

# **X-SEL (Cartesian/IX SCARA)**

## **Serial Communication Protocol Specification (Format B)**

X-SEL (Cartesian) Main Application V0.52

X-SEL (IX SCARA) Main Application V0.23

***IAI America, Inc.***

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## Table of Contents

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1. OVERVIEW .....	6
2. TRANSMISSION CONTROL PROCEDURE .....	7
3. OUTLINE OF MESSAGE.....	9
4. MESSAGE DETAILS .....	11
4-1. Message List.....	11
4-2. Error Response.....	13
4-3. Message Details.....	14
4-3-1. Error Response .....	14
4-3-2. Test Call (200H) .....	15
4-3-3. Version Code Query .....	16
4-3-4. Number of Effective Point Data Query (208H) .....	17
4-3-5. Effective Point Data Query (209H) .....	18

4-3-6.	Input Port Query (20BH) .....	19
4-3-7.	Output Port Query (20CH) .....	20
4-3-8.	Flag Query (20DH).....	21
4-3-9.	Integer Variable Query (20EH) .....	22
4-3-10.	Real Variable Query (20FH) .....	23
4-3-11.	String Variable Query (210H) .....	25
4-3-12.	Axis Status Query (212H) .....	26
4-3-13.	Program Status Query (213H) .....	28
4-3-14.	System Status Query (215H) .....	29
4-3-15.	Error Detail Information Query (216H) .....	31
4-3-16.	Servo ON/OFF (232H) .....	33
4-3-17.	Origin Return (233H).....	34
4-3-18.	Absolute-Coordinate Specification Movement (234H).....	35
4-3-19.	Relative-Coordinate Specification Movement (235H) .....	36

4-3-20.	Jogging/Inching (236H) .....	37
4-3-21.	Point-Number Specification Movement (237H) .....	38
4-3-22.	Operation Stop & Cancel (238H) .....	39
4-3-23.	Point Data Range-Specification Continuous Write (244H) .....	40
4-3-24.	Change Point Data Continuous Write (245H) .....	41
4-3-25.	Point Data Clear (246H) .....	42
4-3-26.	Output Port Status Change (24AH) .....	43
4-3-27.	Flag Status Change (24BH) .....	44
4-3-28.	Integer Variable Change (24CH) .....	45
4-3-29.	Real Variable Change (24DH) .....	46
4-3-30.	String Variable Change (24EH) .....	47
4-3-31.	Alarm Reset (252H) .....	48
4-3-32.	Program Run (253H), Program End (254H), Program Pause (255H), Program One-Step Run (256H), Program Resume (257H) .....	49

4-3-33.	Software Reset (25BH).....	50
4-3-34.	Drive-Source Recovery Request (25CH).....	51
4-3-35.	Operation Pause Cancellation Request (25EH).....	52
4-3-36.	Speed Change (262H) .....	53
4-3-37.	Coordinate System Definition Data Range-Specification Continuous Query (2A0H) .....	54
4-3-38.	SCARA Axis Status Query (2A1H).....	55
4-3-39.	Simple-Interference-Check-Zone Definition Data Range-Specification Continuous Query (2A2H).....	57
4-3-40.	SCARA Absolute-Coordinate Specification Movement (2D4H) .....	59
4-3-41.	SCARA Relative-Coordinate Specification Movement (2D5H) .....	60
4-3-42.	SCARA Point-Number Specification Movement (2D6H) .....	61
5.	TIMEOUT AND RETRY .....	62
6.	CHANGE HISTORY .....	63

# 1. Overview

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This specification covers the communication protocol between the host and the X-SEL controller (Cartesian/IX SCARA).

The X-SEL controller can communicate with the host based on this protocol, in the AUTO mode and using the host connector, if “I/O parameter No. 90: Usage of user-open channel 1” is set to 2 (IAI protocol B (slave)).

The communication conditions are summarized in the table below. (For details on RS232C interface, refer to the operation manual for the controller.)

Item	Communication condition	Setting parameter (*1)
Communication interface	RS232C	
Communication speed	9.6 kbps, 19.2 kbps, 38.4 kbps	“I/O parameter No. 92”
Data length	7 bits, 8 bits	“I/O parameter No. 93”
Stop bit length	1 bit, 2 bits	“I/O parameter No. 94”
Parity	None, odd, even	“I/O parameter No. 95”

\*1 A desired communication condition for each item can be selected by parameter setting.

## 2. Transmission Control Procedure

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### **Controller Setting**

Change the following settings if you wish to enable communication between the host (master station) and the controller (slave station) using this protocol:

- (1) Parameter settings
  - Set "I/O parameter No. 90" to 2 (IAI protocol)
  - Set "I/O parameter Nos. 91 through 95" to the applicable communication conditions with the host (communication speed, data length, stop bit length and parity).
- (2) Set the mode switch on the controller to AUTO (automatic mode).
- (3) Connect the host to the host connector on the controller.

#### Note

- 1 Communication via the host connector is enabled only in the AUTO (automatic) mode (the settings in (1) are required before this protocol can be used). Since the host connector cannot be used simultaneously with the teaching-pendant connector, communication via the teaching-pendant connector will be selected in the MANU (manual) mode and communication cannot be established using the host connector. Exercise caution.
- 2 Refer to the operation manual supplied with the controller for connection between the host and the host connector.

### **Message Transmission Timing**

Under the basic transmission control procedure, one unit of transmission consists of command transmission from the master station (host) and response transmission from the receiving slave station (controller). The switching timing of transmission between the master station and slave station conforms to the following rules:

- (1) Minimum delay time after completion of command reception by the slave station (controller) before start of response transmission =  $\alpha$  msec

$\alpha$  is the setting of "I/O parameter No. 97: User-open SIO channel 1, IAI-protocol response minimum delay time" (this parameter is available in X-SEL (Cartesian) main application V0.26 or later and X-SEL (IX SCARA)). The slave station (controller) will start sending a response message when this time has elapsed after completing the reception of a command message. The master station (host) must become reception-ready within this time after completing the transmission of a command message.

- (2) Minimum delay time after completion of response reception by the master station (host) before start of command transmission = 1 msec

The slave station (controller) will become reception-ready within this time after completing the transmission of a response message. The master station (host) must start sending the next command message only when this time has elapsed after completing the reception of a response message.

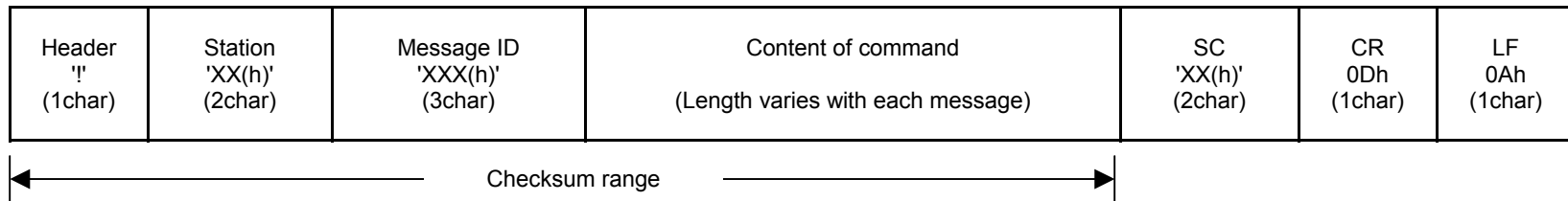


### 3. Outline of Message

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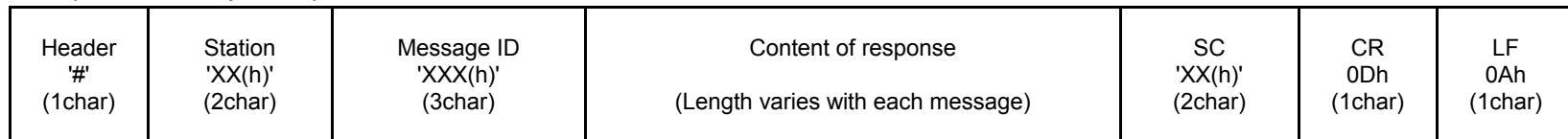
Both commands and responses conform to the respective variable-length formats shown below.

#### (1) Command Format

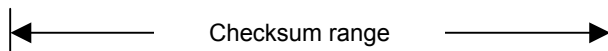
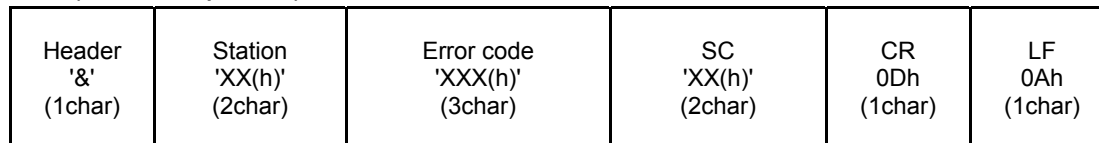


#### (2) Response Format

(Normal response)



(Error response)



**Header:** Indicate the start of a command/response message. The header specifies one of the following message categories:  
     '!' (21H) - - - Command  
     '#' (23H) - - - Normal response  
     '&' (26H) - - - Error response

**Station:** Indicate the station number of the controller (value of "I/O parameter No. 91: User-open SIO channel 1, station code").

**Message ID:** A three-digit hexadecimal code indicates the message type. (Refer to 4-1, "Message List.")

**Message content:** Set data varies with each message. (Refer to 4-3, "Message Details," for details on each message.)

**SC:** Checksum

**CR (0DH):** Indicate the end of a command/response.

**LF (0AH):** Indicate the end of a command/response.

### Calculation of Checksum (SC)

A checksum is used to verify if the communication has been successful. The communication is deemed successful if the checksum calculated from the received data is the same as the checksum in the message. Each checksum is an ASCII code representing the lower byte of the total sum calculated by adding the message values represented in one byte length from the beginning of the message to immediately before the checksum. You can disable the controller's checksum function by entering '@@' as the checksum.

Example: Effective Point Data Query

'!'	'99'		'209'			'001'			'005'			SC		CR	LF
21H	39H	39H	32H	30H	39H	30H	30H	31H	30H	30H	35H	▲	▲	0DH	0AH

Total sum = 21H+39H+39H+32H+30H+39H  
               +30H+30H+31H+30H+30H+35H  
               = 254H

35H  
( '5' )      34H  
( '4' )

The checksum is calculated as '54.'

