

Command Syntax

	bit	Name	Description
Parameter 1	15	pointNumber	Specifies the point number.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	attribute	0 (/J1F0) J1 range: from −90 to +270 (unit: degree) 1 (/J1F1) J1 range: from −270 to −90, or from +270 to +450 (unit: degree)
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

J1Flag attribute specifies the value range of the Joint #1 for one point.

Example

When setting /J1F1 to P1.

Command	Response
04C7H 0001H 0001H	04C7H 0000H 0000H

9.25.25 Command 1224: Acquires the status of J1flag

Acquires the J1flag attribute of the specified point.

Available for 6-axis manipulators.

Command Syntax

	bit	Name	Description
Parameter 1	15	pointNumber	Specifies the point number.
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	attribute	0 (/J1F0) 1 (/J1F1)
	14		
	|		
	1		
	0		

Example

Acquires the attribute of P1.

When the attribute is set to 1 (/J1F1):

Command	Response
04C8H 0001H	04C8H 0001H

9.25.26 Command 1225: Sets the J2flag

Specifies the J2flag attribute for the specified point.

Available for 6-axis manipulators.

Command Syntax

	bit	Name	Description
Parameter 1	15	pointNumber	Specifies the point number.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15 14 ｜ 1 0	attribute	0 (/J2F0) J2 range: from −180 to +180 (unit: degree) 1 (/J2F1) J2 range: from −360 to −180, or from +180 to +360 (unit: degree)

Response Syntax

Refer to the following.

Response Codes Command

Description

J2Flag attribute specifies the value range of the Joint #2 for one point.

Example

When setting /J2F1 to P1.

Command	Response
04C9H 0001H 0001H	04C9H 0000H 0000H

9.25.27 Command 1226: Acquires the status of J2flag

Acquires the J2flag attribute for the specified point.

Available for 6-axis manipulators.

Command Syntax

	bit	Name	Description
Parameter 1	15 14 ｜ 1 0	pointNumber	Specifies the point number.

Response Syntax

	bit	Name	Description
Response 1	15 14 ｜ 1	attribute	0 (/J2F0) 1 (/J2F1)

	bit	Name	Description
	0		

Example

Acquires the attribute of P1.

When the attribute is set to 1 (/J2F1):

Command	Response
04CAH 0001H	04CAH 0001H

9.25.28 Command 1227: Sets the J1angle attribute of the point

Specifies J1angle attribute of the point.

Command Syntax

	bit	Name	Description
Parameter 1	15 14 | 1 0	Option	0 = omit the setting value 1 = use the setting value If “0= omit the setting value” is selected, Parameter 3 and 4 are not necessary.

	bit	Name	Description
Parameter 2	15 14 | 1 0	pointNumber	Specify the point number.

	bit	Name	Description
Parameter 3	15 14 | 1 0	setValue High-order side	Specify the real value by increasing the value thousandfold and converting it to the 32-bit integer.

	bit	Name	Description
Parameter 4	15	setValue Low-order side	Specify the real value by increasing the value thousandfold and converting it to the 32-bit integer.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

J1Angle attribute is only available for RS series manipulators. The attribute specifies the Joint #1 angle in singularity where X coordinate and Y coordinate are both “0”.

J1Angle attribute value is not effective in the points without singularity.

Example

When omitting the setting value: Specify the P1 attribute

Command	Response
04CBH 0000H 0001H	04CBH 0000H 0000H

When using the setting value: Specify 2.001 to P1

Command	Response
04CBH 0001H 0001H 0000H 07D1H	04CBH 0000H 0000H

9.25.29 Command 1228: Acquire the J1angle attribute of the point

Acquires J1angle attribute of the point.

Command Syntax

	bit	Name	Description
Parameter 1	15	pointNumber	Specifies the point number.
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	attribute High-order side	Specify the real value by increasing the value thousandfold and converting it to the 32-bit integer.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	attribute Low-order side	Specify the real value by increasing the value thousandfold and converting it to the 32-bit integer.
	14		
	|		
	1		
	0		

Description

Returns the real value of Joint #1 angle in singularity where X coordinate and Y coordinate are both “0”.

Example

When the P1 attribute is set to 1.002:

Command	Response
04CCH 0001H	04CCH 0000H 03EAH

9.26 LimZ

These commands are used to determine the default value of the Z joint height for Jump commands.

LimZ determines the maximum Z joint height which the arm move to when using the Jump instruction, wherein the manipulator arm raises on the Z joint, moves in the X-Y plane, then lowers on the Z joint. LimZ is simply a default Z joint value used to define the Z joint ceiling position for use during motion caused by the Jump instruction. When a specific LimZ value is not specified in the Jump instruction, the last LimZ setting is used for the Jump instruction.

Resetting LimZ to 0

Restarting the controller, or executing the SFree, SLock, Motor On commands will initialize LimZ to 0.

LimZ Value is Not Valid for Arm, Tool, or Local Coordinates

LimZ Z joint height limit specification is the Z joint value for the robot coordinate system. It is not the Z joint value for Arm, Tool, or Local coordinates. Therefore, take the necessary precautions when using tools or end effectors with different operating heights.

LimZ does not affect Jump3 and Jump3CP

LimZ has no effect on Jump3 or Jump3CP since the span motion is not necessarily perpendicular to the Z axis of the coordinate system.

9.26.1 Command 1250: Sets the initial Joint #3 height (Z coordinate value) in Jump command

These commands are used to determine the default value of the Z joint height for Jump commands.

Command Syntax

	bit	Name	Description
Parameter 1	15	height High-order side	Specifies the coordinate value (mm / real number) as the value × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	height Low-order side	Specifies the coordinate value (mm / real number) as the value × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

These commands are used to determine the default value of the Z joint height for Jump commands.

For the setting value, specify the coordinate value which is in the motion range of Joint #3.

Setting value should be specified as fixed-point data which validates to three decimal places.

Also, if the setting value is a negative number, specify the value in 32-bit two’s complement.

Example

When setting −100 mm for the default value.

Command	Response
04E2H 0001H 86A0H	04E2H 0000H 0000H

9.26.2 Command 1251: Acquires the initial Joint #3 height (Z coordinate value) in Jump command

Acquires the default value of the Z joint height for Jump commands.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
Response 1	15	height High-order side	Returns the coordinate value (mm / real number) as the value × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	height Low-order side	Returns the coordinate value (mm / real number) as the value × 1000 converted to a 32-bit integer. Low-order side 16 bit.
	14		
	|		
	1		
	0		

Description

Acquires the default value of the Z joint height for Jump commands.

Setting value should be specified as fixed-point data which validates to three decimal places.

Also, if the setting value is a negative number, specify the value in 32-bit two’s complement.

Example

When setting −100 mm for the default value.

Command	Response
04E3H	04E3H 0001H 86A0H

9.27 Parallel Processing Lists

Parallel processing allows you to control the specified bit ports by the specified logic in parallel with the execution of motion command, according to progress rate of command execution.

The number of process which can be specified during one motion command is up to 16. This function instructs the list of up to 16 processes to the motion command and executes the parallel processing during the execution of the command.

There are 16 lists provided. The user needs to set which of the previously-configured lists to use before executing the motion command.

Example:

- Progress rate 50% Bit port number 512 ON

- Progress rate 100% Bit port number 512 OFF

By registering the above process to the list and executing the motion command with the "parallel processing available" is specified, ON will be output to the bit port number 512 at 50% of the moving distance and OFF will be output at 100%.

⚠ CAUTION

Registration of processes to the list should be done in ascending order of progress.

9.27.1 Command 1300: Registers the parallel processing list to be used in motion command execution

Registers parameters in the parallel processing list.

Command Syntax

	bit	Name	Description
Parameter 1	15	listNumber	Specifies the list number to register processes by an integer from 0 to 15. Processes are registered to the list of the specified number.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	progressRate	Specify progress rate of the motion by an integer from 0 to 100.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	portNumber (bit)	Specifies the bit port number to control.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	logic	Specifies the logic to control. 0 = OFF 1 = ON
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Registers the processing conditions to the specified list by each progress rate.

Registration of processes to the list should be done in ascending order of progress rates.

If the number of registrations has already reached 16, an error response will be returned.

Example

When registering the following processes to the list 5.

- Progress rate 50% Bit port number 512 ON
- Progress rate 100% Bit port number 512 OFF

Command	Response
0514H 0005H 0032H 0200H 0001H 0514H 0005H 0064H 0200H 0000H	0514H 0000H 0000H 0514H 0000H 0000H

9.27.2 Command 1301: Acquires the setting state of the parallel processing list used in motion command execution

Acquires parameters from the parallel processing list.

Command Syntax

	bit	Name	Description
Parameter 1	15	listNumber	Specifies the list number to acquire the contents by an integer from 0 to 15.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	type	Specify whether to acquire the contents from the top of the list. 0 = continue 1 = start from the top
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	position	Returns the position in the list.
	|		
	8		
	7	number of registration	Returns the number of processes registered in the list.
	|		
	0		

	bit	Name	Description
Response 2	15	progressRate	Returns the progress rate.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 3	15	bitNumber	Returns the port number.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 4	15	logic	Returns the control logic. 0 = OFF 1 = ON
	14		
	|		
	1		

	bit	Name	Description
	0		

Description

Acquires the processing conditions registered in the specified list.

To start the acquisition, specify “start from the top (1)” in type of Parameter 2 before executing the first command. For subsequent commands, specify “continue (2)”.

The final determination is done by receiving the same response for number of registration and position in Response 1.

If no process is registered, number of registration (0) and position (0) will be returned to Response 1. In this case, values are indeterminate after Response 2. Do not use the syntaxes.

After receiving the last response, it will be returned when request is sent again continuously.

Example

When registering the following processes to the list 5.

- Progress rate 50% Bit port number 512 ON
- Progress rate 100% Bit port number 512 OFF

Command	Response
0515H 0005H 0001H 0515H 0005H 0000H	0515H 0102H 0032H 0200H 0001H 0515H 0202H 0064H 0200H 0000H

9.27.3 Command 1302: Initializes the specified list

Initializes the specified parallel processing list.

Command Syntax

	bit	Name	Description
Parameter 1	15	listNumber	Specifies the list number to initialize by an integer from 0 to 15.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Initializes the specified parallel processing list.

The number of registration will be 0.

Example

When initializing the list 15.

Command	Response
0516H 000FH	0516H 0000H 0000H

9.27.4 Command 1303: Sets the parallel processing list to be used in the motion commands

Configures the parallel processing list.

Command Syntax

	bit	Name	Description
Parameter 1	15	listNumber	Specifies the list number by an integer from 0 to 15.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Specifies the parallel processing list to be used at the motion command execution.

If the list with no registration is specified, an error will occur at the command execution.

Example

When setting the list 15.

Command	Response
0517H 000FH	0517H 0000H 0000H

9.27.5 Command 1304: Acquires the selective condition of the parallel processing list to be used in the motion commands

Acquires the current setting of the parallel processing list.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
Response 1	15	listNumber	Specifies the list number by an integer from 0 to 15.
	14		
	|		
	1		
	0		

Description

Acquires the current setting of the parallel processing list to be used during motion command execution.

The list 0 is set as default.

Example

Acquires the status of the list 15.

Command	Response
0518H	0518H 000FH

9.28 Singularity Avoidance

9.28.1 Command 1350: Specifies whether to use LJM automatically in order to avoid singularity (AutoLJM)

Sets Auto LJM (Least Joint Motion).

Command Syntax

	bit	Name	Description
Parameter 1	15	setting	0: Auto LJM disabled (default) 1: Auto LJM enabled
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

AutoLJM is available for following commands.

Arc, Arc3, Go, Jump3, Jump3CP, Move

When AutoLJM is On, the manipulator operates with a least joint motion, just like using the LJM function, whether the LJM function is applied to the position data to be passed to each command or not.

If the Auto LJM is enabled, the function will be applied to all commands until it is disabled.

In any of the following cases, AutoLJM has the setting specified in the controller settings (factory default: Off).

- Controller startup
- Reset
- All task stop
- Motor On
- Switching the Auto / Programming operation mode

AutoLJM Usage Precaution

You can set the AutoLJM function to be enabled at the controller startup by setting the controller preferences. However, if Auto LJM is enabled at all times by controller preferences or commands, this function automatically adjusts the posture of the manipulator to reduce the motion distance, even when you intended to move the joint widely.

