X-SEL
Serial Communication Protocol Specification
(Format B)

[Applicable Models]

X-SEL-J/K Main Application	V0.99
X-SEL-JX/KX Main Application	V0.42
TT Main Application	V0.18
X-SEL-P/Q Main Application	V0.47
X-SEL-PX/QX Main Application	V0.25
SSEL Main Application	V0.11
ASEL/PSEL Main Application	V0.09

IAI America, Inc.

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1. Overview

This specification covers the communication protocol between the host and the X-SEL controller, TT or SSEL/ASEL/PSEL controller.

The X-SEL controller, TT or SSEL/ASEL/PSEL controller can communicate with the host based on this protocol, in the AUTO mode and using the PC connector or teaching connector, if "I/O parameter No. 90: Usage of user-open channel 1 (X-SEL (P/Q/PX/QX); Usage of user-open channel 0 for SSEL/ASEL/PSEL)" is set to 2 (IAI protocol B (slave)). (Whether to use the PC connector or teaching connector varies depending on the controller. For details, refer to 2, "Transmission Control Procedure.")

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

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 B (slave))
- 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.

Controller	Where to connect
X-SEL (K/KX)	PC connector
X-SEL (J/JX/P/Q/PX/QX), TT	Teaching connector
SSEL/ASEL/PSEL	Teaching connector or USB connector

Note
[1] With the X-SEL (K/KX) controller, the PC connector and teaching connector cannot be used at the same time.
[2] When this protocol is used for communication with the X-SEL (J/JX/P/Q/PX/QX) controller or TT, the teaching connector is used. For this reason, the enable input terminal assigned to the teaching connector will be disabled in the AUTO (automatic) mode. The enable input terminal will also be disabled in the AUTO mode when the SSEL/ASEL/PSEL controller is used via the teaching connector.
[3] When the SSEL/ASEL/PSEL connector is used and the teaching connector and USB connector are both connected, connection to the USB connector will be given priority.
[4] Use the cable specified by IAI for connection. If a different cable is used, the cable may be burned due to improper wiring.
[5] Refer to the operation manual supplied with the controller for connection between the host and the 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 = α msec
α is the setting of "I/O parameter No. 97: User-open SIO channel 1, IAI-protocol response minimum delay time (X-SEL (P/Q/PX/QX); User-open SIO channel 0, IAI-protocol response minimum delay time for SSEL/ASEL/PSEL)" (this parameter is available in X-SEL-J/K main application V0.26 or later). 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

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

(1) 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)

|◄─────────────────── Checksum range ───────────────────►|
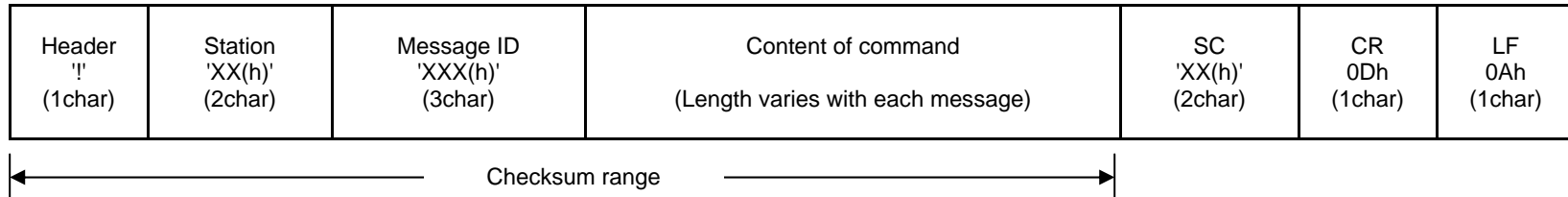
(2) Response Format

(Normal response)

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)

(Error response)