## 4. Message Details

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### 4-1. Message List

Message ID	Message name	Type	Applicable type		Page
			Cartesian	IX SCARA	
	Error response	Common	○	○	14
200H	Test call	Query	○	○	15
201H	Version code query	Query	○	○	16
208H	Number of effective point data query	Query	○	○	17
209H	Effective point data query	Query	○	○	18
20BH	Input port query	Query	○	○	19
20CH	Output port query	Query	○	○	20
20DH	Flag query	Query	○	○	21
20EH	Integer variable query	Query	○	○	22
20FH	Real variable query	Query	○	○	23
210H	String variable query	Query	○	○	25
212H	Axis status query	Query	○		26
213H	Program status query	Query	○	○	28
215H	System status query	Query	○	○	29
216H	Error detail information query	Query	○	○	31
232H	Servo ON/OFF	Execute	○	○	33
233H	Origin return	Execute	○	*1	34
234H	Absolute-coordinate specification movement	Execute	○		35
235H	Relative-coordinate specification movement	Execute	○		36
236H	Jogging/inching	Execute	○	○	37

Message ID	Message name	Type	Applicable type		Page
			Cartesian	IX SCARA	
237H	Point-number specification movement	Execute	○		38
238H	Operation stop & cancel	Execute	○	○	39
244H	Point data range-specification continuous write	Execute	○	○	40
245H	Change point data continuous write	Execute	○	○	41
246H	Point data clear	Execute	○	○	42
24AH	Output port status change	Execute	○	○	43
24BH	Flag status change	Execute	○	○	44
24CH	Integer variable change	Execute	○	○	45
24DH	Real variable change	Execute	○	○	46
24EH	String variable change	Execute	○	○	47
252H	Alarm reset	Execute	○	○	48
253H	Program run	Execute	○	○	49
254H	Program end	Execute	○	○	49
255H	Program pause	Execute	○	○	49
256H	Program one-step run	Execute	○	○	49
257H	Program resume	Execute	○	○	49
25BH	Software reset	Execute	○	○	50
25CH	Drive-source recovery request	Execute	○	○	51
25EH	Operation pause cancellation request	Execute	○	○	52
262H	Speed change	Execute	○		53
2A0H	Coordinate system definition data range-specification continuous query	Query		○	54
2A1H	SCARA axis status query	Query		○	55

Message ID	Message name	Type	Applicable type		Page
			Cartesian	IX SCARA	
2A2H	Simple-interference-check-zone definition data range-specification continuous query	Query		○	57
2D4H	SCARA absolute-coordinate specification movement	Execute		○	59
2D5H	SCARA relative-coordinate specification movement	Execute		○	60
2D6H	SCARA point-number specification movement	Execute		○	61

\*1 This can be used only by IAI as a “Z-axis ABS reset position movement” command.

## 4-2. Error Response

If, for some reason, the slave station (controller) cannot execute the command from the master station (host) that has been received as a normal command by the slave station (controller), an error response will be sent to the master station (host). Each error response stores an error number, so identify the cause of failed command execution based on the error number and take an appropriate action. Refer to 4-3-1, “Error Response,” for details on the error response format.

### 4-3. Message Details

The maximum cumulative data size in the message map only indicates the maximum data size allowable by the format structure. The actual size of transmittable messages will be limited by the sizes of the controller's receive buffer and send buffer.

\* As of June 26, 2001, the maximum receivable size of the controller is 1023 bytes, while the maximum transmittable size is 1024 bytes.

#### 4-3-1. Error Response

Function: Notify the content of an error that occurred with respect to a command.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Error response	Header	'&'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Error code	'XXX(h)'	3	6	○			○		Indicate the error type.	
	SC	'XX(h)'	2	8	○			○			
	CR	0Dh	1	9	○			○			
	LF	0Ah	1	10	○			○			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal.											
(Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											

#### 4-3-2. Test Call (200H)

Function: Perform communication test. The same data as in the command will be returned.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'!'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'200(h)'	3	6	○			○			
	String	'XXXXXXXXXX'	10	16	○			○		Arbitrary string (10 bytes)	
	SC	'XX(h)'	2	18	○			○			
	CR	0Dh	1	19	○			○			
	LF	0Ah	1	20	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'200(h)'	3	6	○			○			
	String	'XXXXXXXXXX'	10	16	○			○		Same string as in the command (10 bytes)	
	SC	'XX(h)'	2	18	○			○			
	CR	0Dh	1	19	○			○			
	LF	0Ah	1	20	○			○			
Error response	Error response format	Refer to the error response format.	10	10	○			○			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											

### 4-3-3. Version Code Query (201H)

Function: Query the version code of the software.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'!'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'201(h)'	3	6	○			○			
	Unit type	'XX(h)'	2	8	○			○		0 = Main CPU application / 1 = Main CPU core / 2 = Driver CPU	
	Device number	'X(h)'	1	9	○			○		Number that specifies the device (0 ~)	
	SC	'XX(h)'	2	11	○			○			
	CR	0Dh	1	12	○			○			
	LF	0Ah	1	13	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'201(h)'	3	6	○			○			
	Unit type	'XX(h)'	2	8	○			○		0 = Main CPU application / 1 = Main CPU core / 2 = Driver CPU	
	Device number	'X(h)'	1	9	○			○		Number that specifies the device (0 ~)	
	Model code	'XX(h)'	2	11	○			○			
	Unit code	'XX(h)'	2	13	○			○			
	Version number	'XXXX(h)'	4	17	○			○			
	Time	'XXXX(h)'	4	21	○			○		Year (4 digits, hexadecimal ASCII code)	
	Time	'XX(h)'	2	23	○			○		Month (1 to 12, hexadecimal ASCII code)	
	Time	'XX(h)'	2	25	○			○		Day (1 to 31, hexadecimal ASCII code)	
	Time	'XX(h)'	2	27	○			○		Hours (0 to 23, hexadecimal ASCII code)	
	Time	'XX(h)'	2	29	○			○		Minutes (0 to 59, hexadecimal ASCII code)	
	Time	'XX(h)'	2	31	○			○		Seconds (0 to 59, hexadecimal ASCII code)	
	SC	'XX(h)'	2	33	○			○			
	CR	0Dh	1	34	○			○			
	LF	0Ah	1	35	○			○			
Error response	Error response format	Refer to the error response format.	10	10	○			○			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											



#### 4-3-4. Number of Effective Point Data Query (208H)

Function: Query the number of effective point data.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'!'	1	1	<input type="radio"/>			<input type="radio"/>			
	Station	'XX(h)'	2	3	<input type="radio"/>			<input type="radio"/>			
	Message ID	'208(h)'	3	6	<input type="radio"/>			<input type="radio"/>			
	SC	'XX(h)'	2	8	<input type="radio"/>			<input type="radio"/>			
	CR	0Dh	1	9	<input type="radio"/>			<input type="radio"/>			
	LF	0Ah	1	10	<input type="radio"/>			<input type="radio"/>			
Normal response	Header	'#'	1	1	<input type="radio"/>			<input type="radio"/>			
	Station	'XX(h)'	2	3	<input type="radio"/>			<input type="radio"/>			
	Message ID	'208(h)'	3	6	<input type="radio"/>			<input type="radio"/>			
	Number of effective point data	'XXX(h)'	3	9	<input type="radio"/>			<input type="radio"/>			
	SC	'XX(h)'	2	11	<input type="radio"/>			<input type="radio"/>			
	CR	0Dh	1	12	<input type="radio"/>			<input type="radio"/>			
	LF	0Ah	1	13	<input type="radio"/>			<input type="radio"/>			
Error response	Error response format	Refer to the error response format.	10	10	<input type="radio"/>			<input type="radio"/>			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											

#### 4-3-5. Effective Point Data Query (209H)

Function: Query data for the number of query points from the query head point number, and return the number of effective point data and the data.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	!	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'209(h)'	3	6	○			○			
	Query head point number	'XXX(h)'	3	9	○			○			
	Number of query records	'XXX(h)'	3	12	○			○		The number of records will be limited based on the send/receive buffers.	
	SC	'XX(h)'	2	14	○			○			
	CR	0Dh	1	15	○			○			
	LF	0Ah	1	16	○			○			
Normal response	Header	#	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'209(h)'	3	6	○			○			
	Number of effective records	'XXX(h)'	3	9	○			○		The number of records will be limited based on the send/receive buffers.	
	Point data (*1)	Point number	'XXX(h)'	12	12	○		○			
		Axis pattern	'XX(h)'	14	14	○		○			
		Acceleration	'XXXX(h)'	18	18	○		○	0.01 G		
		Deceleration	'XXXX(h)'	22	22	○		○	0.01 G		
		Speed	'XXXX(h)'	26	26	○		○	mm/sec		
		Position data (*2)	'XXXXXXXX(h)'	34	34	○		○	0.001 mm		
		Position data repetition for remaining effective axes	Data indicated by *2 for the number of remaining effective axes	MAX 90	MAX 90	○		○	0.001 mm	Data indicated by *2 x Number of remaining effective axes = 8 bytes x (Max 8 – 1) axes = Max 56 bytes	
	Point data repetition for remaining records		Data indicated by *1 for the number of remaining records	MAX 242919	MAX 243009	Refer to the data indicated by *1.				Data indicated by *1 x Number of remaining records = Max 81 bytes x (Max 3000 records – 1) = Max 242919 bytes	
	SC	'XX(h)'	2	MAX 243011	○			○			
	CR	0Dh	1	MAX 243012	○			○			
	LF	0Ah	1	MAX 243013	○			○			
Error response	Error response format	Refer to the error response format.	10	10	○			○			

(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal.

(Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.

#### 4-3-6. Input Port Query (20BH)

Function: Query input ports.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'!'	1	1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
	Station	'XX(h)'	2	3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
	Message ID	'20B(h)'	3	6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
	Query start port number	'XXXX(h)'	4	10	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		Be sure to specify "Category head port number + Multiple of 8."	
	Number of query ports	'XXXX(h)'	4	14	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		The number of ports will be limited based on the send/receive buffers.	
	SC	'XX(h)'	2	16	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
	CR	0Dh	1	17	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
	LF	0Ah	1	18	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
Normal response	Header	'#'	1	1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
	Station	'XX(h)'	2	3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
	Message ID	'20B(h)'	3	6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
	Response start port number	'XXXX(h)'	4	10	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
	Number of response ports	'XXXX(h)'	4	14	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		The number of ports will be limited based on the send/receive buffers.	
	Input port data (*1)	'XX(h)'	2	16	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		8 bits from the head input port	
	Remaining input port data	Data indicated by *1 for the number of remaining data	MAX 16382	MAX 16398	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		Remaining input port data = 2 bytes x (Max 8192 – 1) = 16382 bytes	
	SC	'XX(h)'	2	MAX 16400	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
	CR	0Dh	1	MAX 16401	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
	LF	0Ah	1	MAX 16402	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
Error response	Error response format	Refer to the error response format.	10	10	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											

#### 4-3-7. Output Port Query (20CH)

Function: Query output ports.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'!'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'20C(h)'	3	6	○			○			
	Query start port number	'XXXX(h)'	4	10	○			○		Be sure to specify "Category head port number + Multiple of 8."	
	Number of query ports	'XXXX(h)'	4	14	○			○		The number of ports will be limited based on the send/receive buffers.	
	SC	'XX(h)'	2	16	○			○			
	CR	0Dh	1	17	○			○			
	LF	0Ah	1	18	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'20C(h)'	3	6	○			○			
	Response start port number	'XXXX(h)'	4	10	○			○			
	Number of response ports	'XXXX(h)'	4	14	○			○		The number of ports will be limited based on the send/receive buffers.	
	Output port data (*1)	'XX(h)'	2	16	○			○		8 bits from the head output port	
	Remaining output port data	Data indicated by *1 for the number of remaining data	MAX 16382	MAX 16398	○			○		Remaining output port data = 2 bytes x (Max 8192 – 1) = 16382 bytes	
	SC	'XX(h)'	2	MAX 16400	○			○			
	CR	0Dh	1	MAX 16401	○			○			
	LF	0Ah	1	MAX 16402	○			○			
Error response	Error response format	Refer to the error response format.	10	10	○			○			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											