Therefore, it is recommended to create a program to apply the LJM function only when necessary by using LJM function or AutoLJM command.

Example

Executes Go command with the Auto LJM enabled.

Command	Response	Description
0546H 0001H 07D0H 0000H 0000H 0546H 0000H	0546H 0000H 0000H 07D0H 0000H 0000H 0546H 0000H 0000H	AutoLJM enabled Motion command (Go) AutoLJM disabled

9.28.2 Command 1352: Sets the singularity avoiding function

Sets the singularity avoidance function.

Command Syntax

	bit	Name	Description
Parameter 1	15 14 | 1 0	setting	1: Enables the singularity avoiding function. 0: Disables the singularity avoiding function.

Response Syntax

Refer to the following.

Response Codes

Description

This command is available for following commands.

Move, Arc, Arc3

A singularity avoiding function is to prevent acceleration errors when the vertical 6-axis robot approaches to the singularity in CP motion by passing a different trajectory and returning to the original trajectory after passing the singularity. This function is only applicable for the wrist singularity.

Since the singularity avoiding function is usually set to “1: Enabled” at the controller startup, it is not necessary to change the setting. If you do not want a singularity avoidance to ensure compatibility with software which does not support the singularity avoiding function, or to avoid a trajectory gap, disable the function.

If the parameter is changed, this function remains enabled until the next controller startup.

At the controller startup, the singularity avoiding function has the setting specified in the controller setting (factory default: 1).

Note

Condition setting of singularity neighborhood

To determine whether the manipulator approaches to the singularity neighborhood, angle of Joint #5 and angular velocity of Joint #4 are used.

By default, Joint #5 angle is set to ±5 degree, and Joint #4 angle is set to ±10% with respect to the maximum joint velocity.

9.28.3 Command 1400: Controls ON/OFF of the motor

Controls the motor.

Command Syntax

	bit	Name	Description
Parameter 1	15	control	1 = Motor ON 0 = Motor OFF
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Controls the motor.

Example

Turns on the motor

Command	Response

0578H 0001H	0578H 0000H 0000H

9.28.4 Command 1401: Acquires the status of the motor

Acquires the current motor status.

Command Syntax

No parameter

Response Syntax

<table>
<tr><th></th><th>bit</th><th>Name</th><th>Description</th></tr>
<tr><td rowspan="5">Response 1</td><td>15</td><td rowspan="5">status</td><td rowspan="5">1 = Motor ON
0 = Motor OFF</td></tr>
<tr><td>14</td></tr>
<tr><td>|</td></tr>
<tr><td>1</td></tr>
<tr><td>0</td></tr>
</table>

Description

Acquires the current motor status.

Example

The motor is OFF

Command	Response
0579H	0579H 0000H 0000H

9.28.5 Command 1450: Resets the controller to an initial status.

Resets the controller to an initial status.

Command Syntax

No parameter

Response Syntax

Refer to the following.

Response Codes

Description

This command resets the following items:

- Emergency Stop Status
- Error status
- Output Bits (All Outputs, except I/O assigned to remote output, set to Off; User can set Epson RC+ to turn this feature off)
- Current robot Speed, SpeedR, SpeedS (Initialized to default values)

- Current robot Accel, AccelR, AccelS (Initialized to default values)
- Current robot LimZ parameter (Initialized to 0)
- Current robot Fine (Initialized to default values)
- Current robot Power Low (Low Power Mode set to On)
- Current robot PTPBoost (Initialized to default values)

For servo related errors, Emergency Stop status, and any other conditions requiring a reset, no command other than this one will be accepted. In this case first execute this command, then execute other processing as necessary. For example, after an emergency stop, first verify safe operating conditions, execute Reset, and then execute Motor On.

Critical error state will not be canceled by Reset.

When critical error occurs, turn Off the controller and solve the cause of the error.

⚠ CAUTION

Reset Option Switch

If the "RESET command turns off outputs" controller preference is on, then when the Reset instruction is issued, all outputs will be turned off. This is important to remember when wiring the system such that turning the outputs off should not cause tooling to drop or similar situations.

Refer to the following for details.

“User's Guide-[Setup]-[System Configuration]-[Controller]-[Preferences]”

Example

Command	Response
05AAH	05AAH 0000H 0000H

9.29 Motion Commands

These commands are used to move the Arm to a target position in various ways.

Following is the description common in each command. Note that some functions are not available depending on the commands. Follow the descriptions of each command.

- Setting of Target Position
  This section describes method of designation for the target position.

- Setting by Point Number
  This method specifies the target position by a point number. The point should be defined beforehand to use this method.

- Setting by Pallet
  This method specifies the pallet number and position in the defined pallet. There are two methods to specify the position.
  - A: Specify the divided position directly.
  - B: Specify by the division coordinate.

The pallet can be defined by dividing the area of P1, P2, and P3 by 3×5 as follows.

P3

13	14	15
10	11	12
7	8	9
4	5	6
1	2	3

P1 P2

For setting-by-position method, specify the position you want to move to by a number ranging from 0 to 15. For setting-by-coordinate method, specify the row and line. To move to the position “1”, specify (1, 1). For the position “2”, specify (2, 1). And for the position “8”, specify (2, 3).

- Speed / Accel setting
  By setting Speed/Accel to the option of the motion command, the command will be executed after setting Speed/Accel only by issuing the motion command. This can save the number of command issues. However, prior registration of Speed/Accel table is necessary.

9.29.1 Command 2000: Moves from the current position to the specified position in PTP motion

Moves the Arm from the current position to the specified position using PTP motion.

Command Syntax

1. Option
   Specify the target position specifying method and each option. The number of necessary parameters varies depending on the specified options. Speed / Accel setting and target position specifying method affect the number of parameters. Other options do not affect the number of parameters.
   For Parameter 2 and later by options, follow the descriptions (2) and later.
   Options are specified by Parameter 1.

	bit	Name	Description
Parameter 1	15	Till / Find	Specify Till and Find options. 0 = not specify 1 = Till 2 = Find
	14		
	13	Parallel processing	Select whether to do parallel processing 0 = No 1 = Yes
	12	CP	Select whether to do a CP motion 0 = No 1 = Yes
	11	Speed / Accel	Select whether to set Speed / Accel before the motion command execution 0 = do not set 1 = set only Speed 2 = set only SpeedS 3 = set only SpeedR 4 = set only Accel 5 = set only AccelS 6 = set only AccelR 7 = set Speed and Accel 8 = set SpeedS and AccelS
	10		
	9		

	bit	Name	Description
	8		9 = set SpeedR and AccelR
	7	reserved	Specify “0”
	|		
	3		
	2	Target position specifying method	Select the specifying method of the target position 0 = Setting by point number 1 = Setting by position in the pallet 2 = Setting by coordinate in the pallet
	1		
	0		

2. When selected “Setting by point number” for Target position specifying method and “do not set” in Speed / Accel.
   In this case, use until Parameter 2.
   Command No., Parameter 1, Parameter 2

	bit	Name	Description
Parameter 2	15	pointNumber	Specifies the target position by a point number
	14		
	|		
	1		
	0		

3. When selected “Setting by position in the pallet” for Target position specifying method and “do not set” in Speed / Accel.
   In this case, use until Parameter 3.
   Command No., Parameter 1, Parameter 2, Parameter 3

	bit	Name	Description
Parameter 2	15	palletNumber	Specifies the pallet number to be used
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	position	Specifies the pallet position
	14		
	|		
	1		
	0		

4. When selected "Setting by coordinate in the pallet" for Target position specifying method and "do not set" in Speed / Accel.
   In this case, use until Parameter 4.
   Command No., Parameter 1, Parameter 2, Parameter 3, Parameter 4

	bit	Name	Description
Parameter 2	15	palletNumber	Specifies the pallet number to be used
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	row	Specifies the row in the pallet
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	line	Specifies the line in the pallet
	14		
	|		
	1		
	0		

5. When selected "Setting by point number" for Target position specifying method and "set Speed and Accel" in Speed / Accel.
   In this case, use until Parameter 3.
   Command No., Parameter 1, Parameter 2, Parameter 3

	bit	Name	Description
Parameter 2	15	pointNumber	Specifies the target position by a point number
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	Speed / SpeedS / SpeedR	Specifies the speed table number of the selected type by an integer from 0 to 15. * Specify "0" if acceleration and deceleration are not set.
	|		
	8		
	7	Accel / AccelS / AccelR	Specifies the acceleration/deceleration table number of the selected type by an integer from 0 to 15. *Specify "0" if acceleration and deceleration are not set.
	|		
	0		

6. When selected "Setting by position in the pallet" for Target position specifying method and "set Speed and Accel" in Speed / Accel.
   In this case, use until Parameter 4.
   Command No., Parameter 1, Parameter 2, Parameter 3, Parameter 4

	bit	Name	Description
Parameter 2	15	palletNumber	Specifies the pallet number to be used
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	position	Specifies the pallet position
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	Speed / SpeedS / SpeedR	Specifies the speed table number of the selected type by an integer from 0 to 15. *Specify "0" if acceleration and deceleration are not set.
	|		
	8		
	7	Accel / AccelS / AccelR	Specifies the acceleration/deceleration table number of the selected type by an integer from 0 to 15. *Specify "0" if acceleration and deceleration are not set.
	|		
	0		

7. When selected "Setting by coordinate in the pallet" for Target position specifying method and "set Speed and Accel" in Speed / Accel.

In this case, use until Parameter 5.
Command No., Parameter 1, Parameter 2, Parameter 3, Parameter 4, Parameter 5

	bit	Name	Description
Parameter 2	15 14 | 1 0	palletNumber	Specifies the pallet number to be used

	bit	Name	Description
Parameter 3	15 14 | 1 0	row	Specifies the row in the pallet

	bit	Name	Description
Parameter 4	15 14 | 1 0	line	Specifies the line in the pallet

	bit	Name	Description
Parameter 5	15 | 8	Speed / SpeedS / SpeedR	Specifies the speed table number of the selected type by an integer from 0 to 15. *Specify “0” if acceleration and deceleration are not set.
	7 | 0	Accel / AccelS / AccelR	Specifies the acceleration/deceleration table number of the selected type by an integer from 0 to 15. *Specify “0” if acceleration and deceleration are not set.

Response Syntax

Refer to the following.

Response Codes

Description

Moves the arm from the current position to the specified position using PTP motion.

The Go command moves all manipulator arms simultaneously in PTP motion.

With this function, target position is determined by specifying the point number and specifying the pallet.

The path is not predictable because each joint interpolates between the current point and the target point. Be careful of the interference with peripherals.

Speed of Go command can be set by Speed command. And Accel command determines acceleration and deceleration.

With CP parameter, the arm can accelerate for the next motion command while the arm starts decelerating to a stop. In this case, the arm is not positioned at the target point.

You can use the parallel processing option to output to I/O during command execution. To use the option, register the condition list by parallel processing list command and select the list to be used during the command execution beforehand.

Notes

- Difference between Go and Move
  The Move and Go commands each cause the manipulator arm to move. The primary difference between the two instructions is that the Go command causes point to point motion whereas the Move command causes the arm to move in a straight line. The Go command is used when the user is primarily concerned with the orientation of the arm when it arrives on point. The Move command is used when it is important to control the path of the robot arm while it is moving.

- Difference between Go and Jump
  Jump command and Go command each cause the manipulator arm to move in a point to point type fashion. However, the Jump command has one additional feature. Jump causes the robot end effector to first move up to the LimZ value, then in a horizontal direction until it is above the target point, and then finally down to the target point. This allows Jump to be used to guarantee object avoidance and more importantly to improve cycle times for pick and place motion.

- Proper Speed and Acceleration Instructions with Go
  The Speed and Accel commands are used to specify the speed and acceleration of the manipulator during motion caused by the Go command. Pay close attention to the fact that the Speed and Accel commands apply to point to point type motion (like that for the Go command) while linear and circular interpolation motion uses the SpeedS and AccelS commands.