#### 4-3-8. Flag Query (20DH)

Function: Query flags.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'!'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'20D(h)'	3	6	○			○			
	Program number	'XX(h)'	2	8	○			○		'00(h)' in the case of global flag specification	
	Query start flag number	'XXXX(h)'	4	12	○			○		Be sure to specify "Category head flag number + Multiple of 8."	
	Number of query flags	'XXXX(h)'	4	16	○			○		The number of flags will be limited based on the send/receive buffers.	
	SC	'XX(h)'	2	18	○			○			
	CR	0Dh	1	19	○			○			
	LF	0Ah	1	20	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'20D(h)'	3	6	○			○			
	Program number	'XX(h)'	2	8	○			○		'00(h)' in the case of global flag specification	
	Response start flag number	'XXXX(h)'	4	12	○			○			
	Number of response flags	'XXXX(h)'	4	16	○			○		The number of flags will be limited based on the send/receive buffers.	
	Flag data (*1)	'XX(h)'	2	18	○			○		8 bits from the head flag.	
	Remaining flag data	Data indicated by *1 for the number of remaining data	MAX 16382	MAX 16400	○			○		Remaining flag data = 2 bytes x (Max 8192 – 1) = 16382 bytes	
	SC	'XX(h)'	2	MAX 16402	○			○			
	CR	0Dh	1	MAX 16403	○			○			
	LF	0Ah	1	MAX 16404	○			○			
Error response	Error response format	Refer to the error response format.	10	10	○			○			

(Note 1)

(Note 2)

Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal.  
Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.

(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal.

(Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.

#### 4-3-9. Integer Variable Query (20EH)

Function: Query integer variables for the number of query data from the query start variable number.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'!'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'20E(h)'	3	6	○			○			
	Program number	'XX(h)'	2	8	○			○		'00(h)' in the case of global variable specification	
	Query start variable number	'XXX(h)'	3	11	○			○			
	Number of query variable data	'XX(h)'	2	13	○			○		The number of data will be limited based on the send/receive buffers.	
	SC	'XX(h)'	2	15	○			○			
	CR	0Dh	1	16	○			○			
	LF	0Ah	1	17	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'20E(h)'	3	6	○			○			
	Program number	'XX(h)'	2	8	○			○		'00(h)' in the case of global variable specification	
	Response start variable number	'XXX(h)'	3	11	○			○			
	Number of response variable data	'XX(h)'	2	13	○			○		The number of data will be limited based on the send/receive buffers.	
	Integer variable data (*1)	'XXXXXXXX(h)'	8	21	○		○			Long-type data (hexadecimal ASCII code)	
	Remaining integer variable data	Data indicated by *1 for the number of remaining data	MAX 2032	MAX 2053	○		○			Remaining variable data = Data indicated by *1 x Number of remaining data = 8 bytes (Max FFh – 1) = 2032 bytes	
	SC	'XX(h)'	2	MAX 2055	○			○			
	CR	0Dh	1	MAX 2056	○			○			
	LF	0Ah	1	MAX 2057	○			○			
Error response	Error response format	Refer to the error response format.	10	10	○			○			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											

#### 4-3-10. Real Variable Query (20FH)

Function: Query real variables for the number of query data from the query start variable number.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'!'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'20F(h)'	3	6	○			○			
	Program number	'XX(h)'	2	8	○			○		'00(h)' in the case of global variable specification	
	Query start variable number	'XXX(h)'	3	11	○			○			
	Number of query variable data	'XX(h)'	2	13	○			○		The number of data will be limited based on the send/receive buffers.	
	SC	'XX(h)'	2	15	○			○			
	CR	0Dh	1	16	○			○			
	LF	0Ah	1	17	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'20F(h)'	3	6	○			○			
	Program number	'XX(h)'	2	8	○			○		'00(h)' in the case of global variable specification	
	Response start variable number	'XXX(h)'	3	11	○			○			
	Number of response variable data	'XX(h)'	2	13	○			○		The number of data will be limited based on the send/receive buffers.	
	Format supported in X-SEL (Cartesian) main application V0.41 or earlier, or [in X-SEL (Cartesian) main application V0.42 or later AND other parameter No. 46 (bit 0 to 3) = 0], or [in X-SEL (IX SCARA) AND other parameter No. 46 (bit 0 to 3) = 0]										
	Selected in accordance with the condition	Real variable data (*1)	"XXXXXXXXXXXX XXXXX(h)'	16	29			○		Hexadecimal ASCII code representing lower 4 bytes + upper 4 bytes of double-type data (Example) Variable data 0x0123456789ABCDEF (binary) In the message, the following data will be set from the beginning: '8"9"A"B"C"D"E"F"0"1"2"3"4"5"6"7' (0x38394142434445463031323334353637 (binary))	
		Format supported in conditions other than the above									
	Real variable data (*1)	"XXXXXXXXXXXX XXXXX(h)'	16	29	○			○		Hexadecimal ASCII code representing double-type data (Example) Variable data 0x0123456789ABCDEF (binary) In the message, the following data will be set from the beginning: '0"1"2"3"4"5"6"7"8"9"A"B"C"D"E"F' (0x30313233343536373839414243444546 (binary))	

Normal response (Continued from the previous page)	Remaining integer variable data	Data indicated by *1 for the number of remaining data	MAX 4064	MAX 4093						Remaining variable data = Data indicated by *1 x Number of remaining data = 16 bytes (Max FFh – 1) = 4064 bytes	
	SC	'XX(h)'	2	MAX 4095	○			○			
	CR	0Dh	1	MAX 4096	○			○			
	LF	0Ah	1	MAX 4097	○			○			
Error response	Error response format	Refer to the error response format.	10	10	○			○			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											



#### 4-3-11. String Variable Query (210H)

Function: Query string variables for the number of query data from the query start variable number.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'!'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'210(h)'	3	6	○			○			
	Program number	'XX(h)'	2	8	○			○		'00(h)' in the case of global variable specification	
	Query start variable number	'XXX(h)'	3	11	○			○			
	Number of query variable data	'XX(h)'	2	13	○			○		The number of data will be limited based on the send/receive buffers.	
	SC	'XX(h)'	2	15	○			○			
	CR	0Dh	1	16	○			○			
	LF	0Ah	1	17	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'210(h)'	3	6	○			○			
	Program number	'XX(h)'	2	8	○			○		'00(h)' in the case of global variable specification	
	Response start variable number	'XXX(h)'	3	11	○			○			
	Number of response variable data	'XX(h)'	2	13	○			○		The number of data will be limited based on the send/receive buffers.	
	String variable data (*1)	'XX(h)'	2	15	○			○		Char-type data (hexadecimal ASCII code)	
	Remaining string variable data	Data indicated by *1 for the number of remaining data	MAX 508	MAX 523	○			○		Remaining string variable data = Data indicated by *1 x Number of remaining data = 2 bytes x (Max FFh – 1) = 508 bytes	
	SC	'XX(h)'	2	MAX 525	○			○			
	CR	0Dh	1	MAX 526	○			○			
	LF	0Ah	1	MAX 527	○			○			
Error response	Error response format	Refer to the error response format.	10	10	○			○			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											

#### 4-3-12. Axis Status Query (212H)

Function: Query the axis status												
	Data name		Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
						Big	Little	Yes	No			
Command	Header		'!'	1	1	○			○			
	Station		'XX(h)'	2	3	○			○			
	Message ID		'212(h)'	3	6	○			○			
	Query axis pattern		'XX(h)'	2	8	○			○			
	SC		'XX(h)'	2	10	○			○			
	CR		0Dh	1	11	○			○			
	LF		0Ah	1	12	○			○			
Normal response	Header		'#'	1	1	○			○			
	Station		'XX(h)'	2	3	○			○			
	Message ID		'212(h)'	3	6	○			○			
	Axis pattern		'XX(h)'	2	8	○			○			No axis pattern is the same as "driver not connected."
	Single-axis status (*1)	Axis status	'XX(h)'	2	10	○			○		Bit 6, 7 (Reserved for system use) Bit 5 (Push error detection): 0 = Not detected / 1 = Detected Bit 4 (Operation command successful completion): 0: Not yet complete / 1 = Completed successfully * Can be used only for completion check after an operation command. Bit 3 (Servo): 0 = OFF / 1 = ON Bit 1, 2 (Origin return): 0 = Not yet performed / 1 = Returning to origin / 2 = Completed Bit 0 (Servo axis in use): 0 = Not in use / 1 = In use (moving, etc.) * "Servo axis in use" indicates that a given task has the right to use the applicable axis. Therefore, this bit will turn ON not only when an operation command involving axis movement is in progress (including when an axis is moving), but also in the following conditions: • Servo is starting up from an OFF state • Servo is shutting down from an ON state (excluding emergency stop) • Operation axis is paused * Check method for operation command positioning under IAI protocol After an IAI-protocol operation command is executed, turning OFF (Not in use) of bit 0 (Servo axis in use) will be monitored for the applicable axis. When "Not in use" is detected, the cause will be checked based on the conditions of bit 4 (Operation command successful completion) and bit 5 (Push error detection) (three causes are shown below): (1) [Bit 0 (Servo axis in use) = OFF] AND [Bit 4 (Operation command successful completion) = ON] --- Positioning has completed successfully. (2) [Bit 0 (Servo axis in use) = OFF] AND [Bit 5 (Push error detection) = ON] --- Push error (* Need not be checked if push command is not used.) (3) [Bit 0 (Servo axis in use) = OFF] AND [bit 4 (Operation command successful completion) = OFF] AND [Bit 5 (Push error detection) = OFF] --- Operation cancellation due to error, emergency stop, etc.	

Normal response (Continued from the previous page)	Single-axis status (Continued from the previous page) (*1)	Axis sensor input status	'X(h)'	1	11	○		○	Bit 3 (Reserved for system use) Bit 2 (Origin sensor): 0 = OFF / 1 = ON Bit 1 (Overrun sensor): 0 = OFF / 1 = ON Bit 0 (Creep sensor): 0 = OFF / 1 = ON	
		Axis error code	'XXX(h)'	3	14	○		○		
		Encoder status (at reset)	'XX(h)'	2	16	○		○	Bit 7 (Battery alarm (BA)) Bit 6 (Battery error (BE)) Bit 5 (Multi-rotation error (ME)) Bit 4 (Reserved for system use) Bit 3 (Counter overflow (OF)) Bit 2 (Count error (CE)) Bit 1 (Full absolute status (FS)) Bit 0 (Overspeed (OS))	
		Current position	'XXXXXXXX(h)'	8	24	○		○	0.001 mm	Long-type data (hexadecimal ASCII code)
	Single-axis status repetition for remaining axes	Data indicated by *1 for the number of remaining axes		MAX 112	MAX 136	Refer to the data indicated by *1.				Data indicated by *1 x Number of remaining effective axes = 16 bytes x (Max 8 – 1) = Max 112 bytes
	SC	'XX(h)'	2	MAX 138		○		○		
	CR	0Dh	1	MAX 139		○		○		
	LF	0Ah	1	MAX 140		○		○		
	Error response format	Refer to the error response format.	10	10		○		○		
	(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.									