- Using Go with the Optional Till Modifier
  The optional Till modifier allows the user to specify a condition to cause the robot to decelerate to a stop at an intermediate position prior to completing the motion caused by the Go command. If the Till condition is not satisfied, the robot travels to the target position.
  Checks if the current Till condition becomes satisfied. If satisfied, this command completes by decelerating and stopping the robot at an intermediate position prior to completing the motion caused by the Go command.
  To use Till command, specify the conditions by Till setting commands beforehand.

- Using Go with the Optional Find Modifier
  The optional Find modifier allows the user to specify a condition to cause the robot to record a position during the motion caused by the Go command.
  Checks if the current Find condition is satisfied. If satisfied, the current position is stored in the special point FindPos. By using the point edit command, the user can acquire the coordinate of the desired point. With the acquired point, the user can move the manipulator to the position where the condition is satisfied.

- Go Command Always Decelerates to a Stop
  The Go command always causes the arm to decelerate to a stop prior to reaching the final destination of the move.

- Potential errors
  Attempt to Move Outside of Robots Work Envelope.

When using explicit coordinates with the Go instruction, you must make sure that the coordinates defined are within the robots valid work envelope. Any attempt to move the robot outside of the valid work envelope will result in an error

Example

When specifying P1 by point number determination without an option.

Command	Response
07D0H 0000H 0001H	07D0H 0000H 0000H

When specifying Pallet 15 by pallet position determination, with position =10, without an option.

Command	Response
07D0H 0001H 000FH 000AH	07D0H 0000H 0000H

When specifying Pallet 15 with row = 1 Line = 3 by pallet coordinate determination without an option.

Command	Response
07D0H 0002H 000FH 0001H 0003H	07D0H 0000H 0000H

When specifying Pallet 15 with row = 1 Line = 3 by pallet coordinate determination without an option.

Command	Response
07D0H 0100H 0001H 0800H	07D0H 0000H 0000H

9.29.2 Command 2001: Moves in PTP motion with gate motion

Moves the arm in gate trajectory using PTP motion.

Command Syntax

1. Option
   Specify the target position specifying method and each option. The number of necessary parameters varies depending on the specified options. Speed/Accel setting and target position specifying method affect the number of parameters. Other options do not affect the number of parameters.
   For Parameter 2 and later by options, follow the descriptions “2” and later.
   Options are specified by Parameter 1.

	bit	Name	Description
Parameter 1	15	Till / Find / Sense	Specify Till, Find, and Sense options. 0 = not specify 1 = Till 2 = Find 3 = Sense
	14		
	13	Parallel processing	Select whether to use a parallel processing 0 = No 1 = Yes
	12	CP	Select whether to use a path motion 0 = No 1 = Yes
	11	Speed / Accel	Specify whether to set Speed / Accel before executing the motion command. 0 = do not set 1 = set only Speed 2 = set only SpeedS 3 = set only SpeedR 4 = set only Accel 5 = set only AccelS 6 = set only AccelR 7 = set Speed and Accel 8 = set SpeedS and AccelS 9 = set SpeedR and AccelR
	10		
	9		
	8		
	7	reserved	Specify “0”
	6	Arch	When using Arch: Specify the arch number by an integer from 0 to 6 When not using Arch: Specify “7”
	5		
	4		
	3	reserved	Specify “0”
	2	Target position specifying method	Select the specifying method of the target position 0 Setting by point number 1 Setting by position in the pallet 2 Setting by coordinate in the pallet
	1		
	0		

2. When selected “Setting by point number” for Target position specifying method and “do not set” in Speed / Accel.
   In this case, use until Parameter 2.
   Command No., Parameter 1, Parameter 2

	bit	Name	Description
Parameter 2	15	pointNumber	Specifies the target position by a point number
	14		
	|		
	1		

	bit	Name	Description
	0		

3. When selected "Setting by position in the pallet" for Target position specifying method and "do not set" in Speed / Accel.
   In this case, use until Parameter 3.
   Command No., Parameter 1, Parameter 2, Parameter 3

	bit	Name	Description
Parameter 2	15	palletNumber	Specifies the pallet number to be used
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	position	Specifies the pallet position
	14		
	|		
	1		
	0		

4. When selected "Setting by coordinate in the pallet" for Target position specifying method and "do not set" in Speed / Accel.
   In this case, use until Parameter 4.
   Command No., Parameter 1, Parameter 2, Parameter 3, Parameter 4

	bit	Name	Description
Parameter 2	15	palletNumber	Specifies the pallet number to be used
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	row	Specifies the row in the pallet
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	line	Specifies the line in the pallet
	14		
	|		
	1		
	0		

5. When selected "Setting by point number" for Target position specifying method and "set Speed and Accel" in Speed / Accel.
   In this case, use until Parameter 3.
   Command No., Parameter 1, Parameter 2, Parameter 3

	bit	Name	Description
Parameter 2	15	pointNumber	Specifies the target position by a point number
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	Speed / SpeedS / SpeedR	Specifies the speed table number of the selected type by an integer from 0 to 15. * Specify "0" if acceleration and deceleration are not set.
	|		
	8		
	7	Accel / AccelS / AccelR	Specifies the acceleration/deceleration table number of the selected type by an integer from 0 to 15. *Specify "0" if acceleration and deceleration are not set.
	|		
	0		

6. When selected "Setting by position in the pallet" for Target position specifying method and "set Speed and Accel" in Speed / Accel.
   In this case, use until Parameter 4.
   Command No., Parameter 1, Parameter 2, Parameter 3, Parameter 4

	bit	Name	Description
Parameter 2	15	palletNumber	Specifies the pallet number to be used
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	position	Specifies the pallet position
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	Speed / SpeedS / SpeedR	Specifies the speed table number of the selected type by an integer from 0 to 15. *Specify “0” if acceleration and deceleration are not set.
	|		
	8		
	7	Accel / AccelS / AccelR	Specifies the acceleration/deceleration table number of the selected type by an integer from 0 to 15. *Specify “0” if acceleration and deceleration are not set.
	|		
	0		

7. When selected “Setting by coordinate in the pallet” for Target position specifying method and “set Speed and Accel” in Speed / Accel.
   In this case, use until Parameter 5.
   Command No., Parameter 1, Parameter 2, Parameter 3, Parameter 4, Parameter 5

	bit	Name	Description
Parameter 2	15	palletNumber	Specifies the pallet number to be used
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	row	Specifies the row in the pallet
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	line	Specifies the line in the pallet
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 5	15	Speed / SpeedS / SpeedR	Specifies the speed table number of the selected type by an integer from 0 to 15. *Specify “0” if acceleration and deceleration are not set.
	|		
	8		
	7	Accel / AccelS / AccelR	Specifies the acceleration/deceleration table number of the selected type by an integer from 0 to 15. *Specify “0” if acceleration and deceleration are not set.
	|		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

This command moves the arm from the current position to the specified position with a gate motion (a motion which the arm lifts first, and then moves horizontally and lowers vertically at the end).

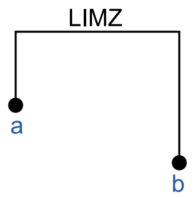
Jump command moves the arm from the current position to the target position in “Arch motion”. This command can be considered as a statement which executes three movements at one time. For example, if the arch number is defined, one issue of Jump command executes following three commands.

1. First, only the Joint #3 lifts up to the Z axis height calculated by the Arch number used for the Jump command .
2. Then, while still moving upward in Z-axis direction, the arm moves horizontally towards the target position until it reaches the upper Z Limit defined by LimZ. Then the arm starts lowering in Z-axis direction while continuing each motion of Joint #1, #2 and #4. The arm moves until final X, Y and U axis coordinates are acquires.
3. Jump command is then completed by moving the arm down with only Z-axis motion until the target Z coordinate position is reached.
   The coordinates of destination (the target position for the move) must be taught previously before executing the Jump command. Acceleration and deceleration for the Jump is controlled by the Accel command. Speed for the move is controlled by the Speed command.
   Jump command cannot be used for horizontal 6-axis manipulators. For those manipulators, use Jump3.

- About CP Parameter
  When CP parameter is added, acceleration of subsequent command can be overwrapped to deceleration of the prior command. In this case, the arm is not positioned at the target point.

- archNumber Details
  The arch shape of Jump command can be modified by the archNumber value optionally specified in Jump command. This

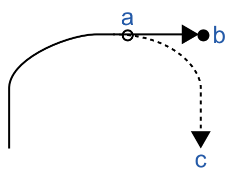
allows the user to define how much the manipulator moves in Z-axis direction before the Joint #1, #2, and #4 move. Valid archNumber entries for Jump command are from 0 to 7. The Arch table entries from 0 to 6 are user definable with the Arch command. However, the arch table entry 7 always defines a Gate Motion. Gate Motion is a motion which the manipulator moves only the Joint #3 to the Z-axis coordinate defined by LimZ command before moving Joint #1, #2, and #4. In Gate Motion, Joint #1, #2 and #4 motion begin when the manipulator reaches Z limit defined by LimZ. After the Joint #1, #2, and #4 reach each final destination position, Joint #3 begins moving downward to the final Z-axis coordinate position as defined by destination (the target point). Gate Motion looks as follows:



Symbol	Description
a	Origin Pt.
b	Destination Pt.

- LimZ Details
  LimZ zLimit specifies the upper Z coordinate value for the horizontal moving plane of the current local coordinate system. The specified arch settings can cause the Joint #1, #2, and #4 to begin movement before reaching LimZ, but LimZ is always the maximum Z height for the move.
  The limit value in height direction specified by LimZ is the Z-axis coordinate of local robot coordinate system. It is not the Z-axis coordinate for Arm or Tool coordinates. Therefore, pay enough attention and take necessary measures to use the tools or hands with different work heights.

- Sense Details
  The Sense optional parameter allows the user to check for an input condition or memory I/O condition before beginning the final Z motion downward. If satisfied, this command completes with the manipulator stopped above the target position where only Z motion is required to reach the target position. It is important to note that the manipulator arm does not stop immediately upon sensing the Sense input modifier.



Symbol	Description
a	Check for a condition
b	Command complete
c	Destination Pt.

Command No. 952 can then be used to verify whether the Sense condition was satisfied and the manipulator stopped prior to its target position or that the Sense condition was not satisfied and the manipulator continued until stopping at its target position.

- Till Details
  The optional Till qualifier allows the user to specify a condition to cause the manipulator to decelerate to stop prior to

completing Jump. The user can check if the input is On or Off and cause the arm to decelerate and stop based on the condition specified.

⚠ CAUTION

Jump cannot be executed for 6-axis manipulators.

Use Jump3 or Jump3CP for 6-axis manipulators.

- Omitting archNumber Parameter
  If the archNumber optional parameter is set to "7", manipulator motion will be Gate Motion, as described above.

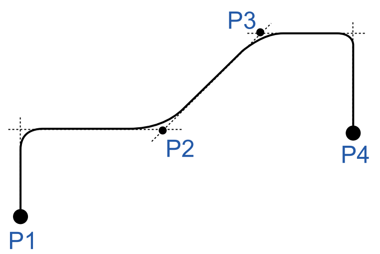
- Difference between Jump and Jump3, Jump3CP
  Jump3 and Jump3CP commands can be used for 6-axis manipulators, while Jump command cannot. For SCARA manipulators (including RS series), using Jump command shortens the joint motion time for depart and approach motion. Depart and approach motion in Jump3 can be executed along the Z axis and in other directions.

- Difference between Go and Jump
  The most important difference is that Go command simply causes Point to Point motion where all joints start and stop at the same time (they are synchronized). Jump is different since it causes vertical Z movement at the beginning and end of the move. Jump is ideal for pick and place type applications.

- Decelerating to stop with Jump command
  Jump command always causes the arm to decelerate to stop prior to reaching the destination point.

- Proper Speed and Acceleration instructions with Jump:
  Speed and Accel commands are used to specify the speed and acceleration of the manipulator during Jump motion. Note that Speed and Accel apply to point to point type motion (Go, Jump, etc.). For linear and circular interpolated motion commands such as Move or Arc, use SpeedS and AccelS commands. For Jump command, it is possible to separately specify speeds and accelerations for upward motion of Joint #3, horizontal travel including Joint #4 rotation, and Joint #3 downward motion.

- Pass function of Jump
  When the CP parameter is specified for Jump with 0 downward motion, the Jump horizontal travel does not decelerate to a stop but goes on smoothly to the next PTP motion.
  When the CP parameter is specified for a PTP motion command right before a Jump with 0 upward motion, the PTP motion does not decelerate to a stop but connects smoothly with the Jump horizontal travel.
  This is useful when you want to replace the horizontal travel of Jump (a PTP motion) with several PTP motion.



- Important concerns for use of Arch
  Actual arch motion trajectory cannot be guaranteed since the arch motion is comprised of vertical motion and horizontal motion executed on trajectory control. The trajectory may change depending on motion speed or Arm motion. Check the actual trajectory with actual speed and posture used in operation.
  - Even if Jump command with the same arch number is executed at the same position, trajectory in low speed mode goes lower than that of in high speed mode. Therefore, even if collision with obstacle is not seen in high speed mode, the manipulator may hit with obstacle in low speed mode.

- Amount of vertical lift tends to increase and vertical-drop tends to decrease in high speed mode compared to low speed mode. When the fall distance of the trajectory is shorter than expected, lower the speed and/or the deceleration, or set the fall distance larger.
- Even if Jump command with the same distance and speed is executed, the trajectory is affected by motion of the robot arms. As a general example, the vertical upward distance increases and the vertical downward distance decreases for a SCARA robot when the movement of the first arm is large. When the vertical fall distance decreases and the trajectory is shorter than expected, lower the speed and/or the deceleration, or set the fall distance larger.

- Potential Errors
  LimZ Value Not High Enough
  When the current arm position of the Z joint is higher than the value set for LimZ and a Jump instruction is attempted, an Error 4005 will occur .

Example

When specifying P1 by point number determination without an option.

Command	Response
07D1H 0070H 0001H	07D1H 0000H 0000H

When specifying Pallet 15 by pallet position determination, with position =10, without an option.

Command	Response
07D1H 0071H 000FH 000AH	07D1H 0000H 0000H

When specifying Pallet 15 with row = 1 Line = 3 by pallet coordinate determination without an option.

Command	Response
07D1H 0072H 000FH 0001H 0003H	07D1H 0000H 0000H

When specifying P1 by point number determination, with Speed/Accel= set Speed only, Table number = 8.

Command	Response
07D1H 0170H 0001H 0800H	07D1H 0000H 0000H

9.29.3 Command 2002: Moves the arm with 3D gate motion

Moves the manipulator in 3D gate trajectory, using a combination of two CP motions and one PTP motion.

Command Syntax

1. Option
   Specify the target position specifying method and each option. The number of necessary parameters varies depending on the specified options. Speed / Accel setting affects the number of parameters.
   Other options do not affect the number of parameters.
   For Parameter 2 and later by options, follow the descriptions “2” and later.
   Options are specified by Parameter 1.

	bit	Name	Description
Parameter 1	15	Till / Find / Sense	Specify Till, Find, and Sense options. 0 = not specify 1 = Till 2 = Find 3 = Sense
	14		
	13	Parallel processing	Select whether to use a parallel processing 0 = No 1 = Yes
	12	CP	Select whether to use a path motion 0 = No 1 = Yes
	11	Speed / Accel	Specify whether to set Speed / Accel before executing the motion command. 0 = do not set 1 = set only Speed 2 = set only SpeedS 3 = set only SpeedR 4 = set only Accel 5 = set only AccelS 6 = set only AccelR 7 = set Speed and Accel 8 = set SpeedS and AccelS 9 = set SpeedR and AccelR
	10		
	9		
	8		
	7	reserved	Specify “0”
	6	Arch	When using Arch: Specify the arch number by an integer from 0 to 6 When not using Arch: Specify “7”
	5		
	4		
	3	reserved	Specify “0”

2. No Speed / Accel setting
   In this case, use until Parameter 4.
   Command No., Parameter 1, Parameter 2, Parameter 3, Parameter 4

	bit	Name	Description
Parameter 2	15	pointNumber	Specifies the target position by a point number
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	approachStart	Specifies the approach start point over the target coordinate by a point number.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	destination	Specifies the target coordinate where the manipulator reaches to by a point number.
	14		
	|		
	1		
	0		

3. With Speed / Accel setting
   In this case, use until Parameter 5.
   Command No., Parameter 1, Parameter 2, Parameter 3, Parameter 4, Parameter 5

	bit	Name	Description
Parameter 2	15	depart	Specifies the depart point over the target coordinate by a point number.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	approachStart	Specifies the approach start point over the target coordinate by a point number.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	destination	Specifies the target coordinate where the manipulator reaches to by a point number.
	14		
	|		
	1		

	bit	Name	Description
	0		

	bit	Name	Description
Parameter 5	15	Speed / SpeedS / SpeedR	Specifies the speed table number of the selected type by an integer from 0 to 15. *Specify “0” if speed is not set.
	|		
	8		
	7	Accel / AccelS / AccelR	Specifies the acceleration/deceleration table number of the selected type by an integer from 0 to 15. *Specify “0” if speed is not set.
	|		
	0		

Response Syntax

Refer to the following.

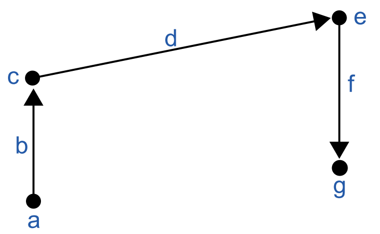
Response Codes

Description

Moves the arm from the current position to the destination in 3D gate motion.

3D gate motion is a combination of two CP motion and one PTP motion.

Moves the arm from the current position to the destination point with 3D gate motion. 3D gate motion. Jump3 is a combination of two CP motion and one PTP motion. The depart motion form the current position to the depart point is always CP motion. The span motion from the depart point to the start approach point is PTP motion in Jump3, and the CP motion in Jump3CP. The approach motion from the starting approach point to the target point is always CP motion.

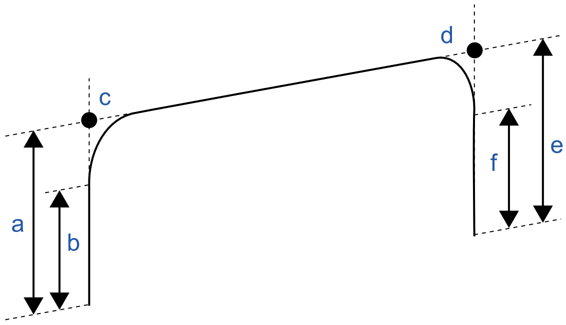


Symbol	Description
a	Current position
b	Depart motion CP
c	Depart point
d	Span motion PTP/CP
e	Approach point
f	Approach motion CP
g	Destination point

Arch motion is achieved by specifying the arch number.

The arch motion for Jump3, Jump3CP is as shown in the figure below.

For arch motion to occur, the Depart distance must be greater than the arch upward distance and the Approach distance must be greater than the arch downward distance.



Symbol	Description
a	Depart distance
b	ARCH Upward
c	Depart point
d	Start approach point
e	Approach distance
f	ARCH downward

Jump3CP uses the SpeedS speed value and AccelS acceleration and deceleration values. Refer to Using Jump3CP with CP below on the relation between the speed/acceleration and the acceleration/deceleration. If, however, the ROT modifier parameter is used, Jump3CP uses the SpeedR speed value and AccelR acceleration and deceleration values. In this case SpeedS speed value and AccelS acceleration and deceleration value have no effect.

Usually, when the move distance is 0 and only the tool orientation is changed, an error will occur. However, by using the ROT parameter and giving priority to the acceleration and the deceleration of the tool rotation, it is possible to move without an error. When there is not an orientational change with the ROT modifier parameter and movement distance is not 0, an error will occur.

Also, when the tool rotation is large as compared to move distance, and when the rotation speed exceeds the specified speed of the manipulator, an error will occur. In this case, please reduce the speed or append the ROT modifier parameter to give priority to the rotational speed/acceleration/deceleration.

Notes

LimZ does not affect Jump3 and Jump3CP

LimZ has no effect on Jump3 or Jump3CP since the span motion is not necessarily perpendicular to the Z axis of the coordinate system.

Jump3 span motion is PTP (point to point)

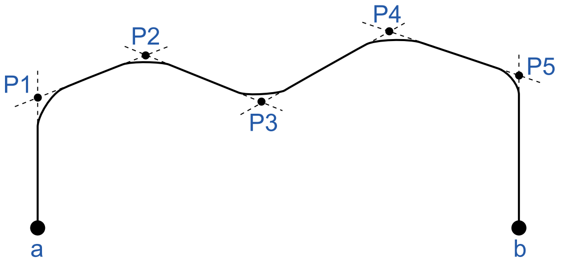
It is difficult to predict Jump3 span motion trajectory. Therefore, be careful that the robot doesn't collide with peripheral equipment and that robot arms don’t collide with the robot.

- Using Jump3, Jump3CP with CP
  The CP parameter causes the arm to move to destination without decelerating or stopping at the point defined by

destination. This is done to allow the user to string a series of motion instructions together to cause the arm to move along a continuous path while maintaining a specified speed throughout all the motion. The Jump3 and Jump3CP instructions without CP always cause the arm to decelerate to a stop prior to reaching the point desination.

- Pass function of Jump3
  When the CP parameter is specified for Jump3 with 0 approach motion, the Jump3 span motion does not decelerate to a stop but goes on smoothly to the next PTP motion.
  When the CP parameter is specified for a PTP motion command right before Jump3 with 0 depart motion, the PTP motion does not decelerate to stop but connects smoothly with the Jump3 span motion.
  This is useful when you want to replace the span motion of Jump3 (a PTP motion) with several PTP motion.

- Pass function of Jump3CP
  When the CP parameter is specified for Jump3CP with 0 approach motion, the Jump3CP span motion does not decelerate to a stop but goes on smoothly to the next CP motion.
  When the CP parameter is specified for a CP motion command right before Jump3CP with 0 depart motion, the CP motion does not decelerate to stop but connects smoothly with the Jump3CP span motion. This is useful when you want to replace the span motion of Jump3CP (a CP motion) with several CP motion.



Symbol	Description
a	Start
b	End

- Important concerns for use of Arch
  Actual arch motion trajectory cannot be guaranteed since the arch motion is comprised of vertical motion and horizontal motion executed on trajectory control. The trajectory may change depending on motion speed or Arm motion. Check the actual trajectory with actual speed and posture used in operation.
  - Even if Jump command with the same arch number is executed at the same position, trajectory in low speed mode becomes lower than that of in high speed mode. Therefore, even if collision with obstacle is not seen in high speed mode, the manipulator may hit with obstacle in low speed mode.
  - Vertical lift distance tends to increase and vertical-drop distance tends to decrease in high speed mode compared to low speed mode. When the fall distance of the trajectory is shorter than expected, lower the speed and/or the deceleration, or set the fall distance larger.
  - Even if Jump command with the same distance and speed is executed, the trajectory may change due to the motion of the manipulator arms.

- Potential errors
  When the majority of depart (approach) motion uses the same joint as the span motion
  An acceleration error may occur during an arch motion executed by the Jump3 andJump3CP commands. This error occurs frequently when the majority of the motion during depart or approach uses the same joint as the span motion. To avoid this error, reduce the acceleration/deceleration speed of the span motion using Accel command for Jump3 or using AccelS command for Jump3CP. Depending on the motion and orientation of the manipulator, it may also help to reduce the acceleration and deceleration of the depart motion (approach motion) using the AccelS command.

Example

When the depart coordinate is P1, the approach start coordinate is P2, and the target coordinate is P3 without options.

Command	Response
07D2H 0070H 0001H 0002H 0003H	07D2H 0000H 0000H

9.29.4 Command 2003: Moves the arm with 3D gate motion

Moves the manipulator in 3D gate trajectory, using three CP motions.

Command Syntax

1. Option
   Specify the target position specifying method and each option. The number of necessary parameters varies depending on the specified options. Speed / Accel setting affects the number of parameters.
   Other options do not affect the number of parameters.
   For Parameter 2 and later by options, follow the descriptions “2” and later.
   Options are specified by Parameter 1.