#### 4-3-13. Program Status Query (213H)

Function: Query the program status.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'I'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'213(h)'	3	6	○			○			
	Program number	'XX(h)'	2	8	○			○			
	SC	'XX(h)'	2	10	○			○			
	CR	0Dh	1	11	○			○			
	LF	0Ah	1	12	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'213(h)'	3	6	○			○			
	Program number	'XX(h)'	2	8	○			○			
	Status	'X(h)'	1	9	○			○		Bit 1 to 3 (Reserved for system use)	
	Executing program step number	'XXXX(h)'	4	13	○			○		Bit 0 (Start): 0 = Not started / 1 = Started	
	Program-dependent error code	'XXX(h)'	3	16	○			○			
	Error occurrence step number	'XXXX(h)'	4	20	○			○			
	SC	'XX(h)'	2	22	○			○			
	CR	0Dh	1	23	○			○			
	LF	0Ah	1	24	○			○			
Error response	Error response format	Refer to the error response format.	10	10	○			○			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											

#### 4-3-14. System Status Query (215H)

Function: Query the system status.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'!'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'215(h)'	3	6	○			○			
	SC	'XX(h)'	2	8	○			○			
	CR	0Dh	1	9	○			○			
	LF	0Ah	1	10	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'215(h)'	3	6	○			○			
	System mode	'X(h)'	1	7	○			○		0 = Indeterminable / 1 = AUTO mode / 2 = MANUAL mode / 3 = Slave update mode / 4 = Core update mode	*1
	Critical level system error number	'XXX(h)'	3	10	○			○			*2
	Latest system error number	'XXX(h)'	3	13	○			○			*3
	System status byte 1	'XX(h)'	2	15	○			○		Bit 7 (Reserved for system use) Bit 6 (Battery voltage error status): 0 = No error / 1 = Error Bit 5 (Battery voltage low warning status): 0 = Not low / 1 = Low Bit 4 (Power error status): 0 = Normal / 1 = Error Bit 3 (Emergency stop switch status): 0 = No emergency stop / 1 = Emergency stop Bit 2 (Safety gate status): 0 = CLOSE / 1 = OPEN Bit 1 (TP enable switch status): 0 = ON / 1 = OFF Bit 0 (Operation mode switch status): 0 = AUTO / 1 = MANUAL	*4
	System status byte 2	'XX(h)'	2	17	○			○		Bit 7 (Reserved for system use) Bit 6 (Reserved for system use) Bit 5 (Program run status): 0 = Not run / 1 = Running Bit 4 (Restart wait status): 0 = Not waiting / 1 = Waiting Bit 3 (I/O interlock status): 0 = No interlock / 1 = Interlock Bit 2 (Servo interlock status): 0 = No interlock / 1 = Interlock Bit 1 (Slave parameter writing status): 0 = Not writing / 1 = Writing Bit 0 (Application data flash ROM write status): 0 = Not writing/erasing / 1 = Writing/erasing	Only bit 0 has meaning when the core program is operating (application update mode). The data indicated by *1 through *6 will have no meaning.

Normal response (Continued from the previous page)	System status byte 3	'XX(h)'	2	19	○			○	Bit 4 to 7 (Reserved for system use) Bit 3 (Reserved for system use)Bit 2 (System ready status): 0 = Not ready / 1 = Ready Bit 1 (System operation status): 0 = Not operating in AUTO mode / 1 = Operating in AUTO mode Bit 0 (Drive-source cutoff status): 0 = Not cut off / 1 = Cut off	*5
	System status byte 4	'XX(h)'	2	21	○			○	Reserved for system use	*6
	SC	'XX(h)'	2	23	○			○		
	CR	0Dh	1	24	○			○		
	LF	0Ah	1	25	○			○		
Error response	Error response format	Refer to the error response format.	10	10	○			○		
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.										

#### 4-3-15. Error Detail Information Query (216H)

Function: Query the error detail information.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'!'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'216(h)'	3	6	○			○			
	Type 1	'X(h)'	1	7	○			○		0 = System error / 1 = Axis-specific error / 2 = Program-specific error / 3 = Error in error list record / 4 = Reserved for system use	
	Type 2	'XX(h)'	2	9	○			○		System error: 0 = Critical level error / 1 = Latest error Axis-specific error: Axis number Program-specific error: Program number Error in error list record: Record number (1 ~)	
	Error number	'XXX(h)'	3	12	○			○			
	SC	'XX(h)'	2	14	○			○			
	CR	0Dh	1	15	○			○			
	LF	0Ah	1	16	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'216(h)'	3	6	○			○			
	Error number	'XXX(h)'	3	9	○			○			
	Detail information 1	'XXXXXXXX(h)'	8	17	○			○		Other than system-down level error: Program number (Error source will be indicated if the step number is not 0.) System-down level error: System down type	
	Detail information 2	'XXXXXXXX(h)'	8	25	○			○		Other than system-down level error: Step number (Error source) System-down level error: System down error code	
	Detail information 3	'XXXXXXXX(h)'	8	33	○			○		Other than system-down level error: Axis number System-down level error: System down information 1	
	Detail information 4	'XXXXXXXX(h)'	8	41	○		○			Other than system-down level error: Point number (Negative value at interpolation point) System-down level error: System down information 2	
	Detail information 5	'XXXXXXXX(h)'	8	49	○			○			
	Detail information 6	'XXXXXXXX(h)'	8	57	○			○			
	Detail information 7	'XXXXXXXX(h)'	8	65	○			○			
	Detail information 8	'XXXXXXXX(h)'	8	73	○			○			
	Reserved for system use	'XX(d)'	2	75	○			○			

Normal response (Continued from the previous page)	Reserved for system use	'XX(d)'	2	77	○			○			
	Reserved for system use	'XX(d)'	2	79	○			○			
	Reserved for system use	'X(d)'	1	80	○			○			
	Reserved for system use	'XX(d)'	2	82	○			○			
	Reserved for system use	'XX(d)'	2	84	○			○			
	Reserved for system use	'XXXX(d)'	4	88	○			○			
	Message bytes	'XX(h)'	2	90	○			○			
	Message string	String for the number of message bytes	MAX 255	MAX 345	○			○		String data x Number of message bytes = 1 byte x (Max FFh) = Max 255 bytes	
	SC	'XX(h)'	2	MAX 347	○			○			
	CR	0Dh	1	MAX 348	○			○			
Error response	LF	0Ah	1	MAX 349	○			○			
	Error response format	Refer to the error response format.	10	10	○			○			
<p>(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal.</p> <p>(Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.</p>											



#### 4-3-16. Servo ON/OFF (232H)

Function: Turn on/off the servo.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'!'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'232(h)'	3	6	○			○			
	Axis pattern	'XX(h)'	2	8	○			○			
	Operation type	'X(h)'	1	9	○			○		Bit 1 to 3 (Reserved for system use) Bit 0 (Servo ON/OFF): 0 = OFF / 1 = ON	
	SC	'XX(h)'	2	11	○			○			
	CR	0Dh	1	12	○			○			
	LF	0Ah	1	13	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'232(h)'	3	6	○			○			
	SC	'XX(h)'	2	8	○			○			
	CR	0Dh	1	9	○			○			
	LF	0Ah	1	10	○			○			
Error response	Error response format	Refer to the error response format.	10	10	○			○			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											

#### 4-3-17. Origin Return (233H)

Function: Perform origin return.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'I'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'233(h)'	3	6	○			○			
	Axis pattern	'XX(h)'	2	8	○			○			
	End search speed at origin return	'XXX(h)'	3	11	○			○	mm/sec	The parameter setting becomes effective if zero.	
	Creep speed at origin return	'XXX(h)'	3	14	○			○	mm/sec	The parameter setting becomes effective if zero.	
	SC	'XX(h)'	2	16	○			○			
	CR	0Dh	1	17	○			○			
	LF	0Ah	1	18	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'233(h)'	3	6	○			○			
	SC	'XX(h)'	2	8	○			○			
	CR	0Dh	1	9	○			○			
	LF	0Ah	1	10	○			○			
Error response	Error response format	Refer to the error response format.	10	10	○			○			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											

#### 4-3-18. Absolute-Coordinate Specification Movement (234H)

Function: Move the actuator to the specified absolute coordinates.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'I'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'234(h)'	3	6	○			○			
	Axis pattern	'XX(h)'	2	8	○			○			
	Acceleration	'XXXX(h)'	4	12	○			○	0.01 G	The parameter setting becomes effective if zero.	
	Deceleration	'XXXX(h)'	4	16	○			○	0.01 G	The parameter setting becomes effective if zero.	
	Speed	'XXXX(h)'	4	20	○			○	mm/sec	The parameter setting becomes effective if zero. (Safety limit applies depending on the mode.)	
	Absolute coordinate data (*1)	'XXXXXXXX(h)'	8	28	○		○		0.001 mm		
	Remaining absolute coordinate data	Data indicated by *1 for the number of remaining axes	MAX 56	MAX 84	○		○		0.001 mm	Data indicated by * x Number of remaining effective axes = 8 bytes x (Max 8 – 1) axes = Max 56 bytes	
	SC	'XX(h)'	2	MAX 86	○			○			
	CR	0Dh	1	MAX 87	○			○			
	LF	0Ah	1	MAX 88	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'234(h)'	3	6	○			○			
	SC	'XX(h)'	2	8	○			○			
	CR	0Dh	1	9	○			○			
	LF	0Ah	1	10	○			○			
Error response	Error response format	Refer to the error response format.	10	10	○			○			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											

#### 4-3-19. Relative-Coordinate Specification Movement (235H)

Function: Move the actuator to the relative coordinates specified with respect to the current position.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'I'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'235(h)'	3	6	○			○			
	Axis pattern	'XX(h)'	2	8	○			○			
	Acceleration	'XXXX(h)'	4	12	○			○	0.01 G	The parameter setting becomes effective if zero.	
	Deceleration	'XXXX(h)'	4	16	○			○	0.01 G	The parameter setting becomes effective if zero.	
	Speed	'XXXX(h)'	4	20	○			○	mm/sec	The parameter setting becomes effective if zero. (Safety limit applies depending on the mode.)	
	Relative coordinate data (*1)	'XXXXXXXX(h)'	8	28	○		○		0.001 mm		
	Remaining relative coordinate data	Data indicated by *1 for the number of remaining axes	MAX 56	MAX 84	○		○		0.001 mm	Data indicated by * x Number of remaining effective axes = 8 bytes x (Max 8 – 1) axes = Max 56 bytes	
	SC	'XX(h)'	2	MAX 86	○			○			
	CR	0Dh	1	MAX 87	○			○			
	LF	0Ah	1	MAX 88	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'235(h)'	3	6	○			○			
	SC	'XX(h)'	2	8	○			○			
	CR	0Dh	1	9	○			○			
	LF	0Ah	1	10	○			○			
Error response	Error response format	Refer to the error response format.	10	10	○			○			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											

#### 4-3-20. Jogging/Inching (236H)

Function: Move by jogging/inching.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'I'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'236(h)'	3	6	○			○			
	Axis pattern	'XX(h)'	2	8	○			○		* Only one axis can be specified for the SCARA type (multiple axes cannot be specified). * With the SCARA type, a jogging/inching command can be issued only when none of the servo axes are operating.	
	Acceleration	'XXXX(h)'	4	12	○			○	0.01 G (For each axis, in %)	The parameter setting becomes effective if zero.	
	Deceleration	'XXXX(h)'	4	16	○			○	0.01 G (For each axis, in %)	The parameter setting becomes effective if zero.	
	Speed	'XXXX(h)'	4	20	○			○	mm/sec (For each axis, in %)	The parameter setting becomes effective if zero. (Safety limit applies depending on the mode.)	
	Inching distance	'XXXXXXXX(h)'	8	28	○			○	0.001 mm (For each axis, in 0.001 deg)	Specify by an absolute value. Distance is not specified if zero (= jogging).	
	Operation type	'X(h)'	1	29	○			○		Bit 3 (Reserved for system use) Bit 1, 2 (Jogging/inching coordinate system (SCARA only)): 0 = Base coordinate system / 1 = Selected work coordinate system / 2 = Selected tool coordinate system / 3 = Each axis system Bit 0 (Jogging/inching direction): 0 = Negative direction on coordinate axis / 1 = Positive direction on coordinate axis	
	SC	'XX(h)'	2	31	○			○			
	CR	0Dh	1	32	○			○			
	LF	0Ah	1	33	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'236(h)'	3	6	○			○			
	SC	'XX(h)'	2	8	○			○			
	CR	0Dh	1	9	○			○			
	LF	0Ah	1	10	○			○			
Error response	Error response format	Refer to the error response format.	10	10	○			○			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											

#### 4-3-21. Point-Number Specification Movement (237H)

Function: Move the actuator to the position of the specified point number.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'I'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'237(h)'	3	6	○			○			
	Axis pattern	'XX(h)'	2	8	○			○		Used by an AND condition with the axis pattern of the point number.	
	Acceleration	'XXXX(h)'	4	12	○			○	0.01 G	The applicable setting in the position data becomes effective if zero. If both are zero, the parameter setting is followed.	
	Deceleration	'XXXX(h)'	4	16	○			○	0.01 G	The applicable setting in the position data becomes effective if zero. If both are zero, the parameter setting is followed.	
	Speed	'XXXX(h)'	4	20	○			○	mm/sec	The applicable setting in the position data becomes effective if zero. If both are zero, the parameter setting is followed. (Safety limit applies depending on the mode.)	
	Point number	'XXX(h)'	3	23	○			○			
	SC	'XX(h)'	2	25	○			○			
	CR	0Dh	1	26	○			○			
	LF	0Ah	1	27	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'237(h)'	3	6	○			○			
	SC	'XX(h)'	2	8	○			○			
	CR	0Dh	1	9	○			○			
	LF	0Ah	1	10	○			○			
Error response	Error response format	Refer to the error response format.	10	10	○			○			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											

#### 4-3-22. Operation Stop & Cancel (238H)

Function: Stop/cancel the operation (including servo command/output cancellation while interlock is on hold)											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'I'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'238(h)'	3	6	○			○			
	Stop axis pattern	'XX(h)'	2	8	○			○		* Including servo command cancellation while interlock is on hold	
	Appended command byte	'XX(h)'	2	10	○			○		Bit 1 to 7 (Reserved for system use) Bit 0 (Specification of output cancellation during interlock on-hold (OUT port) (when all operations are paused)): 0 = Not canceled / 1 = Canceled tentatively	
	SC	'XX(h)'	2	12	○			○			
	CR	0Dh	1	13	○			○			
	LF	0Ah	1	14	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'238(h)'	3	6	○			○			
	SC	'XX(h)'	2	8	○			○			
	CR	0Dh	1	9	○			○			
	LF	0Ah	1	10	○			○			
Error response	Error response format	Refer to the error response format.	10	10	○			○			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											

#### 4-3-23. Point Data Range-Specification Continuous Write (244H)

Function: Change point data for the number of change points from the change start point number.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'I'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'244(h)'	3	6	○			○			
	Change start point data number	'XXX(h)'	3	9	○			○			
	Number of change point data	'XXX(h)'	3	12	○			○		The number of data will be limited based on the send/receive buffers.	
	Point data (*1)	Axis pattern	'XX(h)'	2	○			○			
		Acceleration	'XXXX(h)'	4	○			○	0.01 G		
		Deceleration	'XXXX(h)'	4	○			○	0.01 G		
		Speed	'XXXX(h)'	4	○			○	mm/sec		
		Position data (*2)	'XXXXXXXX(h)'	8	○		○		0.001mm		
		Position data repetition for remaining effective axes	Data indicated by *2 for the number of remaining effective axes	MAX 56	○		○		0.001mm	Data indicated by *2 x Number of remaining effective axes = 8 bytes x (Max 8 – 1) axes = Max 56 bytes	
		Point data repetition for remaining data	Data indicated by *1 for the number of remaining data	MAX 233922	Refer to the data indicated by *1.					Data indicated by *1 x Number of remaining data = Max 78 bytes x (Max 3000 data – 1) = Max 233922 bytes	
	SC	'XX(h)'	2	MAX 234014	○			○			
	CR	0Dh	1	MAX 234015	○			○			
	LF	0Ah	1	MAX 234016	○			○			
Command Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'244(h)'	3	6	○			○			
	Change start point data number	'XXX(h)'	3	9	○			○			
	Number of changed point data	'XXX(h)'	3	12	○			○		The number of data will be limited based on the send/receive buffers.	
	SC	'XX(h)'	2	14	○			○			
	CR	0Dh	1	15	○			○			
	LF	0Ah	1	16	○			○			
Error response	Error response format	Refer to the error response format.	10	10	○			○			

(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal.

(Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.



#### 4-3-24. Change Point Data Continuous Write (245H)

Function: Change the specified point data for the number of change points from the change start point number.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'!'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'245(h)'	3	6	○			○			
	Number of change point data	'XXX(h)'	3	9	○			○		The number of data will be limited based on the send/receive buffers.	
	Point data (*1)	Change point data number	'XXX(h)'	3	○			○			
		Axis pattern	'XX(h)'	2							
		Acceleration	'XXXX(h)'	4	○			○	0.01 G		
		Deceleration	'XXXX(h)'	4	○			○	0.01 G		
		Speed	'XXXX(h)'	4	○			○	mm/sec		
		Position data (*2)	'XXXXXXXX(h)'	8	○		○		0.001mm		
		Position data repetition for remaining effective axes	Data indicated by *2 for the number of remaining effective axes	MAX 56	○		○		0.001mm	Data indicated by *2 x Number of remaining effective axes = 8 bytes x (Max 8 – 1) axes = Max 56 bytes	
		Point data repetition for remaining data	Data indicated by *1 for the number of remaining data	MAX 242919	Refer to the data indicated by *1.					Data indicated by *1 x Number of remaining data = Max 81 bytes x (Max 3000 data – 1) = Max 242919 bytes	
	SC	'XX(h)'	2	MAX 243011	○			○			
	CR	0Dh	1	MAX 243012	○			○			
	LF	0Ah	1	MAX 243013	○			○			
Command Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'245(h)'	3	6	○			○			
	Number of changed point data	'XXX(h)'	3	9	○			○		The number of data will be limited based on the send/receive buffers.	
	SC	'XX(h)'	2	11	○			○			
	CR	0Dh	1	12	○			○			
	LF	0Ah	1	13	○			○			
Error response	Error response format	Refer to the error response format.	10	10	○			○			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal.											
(Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											

#### 4-3-25. Point Data Clear (246H)

Function: Clear point data for the number of clear points from the clear start point number.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'!'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'246(h)'	3	6	○			○			
	Clear start point data number	'XXX(h)'	3	9	○			○			
	Number of clear point data	'XXX(h)'	3	12	○			○			
	SC	'XX(h)'	2	14	○			○			
	CR	0Dh	1	15	○			○			
	LF	0Ah	1	16	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'246(h)'	3	6	○			○			
	SC	'XX(h)'	2	8	○			○			
	CR	0Dh	1	9	○			○			
	LF	0Ah	1	10	○			○			
Error response	Error response format	Refer to the error response format.	10	10	○			○			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											

#### 4-3-26. Output Port Status Change (24AH)

Function: Change the status of the output port specified by the output port number.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'!'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'24A(h)'	3	6	○			○			
	Output port number	'XXXX(h)'	4	10	○			○			
	Change type	'X(h)'	1	11	○			○		Bit 1 to 3 (Reserved for system use) Bit 0 (Output port ON/OFF): 0 = OFF / 1 = ON	
	SC	'XX(h)'	2	13	○			○			
	CR	0Dh	1	14	○			○			
	LF	0Ah	1	15	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'24A(h)'	3	6	○			○			
	SC	'XX(h)'	2	8	○			○			
	CR	0Dh	1	9	○			○			
	LF	0Ah	1	10	○			○			
Error response	Error response format	Refer to the error response format.	10	10	○			○			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											

#### 4-3-27. Flag Status Change (24BH)

Function: Change the status of the flag specified by the flag number.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'!'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'24B(h)'	3	6	○			○			
	Program number	'XX(h)'	2	8	○			○		'00' in the case of a global flag	
	Flag number	'XXXX(h)'	4	12	○			○			
	Change type	'X(h)'	1	13							
	SC	'XX(h)'	2	15	○			○		Bit 1 to 3 (Reserved for system use) Bit 0 (Output port ON/OFF): 0 = OFF / 1 = ON	
	CR	0Dh	1	16	○			○			
	LF	0Ah	1	17	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'24B(h)'	3	6	○			○			
	SC	'XX(h)'	2	8	○			○			
	CR	0Dh	1	9	○			○			
	LF	0Ah	1	10	○			○			
Error response	Error response format	Refer to the error response format.	10	10	○			○			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											