<table>
<tr><th></th><th>bit</th><th>Name</th><th>Description</th></tr>
<tr><td rowspan="13">Parameter 1</td><td>15</td><td rowspan="2">Till / Find / Sense</td><td rowspan="2">Specify Till, Find, and Sense options.
0 = not specify
1 = Till
2 = Find
3 = Sense</td></tr>
<tr><td>14</td></tr>
<tr><td>13</td><td>Parallel processing</td><td>Select whether to use a parallel processing
0 = No
1 = Yes</td></tr>
<tr><td>12</td><td>CP</td><td>Select whether to use a path motion
0 = No
1 = Yes</td></tr>
<tr><td>11</td><td rowspan="4">Speed / Accel</td><td rowspan="4">Specify whether to set Speed / Accel before executing the motion command.
0 = do not set
1 = set only Speed
2 = set only SpeedS
3 = set only SpeedR
4 = set only Accel
5 = set only AccelS
6 = set only AccelR
7 = set Speed and Accel
8 = set SpeedS and AccelS
9 = set SpeedR and AccelR</td></tr>
<tr><td>10</td></tr>
<tr><td>9</td></tr>
<tr><td>8</td></tr>
<tr><td>7</td><td>ROT</td><td>Give priority to tool orientation change and determine motion speed and acceleration / deceleration
0 = do not use
1 = use</td></tr>
<tr><td>6</td><td rowspan="3">Arch</td><td rowspan="3">When using Arch: Specify the arch number by an integer from 0 to 6
When not using Arch: Specify “7”</td></tr>
<tr><td>5</td></tr>
<tr><td>4</td></tr>
</table>

	bit	Name	Description
	3	reserved	Specify "0"
	|		
	0		

2. No Speed / Accel setting
   In this case, use until Parameter 4.
   Command No., Parameter 1, Parameter 2, Parameter 3, Parameter 4

	bit	Name	Description
Parameter 2	15	depart	Specifies the depart point over the target coordinate by a point number.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	approachStart	Specifies the approach start point over the target coordinate by a point number.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	destination	Specifies the target coordinate where the manipulator reaches to by a point number.
	14		
	|		
	1		
	0		

3. With Speed / Accel setting
   In this case, use until Parameter 5.
   Command No., Parameter 1, Parameter 2, Parameter 3, Parameter 4, Parameter 5

	bit	Name	Description
Parameter 2	15	depart	Specifies the depart point over the target coordinate by a point number.
	14		
	|		
	1		

	bit	Name	Description
	0		

	bit	Name	Description
Parameter 3	15	approachStart	Specifies the approach start point over the target coordinate by a point number.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	destination	Specifies the target coordinate where the manipulator reaches to by a point number.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 5	15	Speed / SpeedS / SpeedR	Specifies the speed table number of the selected type by an integer from 0 to 15. *Specify “0” if acceleration and deceleration are not set.
	|		
	8		
	7	Accel / AccelS / AccelR	Specifies the acceleration/deceleration table number of the selected type by an integer from 0 to 15. *Specify “0” if acceleration and deceleration are not set.
	|		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

A combination of 3 CP motion.

Giving priority to tool orientation change by ROT option, the command determines motion speed and acceleration / deceleration.

For more information, refer to the following.

Command 2002: Moves the arm with 3D gate motion

Example

When the depart coordinate is P1, the approach start coordinate is P2, and the target coordinate is P3 without options.

Command	Response
07D3H 0070H 0001H 0002H 0003H	07D3H 0000H 0000H

9.29.5 Command 2005: Moves the arm from the current position to the specified position in a linear interpolation motion

Moves the manipulator from the current position to a target position using linear interpolated motion.

Command Syntax

1. Option
   Specify the target position specifying method and each option. The number of necessary parameters varies depending on the specified options. Speed / Accel setting and target position specifying method affect the number of parameters. Other options do not affect the number of parameters. For Parameter 2 and later for options, follow the descriptions (2) and later.

	bit	Name	Description
Parameter 1	15 14	Till / Find	Specify Till and Find options. 0 = not specify 1 = Till 2 = Find
	13	Parallel processing	Select whether to use a parallel processing 0 = No 1 = Yes
	12	CP	Select whether to use a path motion 0 = No 1 = Yes
	11 10 9 8	Speed / Accel	Specify whether to set Speed / Accel before executing the motion command. 0 = do not set 1 = set only Speed 2 = set only SpeedS 3 = set only SpeedR 4 = set only Accel 5 = set only AccelS 6 = set only AccelR 7 = set Speed and Accel 8 = set SpeedS and AccelS 9 = set SpeedR and AccelR
	7	ROT	Give priority to tool orientation change and determine motion speed and acceleration / deceleration 0 = do not use 1 = use
	6 |	Reserved	Specify “0”.

	bit	Name	Description
	3		
	2	Target position specifying method	Select the specifying method of the target position 0 Setting by point number 1 Setting by position in the pallet 2 Setting by coordinate in the pallet
	1		
	0		

2. When selected "Setting by point number" for Target position specifying method and "do not set" in Speed / Accel.
   In this case, use until Parameter 2.
   Command No., Parameter 1, Parameter 2

	bit	Name	Description
Parameter 2	15	pointNumber	Specifies the target position by a point number
	14		
	|		
	1		
	0		

3. When selected "Setting by position in the pallet" for Target position specifying method and "do not set" in Speed / Accel.
   In this case, use until Parameter 3.
   Command No., Parameter 1, Parameter 2, Parameter 3

	bit	Name	Description
Parameter 2	15	palletNumber	Specifies the pallet number to be used
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	position	Specifies the pallet position
	14		
	|		
	1		
	0		

4. When selected "Setting by coordinate in the pallet" for Target position specifying method and "do not set" in Speed / Accel.
   In this case, use until Parameter 4.
   Command No., Parameter 1, Parameter 2, Parameter 3, Parameter 4

	bit	Name	Description
Parameter 2	15	palletNumber	Specifies the pallet number to be used
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	row	Specifies the row in the pallet
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	line	Specifies the line in the pallet
	14		
	|		
	1		
	0		

5. When selected “Setting by point number” for Target position specifying method and “set Speed and Accel” in Speed / Accel.
   In this case, use until Parameter 3.
   Command No., Parameter 1, Parameter 2, Parameter 3

	bit	Name	Description
Parameter 2	15	palletNumber	Specifies the pallet number to be used
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	Speed / SpeedS / SpeedR	Specifies the speed table number of the selected type by an integer from 0 to 15. *Specify “0” if acceleration and deceleration are not set.
	|		
	8		
	7	Accel / AccelS / AccelR	Specifies the acceleration/deceleration table number of the selected type by an integer from 0 to 15. *Specify “0” if acceleration and deceleration are not set.
	|		
	0		

6. When selected “Setting by position in the pallet” for Target position specifying method and “set Speed and Accel” in Speed / Accel.
   In this case, use until Parameter 4.
   Command No., Parameter 1, Parameter 2, Parameter 3, Parameter 4

	bit	Name	Description
Parameter 2	15	palletNumber	Specifies the pallet number to be used
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	position	Specifies the pallet position
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	Speed / SpeedS / SpeedR	Specifies the speed table number of the selected type by an integer from 0 to 15. *Specify “0” if acceleration and deceleration are not set.
	|		
	8		
	7	Accel / AccelS / AccelR	Specifies the acceleration/deceleration table number of the selected type by an integer from 0 to 15. *Specify “0” if acceleration and deceleration are not set.
	|		
	0		

7. When selected “Setting by coordinate in the pallet” for Target position specifying method and “set Speed and Accel” in Speed / Accel.

In this case, use until Parameter 5.
Command No., Parameter 1, Parameter 2, Parameter 3, Parameter 4, Parameter 5

	bit	Name	Description
Parameter 2	15	palletNumber	Specifies the pallet number to be used
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	row	Specifies the row in the pallet
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	line	Specifies the line in the pallet
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 5	15	Speed / SpeedS / SpeedR	Specifies the speed table number of the selected type by an integer from 0 to 15. *Specify “0” if acceleration and deceleration are not set.
	|		
	8		
	7	Accel / AccelS / AccelR	Specifies the acceleration/deceleration table number of the selected type by an integer from 0 to 15. *Specify “0” if acceleration and deceleration are not set.
	|		
	0		

Response Syntax

Refer to the following.

Response Codes

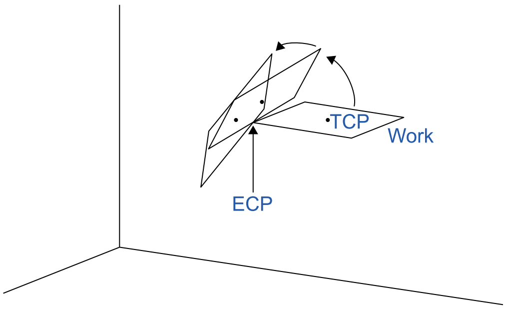
Description

Moves the arm from the current position to destination in a straight line. This command moves all axes to start and stop at the same time. The coordinates of the target position must be taught previously before executing the command. Acceleration and deceleration of the command is controlled by the AccelS command and speed is controlled by the SpeedS command. If the SpeedS value exceeds the allowable speed for any joint, power to all four joint motors will be turned off, and the manipulator will stop.

Move uses the SpeedS speed value and AccelS acceleration and deceleration values. For the relation between the speed/acceleration and the acceleration/deceleration, refer to Using Move with CP below. However, if the ROT modifier parameter is used, Move uses the SpeedR speed value and AccelR acceleration and deceleration values. In this case, SpeedS speed value and AccelS acceleration and deceleration value have no effect.

Usually, when the move distance is 0 and only the tool orientation is changed, an error will occur. However, by using the ROT parameter and giving priority to acceleration and deceleration of the tool rotation, the manipulator can be moved without an error. When there is no orientation change and movement distance is not 0 with the ROT modifier parameter, an error will occur.

Also, when the tool rotation is significantly large compared to the moving distance, and when the rotation speed exceeds the specified manipulator speed, an error will occur. In this case, reduce the speed or append the ROT modifier parameter to give priority to the acceleration and deceleration.



The optional Till qualifier allows the user to specify a condition where the manipulator decelerates to stop before completing the Move. The user can check if the input is On or Off and make the arm to stop based on the specified condition . This feature works like an interrupt where the Move is interrupted (stopped) once the Input condition is met. If the input condition is never met during the Move then the arm successfully arrives on the point specified as the target position.

To use the Till qualifier, the condition must be specified by the Till setting command beforehand.

Notes

- Move Cannot Execute Range Verification Prior To Motion
  Move cannot execute range verification of the trajectory prior to motion. Therefore, even if the target position is within an allowable range, it is possible for the system to find a prohibited position along the way to a target point. In this case, the arm may abruptly stop and cause shock to the servo, resulting in failure. To prevent this, be sure to perform range verifications at low speed prior to using Move at high speeds. In summary, even though the target position is within the range of the arm, the arm cannot reach the position if the trajectory has intermediate points which are out of the physical motion range of the arm.

- Using Move with CP
  The CP parameter causes the arm to move to the target position without decelerating or stopping at the point. This allows the user to string commands and execute a series of motion commands at a constant speed. The Move instruction without CP always causes the arm to decelerate to stop before reaching the target point.

- Proper Speed and Acceleration Instructions with Move
  The SpeedS and AccelS commands are used to specify the speed and acceleration of the manipulator during Move motion. Note that SpeedS and AccelS are applied to the linear and circular interpolated motion while point to point motion uses the Speed and Accel instructions.

- Potential Errors
  - Attempt to execute motion with Linear distance is 0
    Move command causes errors when you attempt to execute motion to change only U coordinate value of four-degree-of-freedom manipulators (SCARA including RS series) or U, V, and W coordinate values of six-degree-of-freedom manipulators (vertical 6-axis manipulators). In this case, use the ROT parameter.
  - Joint Overspeed Errors
    When even one of the axes exceeds its allowable speed during rmotion, an overspeed error will occur. In this case, the arm stops moving and the motor excitation turns OFF.
    Attempt to Pass the Origin Point (RS series)
    If RS series manipulator attempts to pass the point near the origin point by Move command, an overspeed error may occur. For commands which pass near the origin point, take the following countermeasures.
    -
      - Lower the SpeedS value
    -
      - Take a different path to avoid the origin point
    -
      - Use PTP motion such as Go command instead of Move command.

Example

When specifying P1 by point number determination without an option.