#### 4-3-28. Integer Variable Change (24CH)

Function: Change integer variables for the number of change data from the change start variable number.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'!'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'24C(h)'	3	6	○			○			
	Program number	'XX(h)'	2	8	○			○		'00' in the case of a global variable	
	Change start variable number	'XXX(h)'	3	11	○			○			
	Number of change variable data	'XX(h)'	2	13	○			○		The number of data will be limited based on the send/receive buffers.	
	Integer variable data (*1)	'XXXXXXXX(h)'	8	21	○		○			Hexadecimal ASCII code of long-type data	
	Remaining integer variable data	Data indicated by *1 for the number of remaining data	MAX 2032	MAX 2053	○		○			Data indicated by *1 x Number of remaining data = 8 bytes x Max (FFh – 1) = Max 2032 bytes	
	SC	'XX(h)'	2	MAX 2055	○			○			
	CR	0Dh	1	MAX 2056	○			○			
	LF	0Ah	1	MAX 2057	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'24C(h)'	3	6	○			○			
	Program number	'XX(h)'	2	8	○			○		'00' in the case of a global variable	
	Change start variable number	'XXX(h)'	3	11	○			○			
	Number of changed data	'XX(h)'	2	13	○			○		The number of data will be limited based on the send/receive buffers.	
	SC	'XX(h)'	2	15	○			○			
	CR	0Dh	1	16	○			○			
	LF	0Ah	1	17	○			○			
Error response	Error response format	Refer to the error response format.	10	10	○			○			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											

#### 4-3-29. Real Variable Change (24DH)

Function: Change real variables for the number of change data from the change start variable number.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'!'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'24D(h)'	3	6	○			○			
	Program number	'XX(h)'	2	8	○			○		'00' in the case of a global variable	
	Change start variable number	'XXX(h)'	3	11	○			○			
	Number of change variable data	'XX(h)'	2	13	○			○		The number of data will be limited based on the send/receive buffers.	
	Real variable data (*1)	'XXXXXXXXXXXXXXX(h)'	16	29	○		○			Hexadecimal ASCII code of double-type data	
	Remaining real variable data	Data indicated by *1 for the number of remaining data	MAX 4064	MAX 4093	○		○			Data indicated by *1 x Number of remaining data = 16 bytes x Max (FFh – 1) = Max 4064 bytes	
	SC	'XX(h)'	2	MAX 4095	○			○			
	CR	0Dh	1	MAX 4096	○			○			
	LF	0Ah	1	MAX 4097	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'24D(h)'	3	6	○			○			
	Program number	'XX(h)'	2	8	○			○		'00' in the case of a global variable	
	Change start variable number	'XXX(h)'	3	11	○			○			
	Number of changed data	'XX(h)'	2	13	○			○		The number of data will be limited based on the send/receive buffers.	
	SC	'XX(h)'	2	15	○			○			
	CR	0Dh	1	16	○			○			
	LF	0Ah	1	17	○			○			
Error response	Error response format	Refer to the error response format.	10	10	○			○			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											

#### 4-3-30. String Variable Change (24EH)

Function: Change string variable values for the number of change strings from the change start string variable number.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'!'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'24E(h)'	3	6	○			○			
	Program number	'XX(h)'	2	8	○			○		'00' in the case of a global variable	
	Change start variable number	'XXX(h)'	3	11	○			○			
	Number of change variable data	'XX(h)'	2	13	○			○		The number of data will be limited based on the send/receive buffers.	
	String variable data (*1)	'XX(h)'	2	15	○			○			
	Remaining string variable data	Data indicated by *1 for the number of remaining data	MAX 508	MAX 523	○			○		Data indicated by *1 x Number of remaining data = 2 bytes x Max (FFh – 1) = Max 508 bytes	
	SC	'XX(h)'	2	MAX 525	○			○			
	CR	0Dh	1	MAX 526	○			○			
	LF	0Ah	1	MAX 527	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'24E(h)'	3	6	○			○			
	SC	'XX(h)'	2	8	○			○			
	CR	0Dh	1	9	○			○			
	LF	0Ah	1	10	○			○			
Error response	Error response format	Refer to the error response format.	10	10	○			○			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											

#### 4-3-31. Alarm Reset (252H)

Function: Reset the alarm.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'!'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'252(h)'	3	6	○			○			
	SC	'XX(h)'	2	8	○			○			
	CR	0Dh	1	9	○			○			
	LF	0Ah	1	10	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'252(h)'	3	6	○			○			
	SC	'XX(h)'	2	8	○			○			
	CR	0Dh	1	9	○			○			
	LF	0Ah	1	10	○			○			
Error response	Error response format	Refer to the error response format.	10	10	○			○			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											



**4-3-32. Program Run (253H), Program End (254H), Program Pause (255H), Program One-Step Run (256H), Program Resume (257H)**

Function: Run, end, run one step of, pause between steps of, or resume the specified program.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'!'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'XXX(h)'	3	6	○			○			
	Program number	'XX(h)'	2	8	○			○		When an end, pause or resume command is issued with '00' specified, it will apply to all programs currently running.	
	SC	'XX(h)'	2	10	○			○			
	CR	0Dh	1	11	○			○			
	LF	0Ah	1	12	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'XXX(h)'	3	6	○			○			
	SC	'XX(h)'	2	8	○			○			
	CR	0Dh	1	9	○			○			
	LF	0Ah	1	10	○			○			
Error response	Error response format	Refer to the error response format.	10	10	○			○			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											

#### 4-3-33. Software Reset (25BH)

Function: Reset the software.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'!'	1	1	<input type="radio"/>			<input type="radio"/>			
	Station	'XX(h)'	2	3	<input type="radio"/>			<input type="radio"/>			
	Message ID	'25B(h)'	3	6	<input type="radio"/>			<input type="radio"/>			
	SC	'XX(h)'	2	8	<input type="radio"/>			<input type="radio"/>			
	CR	0Dh	1	9	<input type="radio"/>			<input type="radio"/>			
	LF	0Ah	1	10	<input type="radio"/>			<input type="radio"/>			
Normal response			0	0						No normal response. * The controller will become reception-ready upon elapse of approx. 10 seconds after this command is transmitted (as of June 26, 2001).	
Error response	Error response format	Refer to the error response format.	10	10	<input type="radio"/>			<input type="radio"/>			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											

#### 4-3-34. Drive-Source Recovery Request (25CH)

Function: Request recovery of the drive source.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'!'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'25C(h)'	3	6	○			○			
	SC	'XX(h)'	2	8	○			○			
	CR	0Dh	1	9	○			○			
	LF	0Ah	1	10	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'25C(h)'	3	6	○			○			
	SC	'XX(h)'	2	8	○			○			
	CR	0Dh	1	9	○			○			
	LF	0Ah	1	10	○			○			
Error response	Error response format	Refer to the error response format.	10	10	○			○			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											

#### 4-3-35. Operation Pause Cancellation Request (25EH)

Function: Request cancellation of operation pause.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'!'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'25E(h)'	3	6	○			○			
	SC	'XX(h)'	2	8	○			○			
	CR	0Dh	1	9	○			○			
	LF	0Ah	1	10	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'25E(h)'	3	6	○			○			
	SC	'XX(h)'	2	8	○			○			
	CR	0Dh	1	9	○			○			
	LF	0Ah	1	10	○			○			
Error response	Error response format	Refer to the error response format.	10	10	○			○			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											

#### 4-3-36. Speed Change (262H)

Function: Chang the operating speed of the servo axis.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'!'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'262(h)'	3	6	○			○			
	Axis pattern	'XX(h)'	2	8	○			○			
	Speed	'XXXX(h)'	4	12	○			○	mm/sec	Consult IAI if you wish to use this command, since operations during which the command becomes effective are limited.	
	SC	'XX(h)'	2	14	○			○			
	CR	0Dh	1	15	○			○			
	LF	0Ah	1	16	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'262(h)'	3	6	○			○			
	SC	'XX(h)'	2	8	○			○			
	CR	0Dh	1	9	○			○			
	LF	0Ah	1	10	○			○			
Error response	Error response format	Refer to the error response format.	10	10	○			○			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											

#### 4-3-37. Coordinate System Definition Data Range-Specification Continuous Query (2A0H)

Function: Query the definition data for coordinate system.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'!'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'2A0(h)'	3	6	○			○			
	Type	'X(h)'	1	7	○			○		0 = Work coordinate system definition data / 1 = Tool coordinate system definition data	
	Query-target head coordination system definition data number	'XX(h)'	2	9	○			○		Work/tool coordinate system definition data number (0 ~)	
	Number of query records	'XX(h)'	2	11	○			○		The number of records will be limited based on the send/receive buffers.	
	SC	'XX(h)'	2	13	○			○			
	CR	0Dh	1	14	○			○			
	LF	0Ah	1	15	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'2A0(h)'	3	6	○			○			
	Type	'X(h)'	1	7	○			○		0 = Work coordinate system definition data / 1 = Tool coordinate system definition data	
	Response start coordinate system definition data number	'XX(h)'	2	9	○			○		Work/tool coordinate system definition data number (0 ~)	
	Number of response records	'XX(h)'	2	11	○			○		The number of records will be limited based on the send/receive buffers.	
	Coordinate system definition data (*1)	Coordinate offset (*2)	"XXXXXXXX(h)'	8	○		○		0.001 mm	X-axis data	
		Remaining coordinate offset	Date indicated by *2 for the remaining 3 axes	24	○		○		0.001 mm (R-axis: 0.001 deg)	Data indicated by *2 x Remaining 3 axes (Y, Z, R-axes) = 8 bytes x 3 axes = 24 bytes	
	Remaining coordinate system definition data	Data indicated by *1 for the number of remaining records	MAX 4064	MAX 4107	○		○		Refer to the data indicated by *1.	Data indicated by *1 x Number of remaining records = 32 bytes x (Max 128 records – 1) = Max 4064 bytes	
	SC	'XX(h)'	2	MAX 4109	○			○			
	CR	0Dh	1	MAX 4110	○			○			
	LF	0Ah	1	MAX 4111	○			○			
Error response	Error response format	Refer to the error response format.	10	10	○			○			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal.											
(Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											

#### 4-3-38. SCARA Axis Status Query (2A1H)

Function: Query the axis status (SCARA).											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'!'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'2A1(h)'	3	6	○			○			
	Query axis pattern	'XX(h)'	2	8	○			○			
	Type	'X(h)'	1	9	○			○		Bit 2, 3 (Reserved for system use) Bit 0, 1 (Current position type): 0 = Base coordinate system / 1 = Selected work coordinate system / 2 = Reserved for system use / 3 = Each axis system	
	SC	'XX(h)'	2	11	○			○			
	CR	0Dh	1	12	○			○			
	LF	0Ah	1	13	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'2A1(h)'	3	6	○			○			
	Work coordinate system selection number	'XX(h)'	2	8	○			○		Work coordinate system selection number (0 ~)	
	Tool coordinate system selection number	'XX(h)'	2	10	○			○		Tool coordinate system selection number (0 ~)	
	Common axis status	'XX(h)'	2	12	○			○		Bit 4 to 7 (Reserved for system use) Bit 2, 3 (Current position coordinate system type): 0 = Base coordinate system / 1 = Selected work coordinate system / 2 = Reserved for system use / 3 = Each axis system Bit 0, 1 (Current arm system): 0 = Right arm system / 1 = Left arm system / 2 = Indeterminable / 3 = Reserved for system use	
	Axis pattern	'XX(h)'	2	14	○			○			No axis pattern is the same as "driver not connected."

Normal response (Continued from the previous page)	Single-axis status (*1)	Axis status	'XX(h)'	2	16	○				Bit 6, 7 (Reserved for system use) Bit 5 (Push error detection): 0 = Not detected / 1 = Detected Bit 4 (Operation command successful completion): 0: Not yet complete / 1 = Completed successfully * Can be used only for completion check after an operation command. (For positioning that includes any of the X, Y and R-axes, be sure to check completion for all of the X, Y and R-axes.) Bit 3 (Servo): 0 = OFF / 1 = ON Bit 1, 2 (Origin return): 0 = Not yet performed / 1 = Returning to origin / 2 = Completed Bit 0 (Servo axis in use): 0 = Not in use / 1 = In use (moving, etc.) * "Servo axis in use" indicates that a given task has the right to use the applicable axis. Therefore, this bit will turn ON not only when an operation command involving axis movement is in progress (including when an axis is moving), but also in the following conditions: • Servo is starting up from an OFF state • Servo is shutting down from an ON state (excluding emergency stop) • Operation axis is paused * Check method for operation command positioning under IAI protocol After an IAI-protocol operation command is executed, turning OFF (Not in use) of bit 0 (Servo axis in use) will be monitored for the applicable axis. When "Not in use" is detected, the cause will be checked based on the conditions of bit 4 (Operation command successful completion) and bit 5 (Push error detection) (three causes are shown below): (1) [Bit 0 (Servo axis in use) = OFF] AND [Bit 4 (Operation command successful completion) = ON] --- Positioning has completed successfully. (2) [Bit 0 (Servo axis in use) = OFF] AND [Bit 5 (Push error detection) = ON] --- Push error (* Need not be checked if push command is not used.) (3) [Bit 0 (Servo axis in use) = OFF] AND [bit 4 (Operation command successful completion) = OFF] AND [Bit 5 (Push error detection) = OFF] --- Operation cancellation due to error, emergency stop, etc. --- Operation cancellation due to error, emergency stop, etc.	
		Axis sensor input status	'X(h)'	1	17	○			○	Bit 3 (Reserved for system use) Bit 2 (Origin sensor): 0 = OFF / 1 = ON Bit 1 (Overrun sensor): 0 = OFF / 1 = ON Bit 0 (Creep sensor): 0 = OFF / 1 = ON	
		Axis error code	'XXX(h)'	3	20	○			○		
		Encoder status (at reset)	'XX(h)'	2	22	○			○	Bit 7 (Battery alarm (BA)) Bit 6 (Battery error (BE)) Bit 5 (Multi-rotation error (ME)) Bit 4 (Reserved for system use) Bit 3 (Counter overflow (OF)) Bit 2 (Count error (CE)) Bit 1 (Full absolute status (FS)) Bit 0 (Overspeed (OS))	
		Current position	'XXXXXXXX(h)'	8	30	○		○		0.001 mm or 0.001 deg	Long-type data (hexadecimal ASCII code)
	Single-axis status repetition for remaining axes	Data indicated by *1 for the number of remaining axes	MAX 112	MAX 142	Refer to the data indicated by *1.					Data indicated by *1 x Number of remaining effective axes = 16 bytes x (Max 8 – 1) = Max 112 bytes	
	SC	'XX(h)'	2	MAX 144	○			○			
	CR	0Dh	1	MAX 145	○			○			
	LF	0Ah	1	MAX 146	○			○			
	Error response	Error response format	Refer to the error response format.	10	10	○			○		

(Note 1)

(Note 2)

Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal.  
Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.



#### 4-3-39. Simple-Interference-Check-Zone Definition Data Range-Specification Continuous Query (2A2H)

Function: Query the definition data for simple interference check zone.											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'!'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'2A2(h)'	3	6	○			○			
	Query-target simple-interference-check-zone definition data number	'XX(h)'	2	8	○			○		Simple-interference-check-zone definition data number (1 ~)	
	Number of query records	'XX(h)'	2	10	○			○		The number of records will be limited based on the send/receive buffers.	
	SC	'XX(h)'	2	12	○			○			
	CR	0Dh	1	13	○			○			
	LF	0Ah	1	14	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'2A2(h)'	3	6	○			○			
	Simple-interference-check-zone definition data number	'XX(h)'	2	8	○			○		Simple-interference-check-zone definition data number (1 ~)	
	Number of response records	'XX(h)'	2	10	○			○		The number of records will be limited based on the send/receive buffers.	
	Simple-interference-check-zone definition data	Simple-interference-check-zone definition coordinate effective axis pattern	'XX(h)'	2	○			○			
		Simple-interference-check-zone definition coordinate 1 (*2)	'XXXXXXXX(h)'	8	○		○		0.001 mm (R-axis: 0.001 deg)	Define a rectangular solid with coordinates 1 and 2. * Coordinates on the base coordinate system	
		Definition coordinate 1 remaining effective coordinate data	Date indicated by *2 for the number of remaining effective axes	MAX 24	○		○		0.001 mm (R-axis: 0.001 deg)	Data indicated by *2 x Number of remaining effective axes = 8 bytes x Max (4 – 1) axes = Max 24 bytes	
		Simple-interference-check-zone definition coordinate 2 (*3)	'XXXXXXXX(h)'	8	○		○		0.001 mm (R-axis: 0.001 deg)	Define a rectangular solid with coordinates 1 and 2. * Coordinates on the base coordinate system	
		Definition coordinate 2 remaining effective coordinate data	Date indicated by *3 for the number of remaining effective axes	MAX 24	○		○		0.001 mm (R-axis: 0.001 deg)	Data indicated by *3 x Number of remaining effective axes = 8 bytes x Max (4 – 1) axes = Max 24 bytes	

Normal response (Continued from the previous page)	Simple-interference-check-zone definition data (Continued from the previous page) (*1)	Physical output port number or global flag number for output upon entry	'XXXX(h)'	4	MAX 80	○		○		Invalid if 0.	
		Entry error type specification	'XX(h)'	2	MAX 82	○		○		0 = No error handling / 1 = Message-level error / 2 = Operation-cancellation level error	
		Reserved for system use	'XX(h)'	2	MAX 84	○		○			
		Reserved for system use	'XX(h)'	2	MAX 86	○		○			
		Reserved for system use	'XX(h)'	2	MAX 88	○		○	0.001 mm or 0.001 deg		
	Remaining simple-interference-check-zone definition data	Data indicated by *1 for the number of remaining records		MAX 1170	MAX 1258	Refer to the data indicated by *1.				Data indicated by *1 x Number of remaining records = 78 bytes x (Max 16 records – 1) = Max 1170 bytes	
	SC	'XX(h)'	2	MAX 1260	○			○			
	CR	0Dh	1	MAX 1261	○			○			
	LF	0Ah	1	MAX 1262	○			○			
	Error response format	Refer to the error response format.	10	10	○			○			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											

#### 4-3-40. SCARA Absolute-Coordinate Specification Movement (2D4H)

Function: Move to the specified absolute coordinates (SCARA).											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'!'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'2D4(h)'	3	6	○			○			
	Axis pattern	'XX(h)'	2	8	○			○			
	Acceleration	'XXXX(h)'	4	12	○			○	% or 0.01 G	The parameter setting becomes effective if 0. * Unit: Movement control = PTP: [%] / Movement control = CP: [0.01 G]	
	Deceleration	'XXXX(h)'	4	16	○			○	% or 0.01 G	The parameter setting becomes effective if 0. * Unit: Movement control = PTP: [%] / Movement control = CP: [0.01 G]	
	Speed	'XXXX(h)'	4	20	○			○	% or mm/sec	The parameter setting becomes effective if 0. (Safety limit applies depending on the mode.) * Unit: Movement control = PTP: [%] / Movement control = CP: [mm/sec]	
	Positioning operation type	'XX(h)'	2	22	○			○		Bit 5 to 7 (Reserved for system use) Bit 3, 4 (PTP target arm system specification type (Always move current arm system if CP): 0 = Current arm system (Movement of opposite arm system prohibited if unfeasible) / 1 = Current arm system (Movement of opposite arm system permitted if unfeasible) / 2 = Right arm system (Movement of opposite arm system prohibited if unfeasible) / 3 = Left arm system (Movement of opposite arm system permitted if unfeasible) Bit 1, 2 (Movement coordinate system): 0 = Reserved for system use / 1 = Selected work coordinate system / 2, 3 = Reserved for system use Bit 0 (Movement control): 0 = PTP / 1 = CP	
	Absolute coordinate data (*1)	'XXXXXXXX(h)'	8	30	○		○		0.001 mm		
	Remaining absolute coordinate data	Data indicated by *1 for the number of remaining axes	MAX 56	MAX 86	○		○		0.001 mm (R-axis: 0.001 deg)	Data indicated by *1 x Number of remaining effective axes = 8 bytes x (Max 8 – 1) axes = Max 56 bytes	
	SC	'XX(h)'	2	MAX 88	○			○			
Normal response	CR	0Dh	1	MAX 89	○			○			
	LF	0Ah	1	MAX 90	○			○			
	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'2D4(h)'	3	6	○			○			
	SC	'XX(h)'	2	8	○			○			
Error response	CR	0Dh	1	9	○			○			
	LF	0Ah	1	10	○			○			
Error response	Error response format	Refer to the error response format.	10	10	○			○			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											

#### 4-3-41. SCARA Relative-Coordinate Specification Movement (2D5H)

Function: Move to the relative coordinates specified with respect to the current position (SCARA).											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'!'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'2D5(h)'	3	6	○			○			
	Axis pattern	'XX(h)'	2	8	○			○			
	Acceleration	'XXXX(h)'	4	12	○			○	% or 0.01 G	The parameter setting becomes effective if 0. * Unit: Movement control = PTP: [%] / Movement control = CP: [0.01 G]	
	Deceleration	'XXXX(h)'	4	16	○			○	% or 0.01 G	The parameter setting becomes effective if 0. * Unit: Movement control = PTP: [%] / Movement control = CP: [0.01 G]	
	Speed	'XXXX(h)'	4	20	○			○	% or mm/sec	The parameter setting becomes effective if 0. (Safety limit applies depending on the mode.) * Unit: Movement control = PTP: [%] / Movement control = CP: [mm/sec]	
	Positioning operation type	'XX(h)'	2	22	○			○		Bit 5 to 7 (Reserved for system use) Bit 3, 4 (PTP target arm system specification type (Always move current arm system if CP)): 0 = Current arm system (Movement of opposite arm system prohibited if unfeasible) / 1 = Current arm system (Movement of opposite arm system permitted if unfeasible) / 2 = Right arm system (Movement of opposite arm system prohibited if unfeasible) / 3 = Left arm system (Movement of opposite arm system permitted if unfeasible) Bit 1, 2 (Movement coordinate system): 0 = Reserved for system use / 1 = Selected work coordinate system / 2, 3 = Reserved for system use Bit 0 (Movement control): 0 = PTP / 1 = CP	
	Relative coordinate data (*1)	'XXXXXXXX(h)'	8	30	○		○		0.001 mm		
	Remaining relative coordinate data	Data indicated by *1 for the number of remaining axes	MAX 56	MAX 86	○		○		0.001 mm (R-axis: 0.001 deg)	Data indicated by *1 x Number of remaining effective axes = 8 bytes x (Max 8 - 1) axes = Max 56 bytes	
	SC	'XX(h)'	2	MAX 88	○			○			
	CR	0Dh	1	MAX 89	○			○			
	LF	0Ah	1	MAX 90	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'2D5(h)'	3	6	○			○			
	SC	'XX(h)'	2	8	○			○			
	CR	0Dh	1	9	○			○			
	LF	0Ah	1	10	○			○			
Error response	Error response format	Refer to the error response format.	10	10	○			○			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											