Command	Response
07D5H 0000H 0001H	07D5H 0000H 0000H

When specifying Pallet 15 by pallet position determination, with position =10, without an option.

Command	Response
07D5H 0001H 000FH 000AH	07D5H 0000H 0000H

When specifying Pallet 15 with row = 1 Line = 3 by pallet coordinate determination without an option.

Command	Response
07D5H 0002H 000FH 0001H 0003H	07D5H 0000H 0000H

When specifying P1 by point number determination, with Speed/Accel= set Speed only, Table number = 8.

Command	Response
07D5H 0100H 0001H 0800H	07D5H 0000H 0000H

9.29.6 Command 2006: Moves the arm from the current position to the specified position in Arc interpolation motion on XY plane face

Moves the arm to the specified position using circular interpolation in the XY plane.

Command Syntax

1. Option
   Specify the target position specifying method and each option. The number of necessary parameters varies depending on the specified options. Speed / Accel setting affects the number of parameters.
   Other options do not affect the number of parameters.

For Parameter 2 and later for options, follow the descriptions (2) and later.
Options are specified by Parameter 1.

	bit	Name	Description
Parameter 1	15	Till / Find	Specify Till and Find options. 0 = not specify 1 = Till 2 = Find
	14		
	13	Parallel processing	Select whether to use a parallel processing 0 = No 1 = Yes
	12	CP	Select whether to use a path motion 0 = No 1 = Yes
	11	Speed / Accel	Specify whether to set Speed / Accel before executing the motion command. 0 = do not set 1 = set only Speed 2 = set only SpeedS 3 = set only SpeedR 4 = set only Accel 5 = set only AccelS 6 = set only AccelR 7 = set Speed and Accel 8 = set SpeedS and AccelS 9 = set SpeedR and AccelR
	10		
	9		
	8		
	7	ROT	Give priority to tool orientation change and determine motion speed and acceleration / deceleration 0 = do not use 1 = use
	6	Reserved	Specify “0”.
	|		
	0		

2. No Speed / Accel setting
   In this case, use until Parameter 3.
   Command No., Parameter 1, Parameter 2, Parameter 3

	bit	Name	Description
Parameter 2	15	midPoint	Specify by a point number. The middle point (taught previously by the user) which the arm travels through on its way from the current point to endPoint.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	destination	Specify by a point number. The end point (taught previously by the user) which the arm travels to during the arc type motion. This is the final position at the end of the circular move.
	14		
	|		
	1		
	0		

3. With Speed / Accel setting
   In this case, use until Parameter 4.
   Command No., Parameter 1, Parameter 2, Parameter 3, Parameter 4

	bit	Name	Description
Parameter 2	15	midPoint	Specify by a point number. The middle point (taught previously by the user) which the arm travels through on its way from the current point to endPoint.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	destination	Specify by a point number. The end point (taught previously by the user) which the arm travels to during the arc type motion. This is the final position at the end of the circular move.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	Speed / SpeedS / SpeedR	Specifies the speed table number of the selected type by an integer from 0 to 15. *Specify “0” if acceleration and deceleration are not set.
	|		
	8		
	7	Accel / AccelS / AccelR	Specifies the acceleration/deceleration table number of the selected type by an integer from 0 to 15. *Specify “0” if acceleration and deceleration are not set.
	|		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Moves the arm to the specified position using circular interpolation in the XY plane.

These two commands are available for SCARA (including RS series) and 6-axis manipulators.

Arc and Arc3 are used to move the arm in a circular interpolation motion from the current position to endPoint through midPoint.

The system automatically calculates a trajectory based on three points (current position, endPoint, and midPoint) and then moves the arm to the point defined by endPoint along the trajectory. The coordinates of midPoint and endPoint must be taught previously before executing the command.

Arc and Arc3 use the SpeedS speed value and AccelS acceleration and deceleration values. For the relation between the speed/acceleration and the acceleration/deceleration, refer to Using Arc3 with CP below. However, if the ROT modifier parameter is used, Arc and Arc3 use the SpeedR speed value and AccelR acceleration and deceleration values. In this case, SpeedS speed value and AccelS acceleration and deceleration value have no effect.

Usually, when the move distance is 0 and only the tool orientation is changed, an error occurs. However, by using the ROT parameter and giving priority to the acceleration and the deceleration of the tool rotation, it is possible to move the manipulator without the error. When there is no orientation change and movement distance is not 0 with the ROT modifier parameter, an error will occur.

Setting Speed and Acceleration for Arc motion

SpeedS and AccelS are used to set speed and acceleration for the Arc and Arc3 instructions.

SpeedS and AccelS allow the user to specify a velocity in mm/sec and acceleration in mm/sec^2.

Notes

Arc Instruction works in Horizontal Plane Only

The Arc path is a true arc in the Horizontal plane. The path is interpolated using the values for endPoint as its basis for Z and U. Use Arc3 for 3 dimensional arcs.

- Range verification for Arc command
  The Arc and Arc3 statements cannot compute a range verification of the trajectory prior to the arc motion. Therefore, even for target positions that are within an allowable range, en route the robot may attempt to traverse a path which has an invalid range, stopping with a severe shock which may damage the arm. To prevent this from occurring, be sure to perform range verifications by running the program at low speeds prior to running at faster speeds.

- Suggested motion to setup for the Arc move
  Because the arc motion begins from the current position, it may be necessary to use the Go, Jump or other related motion command to bring the robot to the desired position prior to executing Arc or Arc3.

- Using Arc, Arc3 with CP
  The CP parameter causes the arm to move to the end point without decelerating or stopping at the point defined by endPoint. This allows the user to string commands and execute a series of motion commands at a constant speed. The Arc and Arc3 instructions without CP always make the arm to decelerate to stop before reaching the end point.

- Potential Errors
  - Changing Hand Attributes
    Pay attention to the Hand attribute of each point when using the Arc command. If the hand orientation is changed (from Righty to Lefty or vice-versa) during the circular interpolation move, an error will occur. The arm attributes (/L: Lefty, or /R: Righty) must be the same for the current position, midPoint and endPoint points.

- Attempt to move the arm outside the work envelope
  If the specified circular motion attempts to move the arm outside the work envelope of the arm, an error will occur.

Example

When the midpoint is P1 and endPoint is P2, without an option.

Command	Response
07D6H 0000H 0001H 0002H	07D6H 0000H 0000H

9.29.7 Command 2007: Moves the arm from the current position to the specified position in Arc interpolation motion in 3D

Moves the arm to the specified point using circular interpolation in 3 dimensions.

Command Syntax

1. Option
   Specify the target position specifying method and each option. The number of necessary parameters varies depending on the specified options. Speed / Accel setting affects the number of parameters.
   Other options do not affect the number of parameters. For Parameter 2 and later for options, follow the descriptions (2) and later. Options are specified by Parameter 1.

	bit	Name	Description
Parameter 1	15	Till / Find	Specify Till and Find options. 0 = not specify 1 = Till 2 = Find
	14		
	13	Parallel processing	Select whether to use a parallel processing 0 = No 1 = Yes
	12	CP	Select whether to use a path motion 0 = No 1 = Yes
	11	Speed / Accel	Specify whether to set Speed / Accel before executing the motion command. 0 = do not set 1 = set only Speed 2 = set only SpeedS 3 = set only SpeedR 4 = set only Accel 5 = set only AccelS 6 = set only AccelR 7 = set Speed and Accel 8 = set SpeedS and AccelS 9 = set SpeedR and AccelR
	10		
	9		
	8		
	7	ROT	Give priority to tool orientation change and determine motion speed and acceleration / deceleration 0 = do not use 1 = use

	bit	Name	Description
	6	Reserved	Specify “0”.
	｜		
	0		

2. No Speed / Accel setting
   In this case, use until Parameter 3.
   Command No., Parameter 1, Parameter 2, Parameter 3

	bit	Name	Description
Parameter 2	15	midPoint	Specify by a point number. The middle point (taught previously by the user) which the arm travels through on its way from the current point to endPoint.
	14		
	｜		
	1		
	0		

	bit	Name	Description
Parameter 3	15	destination	Specify by a point number. The end point (taught previously by the user) which the arm travels to during the arc type motion. This is the final position at the end of the circular move.
	14		
	｜		
	1		
	0		

3. With Speed / Accel setting
   In this case, use until Parameter 4.
   Command No., Parameter 1, Parameter 2, Parameter 3, Parameter 4

	bit	Name	Description
Parameter 2	15	midPoint	Specify by a point number. The middle point (taught previously by the user) which the arm travels through on its way from the current point to endPoint.
	14		
	｜		
	1		
	0		

	bit	Name	Description
Parameter 3	15	destination	Specify by a point number. The end point (taught previously by the user) which the arm travels to during the arc type motion. This is the final position at the end of the circular move.
	14		
	｜		
	1		

	bit	Name	Description
	0		

	bit	Name	Description
Parameter 4	15 ｜ 8	Speed / SpeedS / SpeedR	Specifies the speed table number of the selected type by an integer from 0 to 15. *Specify “0” if acceleration and deceleration are not set.
	7 ｜ 0	Accel / AccelS / AccelR	Specifies the acceleration/deceleration table number of the selected type by an integer from 0 to 15. *Specify “0” if acceleration and deceleration are not set.

Response Syntax

Refer to the following.

Response Codes

Description

Moves the arm to the specified point using circular interpolation in 3 dimensions.

For the rest about the command, refer to the following.

Command 2006: Moves the arm from the current position to the specified position in Arc interpolation motion on XY plane face

Example

When the midpoint is P1 and endPoint is P2, without an option.

Command	Response
07D7H 0000H 0001H 0002H	07D7H 0000H 0000H

9.30 Jog & Teach

9.30.1 Command 2050: Jog motion

Moves the manipulator using Jog motion.

Command Syntax

	bit	Name	Description
Parameter 1	15 ｜ 3	reserved	Specify “0”

	bit	Name	Description
	2	mode	Select the Jog mode. 0 = World 1 = Joint
	1		
	0		

	bit	Name	Description
Parameter 2	15	axisSelection	Select the target axis. When World is selected: 1 = X axis 2 = Y axis 3 = Z axis 4 = U axis 5 = V axis 6 = W axis When Joint is selected: 1 = Joint #1 2 = Joint #2 3 = Joint #3 4 = Joint #4 5 = Joint #5 6 = Joint #6
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 3	15	distance High-order word	Specifies the move distance (real number) as the value × 1000 converted to a 32-bit integer. When World is selected: X, Y, Z = mm U, V, X = deg When Joint is selected: For prismatic joints, (Unit: mm) For rotational joints, (Unit: deg) High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 4	15	distance Low-order word	Specifies the move distance (real number) as the value 1000 converted to a 32-bit integer. When World is selected: X, Y, Z = mm U, V, W = deg When Joint is selected: For prismatic joints, (Unit: mm) For rotational joints, (Unit: deg) Low-order side 16 bit.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Moves the manipulator using Jog motion by selecting World or Joint.

World moves the manipulator in the World coordinate system while Joint moves the manipulator by each joint. This command only supports step jogs.

Example

When moving the X axis 120.005 mm in World mode.

Command	Response
0802H 0000H 0001H 0001H D4C5H	0802H 0000H 0000H

9.30.2 Command 2051: Teach the current position to the specified point

Teaches the result of Jog to a point.

Command Syntax

	bit	Name	Description
Parameter 1	15	reserved	Specify "0"
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	pointNumber	Specifies the point number to be taught.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Teaches the coordinate where Jog is executed to the point specified.

Use the point edit command to configure the flags as necessary.

Example

When teaching the coordinate to P5.

Command	Response
0803H 0000H 0005H	0803H 0000H 0000H

9.30.3 Command 2052: Save the current point setting to the point file

Saves the taught points to the point file.

Command Syntax

	bit	Name	Description
Parameter 1	15	reserved	Specify “0”
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Saves the taught points to the point file.

Point file: Points.pts

Example

When teaching the coordinate to P5.

Command	Response
0804H 0000H 0005H	0804H 0000H 0000H

9.30.4 Command 2053: Controls the temporary halt and resume of the motor excitation

Controls the excitation of joints.