#### 4-3-42. SCARA Point-Number Specification Movement (2D6H)

Function: Move to the specified point number (SCARA).											
	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command	Header	'!'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'2D6(h)'	3	6	○			○			
	Axis pattern	'XX(h)'	2	8	○			○		Used by an AND condition with the axis pattern of the point number.	
	Acceleration	'XXXX(h)'	4	12	○			○	% or 0.01 G	The applicable setting in the position data becomes effective if zero. If both are zero, the parameter setting is followed. * Unit: Movement control = PTP: [%] / Movement control = CP: [0.01 G]	
	Deceleration	'XXXX(h)'	4	16	○			○	% or 0.01 G	The applicable setting in the position data becomes effective if zero. If both are zero, the parameter setting is followed. * Unit: Movement control = PTP: [%] / Movement control = CP: [0.01 G]	
	Speed	'XXXX(h)'	4	20	○			○	% or mm/sec	The applicable setting in the position data becomes effective if zero. If both are zero, the parameter setting is followed. (Safety limit applies depending on the mode.) * Unit: Movement control = PTP: [%] / Movement control = CP: mm/sec	
	Positioning operation type	'XX(h)'	2	22	○			○		Bit 5 to 7 (Reserved for system use) Bit 3, 4 (PTP target arm system specification type (Always move current arm system if CP)): 0 = Current arm system (Movement of opposite arm system prohibited if unfeasible) / 1 = Current arm system (Movement of opposite arm system permitted if unfeasible) / 2 = Right arm system (Movement of opposite arm system prohibited if unfeasible) / 3 = Left arm system (Movement of opposite arm system permitted if unfeasible) Bit 1, 2 (Movement coordinate system): 0 = Reserved for system use / 1 = Selected work coordinate system / 2, 3 = Reserved for system use Bit 0 (Movement control): 0 = PTP / 1 = CP	
	Point number	'XXX(h)'	3	25	○			○			
	SC	'XX(h)'	2	27	○			○			
	CR	0Dh	1	28	○			○			
	LF	0Ah	1	29	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'2D6(h)'	3	6	○			○			
	SC	'XX(h)'	2	8	○			○			
	CR	0Dh	1	9	○			○			
	LF	0Ah	1	10	○			○			
Error response	Error response format	Refer to the error response format.	10	10	○			○			
(Note 1) Add H (or h) at the end of each data expressed in hexadecimal notation. If there is no H or h at the end, the data is considered a decimal. (Note 2) Data enclosed in single quotation marks indicates an ASCII code. Data is a hexadecimal ASCII code if (h) is added before the closing quotation mark, or a decimal ASCII code if (d) is added before the closing quotation mark.											

## 5. Timeout and Retry

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The normal responses and error responses received by the master station (host) from the slave station (controller) must satisfy all of the following conditions:

- (1) The normal response or error response format is satisfied.
- (2) The checksum (SC) is correct.
- (3) The station number in the transmitted command is the same as the station number in the reception response.
- (4) The message ID in the transmitted command is the same as the message ID in the reception response (except in the case of error response).

If completion of reception of a normal response or error response that satisfies the above conditions cannot be confirmed within a specified period (3 seconds) after completion of command transmission, the master station (host) will attempt to restore communication via command retransmission (retry transmission). When the number of retry transmissions exceeds the upper limit (2 or 3, selected in accordance with the system), the system shall recognize an irrecoverable communication error.

## 6. Change History

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Revision number	Date	Content of change	Page	Changed by
First edition	Nov. 10, '02	-		H.K
Second edition	Dec. 02, '02	Added note on bit 0 status (Servo axis in use) under “Axis Status Query” and “SCARA Axis Status Query.”	P26, P.56	H.K
Third edition	Jan. 09, '03	Added check method for operation command positioning under IAI protocol for the axis status under “Axis Status Query” and “SCARA Axis Status Query.”	P26, P.56	H.K

\* The numbers under “Page” indicate the pages in the revised specification (Japanese version) corresponding to the respective changes.

# 1. General Rules

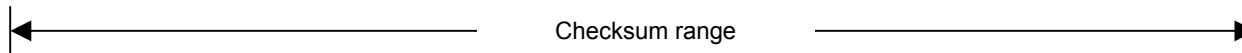
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## 1.1 Command/Response Formats

The commands received and responses sent by the controller follow the respective variable-length formats specified below (character codes are in ASCII).

### ○ Command Format

Header '!' (1char)	Station 'XX(h)' (2char)	Message ID 'XXX(h)' (3char)	Content of command (Length varies with each message)	SC 'XX(h)' (2char)	CR 0Dh (1char)	LF 0Ah (1char)
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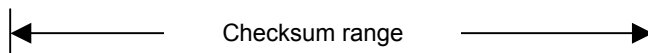
### ○ Response Format

(Normal)

Header '#' (1char)	Station 'XX(h)' (2char)	Message ID 'XXX(h)' (3char)	Content of response (Length varies with each message)	SC 'XX(h)' (2char)	CR 0Dh (1char)	LF 0Ah (1char)
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(Error)

Header '&' (1char)	Station 'XX(h)' (2char)	Error code 'XXX(h)' (3char)	SC 'XX(h)' (2char)	CR 0Dh (1char)	LF 0Ah (1char)
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## 1.2 Content of Command/Response

<b>Header:</b>	Indicate the start of a command/response message. The header specifies one of the following message categories: '!' (21H)    - - -    Command '#' (23H)    - - -    Normal response '%' (25H)    - - -    Error response (format B)
<b>Station:</b>	Indicate the station number of the controller (value of "I/O parameter No. 91: User-open SIO channel 1, station code").
<b>Message ID:</b>	A three-digit hexadecimal code indicates the message type.
<b>Message content:</b>	Set data varies with each message. (Refer to 2, "Message," for details on each message.) The following rules apply commonly to all messages: (1) Set the data in the specified data size. If the digits in the data are less than the specified digits, add 0 in the upper digit(s) left blank. Example:    Entering data 12H (hexadecimal notation) when the data size is 4 bytes Set '0012.' (2) If the data unit is specified, set that data in that unit. Example 1:    Entering 400 mm in hexadecimal notation when the data size is 8 bytes and unit is 0.001 mm. 400 [mm] = 400000 [in units of 0.001 mm] (decimal notation) = 61A80A [in units of 0.001 mm] (hexadecimal notation) Set '00061A80A.' Example 2:    Entering -400 mm in hexadecimal notation (with sign extension) when the data size is 8 bytes and unit is 0.001 mm. -400 [mm] = -400000 [in units of 0.001 mm] (decimal notation) = FFF9E580H [in units of 0.001 mm] (hexadecimal notation, with sign extension) Set 'FFF9E580.' (3) Set the axis pattern, I/O port, flag port, status data, etc, in bit pattern. Example:    Entering the axis-pattern data indicating axes 1, 2 and 4 when the data size is 2 bytes Binary 00001011 → Hexadecimal 0BH Set '0B.'
<b>SC:</b>	Checksum
<b>CR (0DH):</b>	Indicate the end of a command/response.
<b>LF (0AH):</b>	Indicate the end of a command/response.

### 1.3 Checksum

A checksum is used to verify if the communication has been successful. The communication is deemed successful if the checksum calculated from the received data is the same as the checksum in the message. Each checksum is an ASCII code representing the lower byte of the total sum calculated by adding the message values represented in one byte length from the beginning of the message to immediately before the checksum. You can disable the controller's checksum function by entering '@@' as the checksum.

Example: Effective Point Data Query

'!'	'99'		'209'			'000'			'032'			SC		CR	LF
21H	39H	39H	32H	30H	39H	30H	30H	30H	30H	33H	32H	▲	▲	0DH	0AH

Total sum = 21H+39H+39H+32H+30H+39H  
+30H+30H+30H+30H+33H+32H  
= 253H

35H  
('5')      35H  
('3')

The checksum is calculated as '53.'

### 1.4 Error Response

If the command from the master station (host equipment) has generated an error in the slave station (controller), an error response will be returned instead of a normal response (refer to 2, "Message," for the format). **When an error response is received, stop the system or take other appropriate action.**

## 2. Message

### 2.1 Message ID

Message ID	Message name	Type	Applicable type		Page
			Cartesian	New SCARA	
	Error response	Common	○	○	
200H	Test call	Query	○	○	
201H	Version code query	Query	○	○	
208H	Number of effective point data query	Query	○	○	
209H	Effective point data query	Query	○	○	
20BH	Input port query	Query	○	○	
20CH	Output port query	Query	○	○	
20DH	Flag query	Query	○	○	
20EH	Integer variable query	Query	○	○	
20FH	Real variable query	Query	○	○	
210H	String variable query	Query	○	○	
212H	Axis status query	Query	○	○	
213H	Program status query	Query	○	○	
215H	System status query	Query	○	○	
216H	Error detail information query	Query	○	○	
232H	Servo ON/OFF	Execute	○	○	
233H	Origin return	Execute	○	*1	
234H	Absolute-coordinate specification movement	Execute	○		
235H	Relative-coordinate specification movement	Execute	○		
236H	Jogging/inching	Execute	○	○	
237H	Point-number specification movement	Execute	○		38
238H	Operation stop & cancel	Execute	○	○	39
244H	Point data range-specification continuous write	Execute	○	○	40
245H	Change point data continuous write	Execute	○	○	41
246H	Point data clear	Execute	○	○	42
24AH	Output port status change	Execute	○	○	43
24BH	Flag status change	Execute	○	○	44

## 2.2 Message Format

Message ID	Message name	Type	Applicable type		Page
			Cartesian	New SCARA	
24CH	Integer variable change	Execute	○	○	
24DH	Real variable change	Execute	○	○	
24EH	String variable change	Execute	○	○	
252H	Alarm reset	Execute	○	○	
253H	Program run	Execute	○	○	
254H	Program end	Execute	○	○	
255H	Program pause	Execute	○	○	
256H	Program one-step run	Execute	○	○	
257H	Program resume	Execute	○	○	
25BH	Software reset	Execute	○	○	
25CH	Drive-source recovery request	Execute	○	○	
25EH	Operation pause cancellation request	Execute	○	○	
262H	Speed change	Execute	○		
2A0H	Coordinate system definition data	Query		○	
2A1H	SCARA axis status query	Query		○	
2A2H	Simple interference check zone	Query		○	
2D4H	SCARA absolute-coordinate specification movement	Execute		○	
2D5H	SCARA relative-coordinate specification movement	Execute		○	
2D6H	SCARA point-number specification movement	Execute		○	