Command Syntax

	bit	Name	Description
Parameter 1	15	reserved	Specify “0”
	|		
	1		

	bit	Name	Description
	0	control	Select ON/OFF of excitation. 0 = no excitation 1 = excitation

<table>
<tr><th></th><th>bit</th><th>Name</th><th>Description</th></tr>
<tr><td rowspan="5">Parameter 2</td><td>15</td><td rowspan="5">jointSelect</td><td rowspan="5">Specifies the joint number to be controlled.
0 = All joints
1 = Joint #1
2 = Joint #2
3 = Joint #3
4 = Joint #4
5 = Joint #5
6 = Joint #6</td></tr>
<tr><td>14</td></tr>
<tr><td>|</td></tr>
<tr><td>1</td></tr>
<tr><td>0</td></tr>
</table>

Response Syntax

Refer to the following.

Response Codes

Description

The command controls the excitation of the specified joints.

Select ON/OFF of the joint in Parameter 1.

Select the target joints in Parameter 2. When 0 is selected, all joints can be controlled at one time.

Example

To turn ON Joint #3.

Command	Response
0805H 0001H 0003H	0805H 0000H 0000H

9.30.5 Command 2054: Acquires the motor excitation status

Acquires the excitation status of joints.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
Response 1	15	reserved	Returns “0”
	|		
	6		
	5	Joint #6	0 = no excitation 1 = excitation
	4	Joint #5	
	3	Joint #4	
	2	Joint #3	
	1	Joint #2	
	0	Joint #1	

Description

Returns the excitation status of each joint.

9.31 I/O control

The following commands are to output and input to I/O.

- Input/Output by bit (1bit).
- Input/Output by byte(8bits).
- Input/Output by word(16bits).

9.31.1 Command 2100: Acquires the status of the specified input port in bytes

Returns the status of the specified byte port.

Each port contains 8 input channels.

Command Syntax

	bit	Name	Description
Parameter 1	15	byteportNumber	Specifies the byte port of I/O.
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	reserved	Returns “0”.
	|		
	8		
	7	returnValue	Returns the acuqires state by binary.
	6		
	5		
	4		
	3		
	2		
	1		
	0		

Description

By using the command, you can check values of eight input bits at the same time.

Since eight channels can be checked at a time, the return values are integers ranging from 0-255.

See the chart below to check the correspondence of the integer return values and each input channel.

Input Channel Result (Using Byte port #0)

Return Value	7	6	5	4	3	2	1	0
1	off	off	off	off	off	off	off	on
5	off	off	off	off	off	on	off	on
15	off	off	off	off	on	on	on	on
255	on	on	on	on	on	on	on	on

Input Channel Result (Using Byte port #2)

Return Value	23	22	21	20	19	18	17	16
3	off	off	off	off	off	off	on	on
7	off	off	off	off	off	on	on	on
32	off	off	on	off	off	off	off	off
255	on	on	on	on	on	on	on	on

Example

When acquiring the value from byte port #2.

Value	23	22	21	20	19	18	17	16
7	off	off	off	off	off	on	on	on

Command	Response
0834H 0002H	0834H 0007H

9.31.2 Command 2101: Acquires the status of the specified input port in words

Returns the status of the specified input word port.

Each word port contains 16 input bits.

Command Syntax

	bit	Name	Description
Parameter 1	15	byteportNumber	Specifies the byte port of I/O.
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	returnValue	Returns the status of the input port (from 0 to 65535).
	14		
	|		
	1		
	0		

Description

Returns the status of the specified input port by word.

Example

When inputing from the word port #10.

Word Port #10 = 5AA5H

Command	Response
0835H 000AH	0835H 5AA5H

9.31.3 Command 2102: Outputs the byte data to the specified byte output port

Sets 8 output bits simultaneously.

Command Syntax

<table>
<tr><th></th><th>bit</th><th>Name</th><th>Description</th></tr>
<tr><td rowspan="5">Parameter 1</td><td>15</td><td rowspan="5">byteportNumber</td><td rowspan="5">Specifies the byte port of I/O.</td></tr>
<tr><td>14</td></tr>
<tr><td>|</td></tr>
<tr><td>1</td></tr>
<tr><td>0</td></tr>
</table>

<table>
<tr><th></th><th>bit</th><th>Name</th><th>Description</th></tr>
<tr><td rowspan="11">Parameter 2</td><td>15</td><td rowspan="3">reserved</td><td rowspan="3">Returns “0”.</td></tr>
<tr><td>|</td></tr>
<tr><td>8</td></tr>
<tr><td>7</td><td rowspan="8">outData</td><td rowspan="8">Specifies the output byte.</td></tr>
<tr><td>6</td></tr>
<tr><td>5</td></tr>
<tr><td>4</td></tr>
<tr><td>3</td></tr>
<tr><td>2</td></tr>
<tr><td>1</td></tr>
<tr><td>0</td></tr>
</table>

Response Syntax

Refer to the following.

Response Codes

Description

The command simultaneously sets 8 output I/O bits using the combination of the portNumber and outData values. The portNumber parameter specifies which group of 8 outputs to use where portNumber = 0 means outputs 0-7, portNumber = 1 means outputs 8-15, etc.

Once a portNumber is selected, a specific output pattern must be defined. The outData parameter may have a value between 0-255.

The table below shows some of the possible I/O combinations and their associated outData values assuming that portNumber is 0, and 1 accordingly.

Output Settings When portNumber = 0 (Output number)

outData Value	7	6	5	4	3	2	1	0
01	off	off	off	off	off	off	off	on

outData Value	7	6	5	4	3	2	1	0
02	off	off	off	off	off	off	on	off
03	off	off	off	off	off	off	on	on
08	off	off	off	off	on	off	off	off
09	off	off	off	off	on	off	off	on
10	off	off	off	on	off	off	off	off
11	off	off	off	on	off	off	off	on
99	off	on	on	off	off	off	on	on
255	on	on	on	on	on	on	on	on

Output Settings When portNumber = 1 (Output number)

outData Value	15	14	13	12	11	10	9	8
01	off	off	off	off	off	off	off	on
02	off	off	off	off	off	off	on	off
03	off	off	off	off	off	off	on	on
08	off	off	off	off	on	off	off	off
09	off	off	off	off	on	off	off	on
10	off	off	off	on	off	off	off	off
11	off	off	off	on	off	off	off	on
99	off	on	on	off	off	off	on	on
255	on	on	on	on	on	on	on	on

Example

When outputing 255 to Byte Port #10.

Command	Response
0836H 000AH 00FFH	0836H 0000H 0000H

9.31.4 Command 2103: Outputs the word data to the specified word output port

Sets the status of output port to 16 output bits by word simultaneously.

Command Syntax

	bit	Name	Description
Parameter 1	15	wordPortNumber	Specifies the word port of the I/O.
	14		
	|		

	bit	Name	Description
	1		
	0		

	bit	Name	Description
	15		
	14		
Parameter 2	|	outData	Specify the output data (integer from 0 to 65535).
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Changes the current status of the user I/O output port group specified by the word port number to the specified output data.

Example

When outputting 23205(5AA5H) to the Word Port #10.

Command	Response
0837H 000AH 5AA5H	0837H 0000H 0000H

9.31.5 Command 2104: Acquires the bit status of the specified input bit port

Acquires the status of selected input port.

Command Syntax

	bit	Name	Description
	15		
	14		
Parameter 1	|	bitNumber	Specifies the word port of the I/O.
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	status	Return the status of the selected input. 0 = OFF 1 = ON
	14		
	|		
	1		
	0		

***Description**

The command checks the status of I/O input. This is most commonly used to check the status of sensors connected to the loader, conveyor, gripper solenoid, or other peripheral devices which works via I/O. Input status are “1” or “0”. They indicate ON (1) or OFF (0) of the device.

Example

When acquiring the status of bit number 15.

Bit number 15 is ON.

Command	Response
0838H 000FH	0838H 0001H

9.31.6 Command 2105: Turns ON the output of the specified bit port

Turns ON the specified output bit.

Command Syntax

	bit	Name	Description
Parameter 1	15	bitNumber	Specifies the bit number to be turned ON.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

The command turns ON (sets to 1) the specified output.

> ⚠ CAUTION
>
> - Output bits configured as remote
>   If an output bit which was set up as remote is specified, an error will occur. Remote output bits are turned ON or OFF automatically according to system status.
> - When an emergency stop occurs
>   The Controller has a feature which causes all outputs to go off when an E-Stop occurs. To keep the setting in emergency, follow the procedure described in the following.
>   “Epson RC+ User’s Guide” - [Setup]-[System Configuration]-[Controller]-[Preferences]-Output port OFF with emergency stop”

Example

When turning ON the output bit number 15.

Command	Response
0839H 000FH	0839H 0000H 0000H

9.31.7 Command 2106: Turns OFF the output of the specified bit port

Turns OFF the specified output bit.

Command Syntax

	bit	Name	Description
Parameter 1	15	bitNumber	Specifies the bit number to be turned OFF.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

The command turns OFF (sets to 0) the specified output.

> ⚠ CAUTION
>
> - Output bits configured as remote
>   If an output bit which was set up as remote is specified, an error will occur. Remote output bits are turned ON or OFF automatically according to system status.

- When an emergency stop occurs
  The Controller has a feature which causes all outputs to go off when an E-Stop occurs. To keep the setting in emergency, follow the procedure described in the following.
  "Epson RC+ User's Guide"

Example

When turning OFF the output bit number 15.

Command	Response
083AH 000FH	083AH 0000H 0000H

9.31.8 Command 2107: Acquires the status of the specified memory I/O port in bytes

Acquires the status of the specified memory I/O port.

Each port contains 8 memory bits.

Command Syntax

	bit	Name	Description
Parameter 1	15	byteportNumber	Specifies the byte port of the memory I/O.
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	reserved	Returns "0".
	|		
	8		
	7	returnValue	Returns the integer from 0 to 255. The return value is 8 bits, with each bit corresponding to 1 memory I/O bit.
	6		
	5		
	4		
	3		
	2		
	1		
	0		

Description

By using the command, you can check values of eight memory I/O bits at the same time.

Since eight channels can be checked at a time, the return values are integers ranging from 0-255. See the chart below to check the correspondence of the integer return values and each memory I/O bit.

Memory I/O Bit Result (Using Port #0)

Return Value	7	6	5	4	3	2	1	0
1	off	off	off	off	off	off	off	on
5	off	off	off	off	off	on	on	on
15	off	off	off	off	on	on	on	on
255	on	on	on	on	on	on	on	on

Memory I/O Bit Result (Using Port #31)

Return Value	255	254	253	252	251	250	249	248
3	off	off	off	off	off	off	on	on
7	off	off	off	off	off	on	on	on
32	off	off	on	off	off	off	off	off
255	on	on	on	on	on	on	on	on

Example

When acquiring the status of Port #0.

The status of Port #0 is 32.

Command	Response
083BH 0000H	083BH 0010H

9.31.9 Command 2108: Acquires the status of the specified memory I/O port in words

Acquires the status of the specified memory I/O word port.

Each word port contains 16 memory I/O bits.

Command Syntax

	bit	Name	Description
Parameter 1	15	wordPortNumber	Specifies the memory I/O word port.
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	returnValue	Returns the status of the memory I/O (from 0 to 65535).
	14		
	|		
	1		
	0		

Description

Returns the status of the specified memory I/O word port.

Example

When acquiring the status of Port #1.

The status of Port #1 is 65535.

Command	Response
083CH 0001H	083CH FFFFH

9.31.10 Command 2109: Sets the specified memory I/O port in bytes

Simultaneously sets 8 memory I/O bits.

Command Syntax

	bit	Name	Description
Parameter 1	15	bytePortNumber	Specifies the byte port of the memory I/O.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	reserved	Returns “0”.
	|		
	8		

	7	outData	Returns the output pattern of the output group specified by portNumber by an integer from 0 to 255.
	6		
	5		
	4		
	3		
	2		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

The command simultaneously sets eight memory I/O bits using the combination of portNumber and outData values. The portNumber parameter specifies which group of 8 outputs to be used.

For example, if portNumber = 0, output bits 0-7 are used. If portNumber = 1, output bits 8-15 are used..

Once portNumber is selected, a specific output pattern must be defined using the outData parameter. The outData parameter is an integer value between 0-255.

The tables below show combination examples of I/O and their associated outData values when portNumber is 0 or 1 accordingly.

Output Settings When portNumber = 0 (Output number)

outData Value	7	6	5	4	3	2	1	0
01	off	off	off	off	off	off	off	on
02	off	off	off	off	off	off	on	off
03	off	off	off	off	off	off	on	on
08	off	off	off	off	on	off	off	off
09	off	off	off	off	on	off	off	on
10	off	off	off	on	off	off	off	off
11	off	off	off	on	off	off	off	on
99	off	on	on	off	off	off	on	on
255	on	on	on	on	on	on	on	on

Output Settings When portNumber = 1 (Output number)

outData Value	15	14	13	12	11	10	9	8
01	off	off	off	off	off	off	off	on

outData Value	15	14	13	12	11	10	9	8
02	off	off	off	off	off	off	on	off
03	off	off	off	off	off	off	on	on
08	off	off	off	off	on	off	off	off
09	off	off	off	off	on	off	off	on
10	off	off	off	on	off	off	off	off
11	off	off	off	on	off	off	off	on
99	off	on	on	off	off	off	on	on
255	on	on	on	on	on	on	on	on

Example

When outputting 254 to Port #1.

Command	Response
083DH 0001H 00FEH	083DH 0000H 0000H

9.31.11 Command 2110: Sets the specified memory I/O port in words

Sets the status of 16 memory I/O ports by word simultaneously.

Command Syntax

	bit	Name	Description
Parameter 1	15	wordPortNumber	Specifies the memory I/O word (from 0 to 31).
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	outData	Specifies the memory I/O data (integer from 0 to 65535).
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Changes the current status of memory I/O port group specified by the word port number to the specified output data.

Example

When outputting 65535 to Port #1.

Command	Response
083EH 0001H FFFFH	083EH 0000H 0000H

9.31.12 Command 2111: Acquires the status of the specified memory I/O bit

Acquires the status of the specified memory I/O bit.

Command Syntax

	bit	Name	Description
Parameter 1	15	bitNumber	Specifies the value representing the memory I/O bit number.
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	returnValue	Returns the status of specified bit. 0 = OFF 1 = ON
	14		
	|		
	1		
	0		

Description

Returns the status of specified memory I/O bit.

Example

When acquring the statsu of Bit #20.

Bit #20 is ON.

Command	Response
083FH 0014H	083FH 0001H

9.31.13 Command 2112: Turns ON the specified bit of the memory I/O

Turns ON the specified bit of the memory I/O.

Command Syntax

	bit	Name	Description
Parameter 1	15	bitNumber	Specifies the memory I/O bit by an integer.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Turns ON (set to 1) the specified bit of the memory I/O.

Example

When turing ON the Bit #30.

Command	Response
0840H 001EH	0840H 0000H 0000H

9.31.14 Command 2113: Turns OFF the specified bit of the memory I/O

Turns OFF the specified bit of the memory I/O.

Command Syntax

	bit	Name	Description
Parameter 1	15	bitNumber	Specifies the memory I/O bit by an integer.
	14		
	|		
	1		
	0		

Response Syntax

Refer to the following.

Response Codes

Description

Turns OFF (set to 0) the specified bit of the memory I/O.

Example

When turing OFF the Bit #30.

Command	Response
0841H 001EH	0840H 0000H 0000H

9.31.15 Command 2114: Acquires the status of the specified output bit

Acquires the status of selected output port.

Command Syntax

	bit	Name	Description
Parameter 1	15	bitNumber	Specifies the word port of the I/O.
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	status	Returns the status of the selected output. 0 = OFF 1 = ON
	14		
	|		
	1		
	0		

Description

The command checks the status of I/O output. Output status are “1” or “0”. They indicate ON (1) or OFF (0) of output.

Example

When acquiring the status of bit number 15.
Bit number 15 is ON.

Command	Response
0842H 000FH	0842H 0001H

9.31.16 Command 2150: Acquires the current position of the manipulator

Returns the current position of the manipulator.

Command Syntax

<table>
<tr><th></th><th>bit</th><th>Name</th><th>Description</th></tr>
<tr><td rowspan="10">Parameter 1</td><td>15</td><td rowspan="3">reserved</td><td rowspan="3">Specify “0”</td></tr>
<tr><td>|</td></tr>
<tr><td>6</td></tr>
<tr><td>5</td><td rowspan="2">format</td><td rowspan="2">Select the format of data.
0: World
1: Joint
2: Pulse
3: Flag</td></tr>
<tr><td>4</td></tr>
<tr><td>3</td><td>reserved</td><td>Specify “0”</td></tr>
<tr><td>2</td><td rowspan="3">axisSelection</td><td rowspan="3">Specifies the coordinate or axis to acquire the position.
*If “3: Flag” is selected in Format, specify “0”.

[Format: World]
1: X coordinate
2: Y coordinate
3: Z coordinate
4: U coordinate
5: V coordinate
6: W coordinate

[Format: Joint or Pulse]
1: Joint #1
2: Joint #2
3: Joint #3
4: Joint #4
5: Joint #5
6: Joint #6</td></tr>
<tr><td>1</td></tr>
<tr><td>0</td></tr>
</table>

Response Syntax

Format of the response data varies depending on the format of data to be acquired.

When format is either World, Joint, or Pulse.

<table>
<tr><th></th><th>bit</th><th>Name</th><th>Description</th></tr>
<tr><td rowspan="5">Response 1</td><td>15</td><td rowspan="5">position
High-order word</td><td rowspan="5">Returns the high-order word (16 bit) of the position.</td></tr>
<tr><td>14</td></tr>
<tr><td>|</td></tr>
<tr><td>1</td></tr>
<tr><td>0</td></tr>
</table>

	bit	Name	Description
Response 2	15	position Low-order word	Returns the low-order word (16 bit) of the position.
	14		
	|		
	1		
	0		

When World or Joint is selected

Returns the position information as the actual value 1000 converted to a 32-bit integer.

If the setting value is a negative number, returns the value in 32-bit two’s complement.

- When World is selected:
  X, Y, Z = mm
  U, V, W = deg

- When Joint is selected:
  For prismatic joints, Unit: mm
  For rotational joints, Unit: deg

- When Pulse is selected
  Returns the value by pulse (32-bit integer without offset)

When format is Flag.

	bit	Name	Description
Response 1	15	reserved	Specify “0”
	|		
	3		
	2	wrist	0 = NoFlip 1 = Flip *Effective only for 6-axis manipulators.
	1	elbow	0 = Above 1 = Below *Effective only for 6-axis manipulators.
	0	hand	0 = Lefty 1 = Righty

	bit	Name	Description
Response 2	15	localNumber	Returns the local number
	14		
	|		
	1		

	bit	Name	Description
	0		

	bit	Name	Description
Response 3	15	J4flag	Returns the statsu of j4flag. 0 = J4F0 1 = J4F1 *Effective only for 6-axis manipulators.
	14		
	｜		
	1		
	0		

	bit	Name	Description
Response 4	15	J6flag	Returns the status of j6flag. 0 = J6F0 ｜ 127 = J6F127 *Effective only for 6-axis manipulators.
	14		
	｜		
	1		
	0		

Description

The command returns the information of current manipulator position. This command can be executed when the manipulator is stopped.

Select the information to be acquired in Parameter 1 .

To acquire the position information, for instance, select either World, Joint, or Pulse in format and select axis to acquire the information.

To acquire all information, the command must be executed several times.

Example

When acquring Y-axis coordinate in World.

Y coordinate is 100.002 mm.

Command	Response
0866H 0002H	0866H 0001H 86A2H

9.31.17 Command 2151: Acquires the distance between 2 manipulator coordinates

Acquires the distance between two manipulator coordinates.

Command Syntax

	bit	Name	Description
Parameter 1	15	P1	Specify one of two point numbers to acquire the distance.
	14		
	|		
	1		
	0		

	bit	Name	Description
Parameter 2	15	P2	Specify one of two point numbers to acquire the distance.
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	position High-order word	Returns the acquired distance (mm/ real number) as the value × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

	bit	Name	Description
Response 2	15	position Low-order word	Returns the acquired distance (mm/ real number) as the value × 1000 converted to a 32-bit integer. High-order side 16 bit.
	14		
	|		
	1		
	0		

Description

Returns the distance between two manipulator coordinates. (Unit: mm)

Example

When acquiring the distance between P1 and P2.

The distance is 100.002 mm.

Command	Response

0867H 0001H 0002H	0867H 0001H 86A2H

9.31.18 Command 2152: Acquires whether the PTP (point to point) motion from the current position to the target position is possible

Returns the status whether the PTP (Point to Point) motion from the current position to a target position is possible or not.

Command Syntax

	bit	Name	Description
Parameter 1	15	pointNumber	Specifies the point number to verify.
	14		
	|		
	1		
	0		

Response Syntax

	bit	Name	Description
Response 1	15	result	Returns whether the PTP motion to the target position ir possible or not. 0 = Impossible 1 = Possible
	14		
	|		
	1		
	0		

Description

This command verifies whether the manipulator can reach to the target position and the orientation before actual operation. The motion trajectory to the target point is not considered.

Example

When verifying the motion to P2. When the motion is possible.

Command	Response
0868H 0002H	0868H 0001H

9.31.19 Command 2153: Acquires the manipulator type

Acquires the manipulator type.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
Response 1	15	type	Returns the manipulator type. 1: Joint 2: Cartesian 3: SCARA 5: 6-AXIS 6: RS series
	14		
	|		
	1		
	0		

Description

Returns the manipulator type.

Example

When the manipulator is 6-AXIS .

Command	Response
0869H	0869H 0005H

9.31.20 Command 2154: Acquires the manipulator model name

Returns the manipulator model name.

Command Syntax

	bit	Name	Description
Parameter 1	15	reserved	Specify “0”
	|		
	1		
	0	Start / Continue	Specify whether to acquire the manipulator model name from the top. 0 = Acquire continuously 1 = Start from the top

Response Syntax

	bit	Name	Description
Response 1	15	reserved	Returns “0”
	|		
	3		
	2	acquisitionStatus	0 = Indicates the last character. 1 = Indicates there is character(s) remained. 2 = Indicates the sending is completed.
	1		
	0		

	bit	Name	Description
Response 2	15	reserved	Returns “0”
	|		
	8		
	7	charaCode	ASCII code
	|		
	0		

Description

Returns the string containing the model name. This is the name shown on the rear panel of the manipulator.

To acquire the model name, follow the steps below.

1. Specify “1=Start from the top” in Parameter 1 and issue the command.
2. Acquire the first character from the response.
3. Specify “0=Acquire continuously” in Parameter 1 and issue the command.
4. Acquire one character from the response.
5. Check the status of response and repeat the steps from the step 3) if the character is left (1).
6. If the response status is “0” (the last character), finish the acquisition.

Example

When the model name is “G6-551S-II”.

Command	Response
086AH 0001H	086AH 0001H 0047H
086AH 0000H	086AH 0001H 0036H
086AH 0000H	086AH 0001H 002DH
086AH 0000H	086AH 0001H 0035H
086AH 0000H	086AH 0001H 0035H
086AH 0000H	086AH 0001H 0031H
086AH 0000H	086AH 0001H 0053H
086AH 0000H	086AH 0001H 002DH
086AH 0000H	086AH 0001H 0049H
086AH 0000H	086AH 0000H 0049H

9.31.21 Command 2155: Acquires the Controller error information

Acquires the error code during the controller error.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
Response 1	15	errorCode	Returns the controller error code.
	14		
	|		
	1		
	0		

Description

Acquires the error code when controller is in the error state. When executed the command during normal state, error code 0000H will be returned.

9.31.22 Command 2156: Acquires the control device

Returns the number of the current control device.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
Response 1	15	Control device number	21: PC/ TP4 22: Remote I/O 26: Remote Ethernet 29: Remote RS232C 20: TP3
	14		
	|		
	1		
	0		

Description

Returns the number of control device set in the controller.

When executed the command during normal state, control device number 22 will be returned.

9.31.23 Command 2157: Acquires PLC vender type

Returns the number of PLC vender.

Command Syntax

No parameter

Response Syntax

	bit	Name	Description
Response 1	15	PLC Vender Number	0: None 1: Allen Bradley 2: CODESYS
	14		
	|		
	1		
	0		

Description

Returns PLC vender number set in the controller.