Header '&' (1char)	Station 'XX(h)' (2char)	Error code 'XXX(h)' (3char)	SC 'XX(h)' (2char)	CR 0Dh (1char)	LF 0Ah (1char)
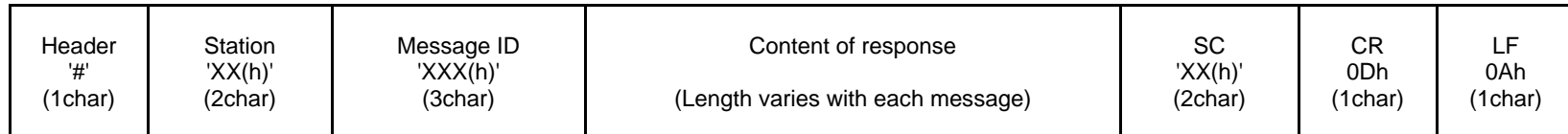
|◄─────────── Checksum range ───────────►|
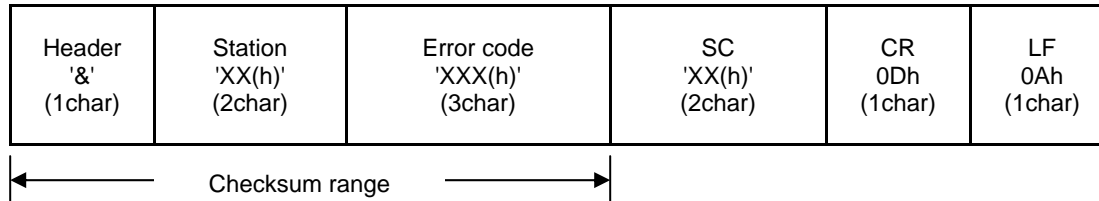
Header:	Indicate the start of a command/response message. The header specifies one of the following message categories:
	'!' (21H) - - - Command
	'#' (23H) - - - Normal response
	'&' (26H) - - - Error response
Station:	Indicate the station number of the controller (value of "I/O parameter No. 91: User-open SIO channel 1, station code (X-SEL (P/Q/PX/QX); User-open SIO channel 0, station code for SSEL/ASEL/PSEL).
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
= 2<u>54</u>H

35H ('5')   34H ('4')

The checksum is calculated as '54.'

4. Message Details

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	Home 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		O	57
2D4H	SCARA absolute-coordinate specification movement	Execute		O	59
2D5H	SCARA relative-coordinate specification movement	Execute		O	60
2D6H	SCARA point-number specification movement	Execute		O	61

*1 With SCARA axes of X-SEL-JX/KX/PX/QX controllers, this can be used only by IAI as a "Z-axis ABS reset position movement" command. Direct-acting axes of X-SEL-PX/QX controllers can also be used by users.

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 September 12, 2006, the maximum receivable size and maximum transmittable size of the controller are as follows:
X-SEL (J/K/JX/KX), TT: The maximum receivable size is 1023 bytes, while the maximum transmittable size is 1024 bytes.
X-SEL (P/Q/PX/QX), SSEL/ASEL/PSEL: The maximum receivable size is 2051 bytes, while the maximum transmittable size is 2048 bytes.

4-3-1.   Error Response

<table>
<tr><td colspan="14">Function: Notify the content of an error that occurred with respect to a command.</td></tr>
<tr><td colspan="2" rowspan="2"></td><td rowspan="2">Data name</td><td rowspan="2">Data range (value)</td><td rowspan="2">Data size [bytes]</td><td rowspan="2">Cumulative bytes [bytes]</td><td colspan="2">Endian</td><td colspan="2">Sign extension</td><td rowspan="2">Unit</td><td rowspan="2">Description</td><td rowspan="2">Remarks</td></tr>
<tr><td>Big</td><td>Little</td><td>Yes</td><td>No</td></tr>
<tr><td rowspan="6">Error response</td><td>Header</td><td>'&'</td><td>1</td><td>1</td><td>○</td><td></td><td></td><td>○</td><td></td><td></td><td></td></tr>
<tr><td>Station</td><td>'XX(h)'</td><td>2</td><td>3</td><td>○</td><td></td><td></td><td>○</td><td></td><td></td><td></td></tr>
<tr><td>Error code</td><td>'XXX(h)'</td><td>3</td><td>6</td><td>○</td><td></td><td></td><td>○</td><td></td><td>Indicate the error type.</td><td></td></tr>
<tr><td>SC</td><td>'XX(h)'</td><td>2</td><td>8</td><td>○</td><td></td><td></td><td>○</td><td></td><td></td><td></td></tr>
<tr><td>CR</td><td>0Dh</td><td>1</td><td>9</td><td>○</td><td></td><td></td><td>○</td><td></td><td></td><td></td></tr>
<tr><td>LF</td><td>0Ah</td><td>1</td><td>10</td><td>○</td><td></td><td></td><td>○</td><td></td><td></td><td></td></tr>
<tr><td colspan="14">(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.</td></tr>
</table>

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

	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
	Function: Perform communication test. The same data as in the command will be returned.										
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)

	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	O			O			
	Station	'XX(h)'	2	3	O			O			
	Message ID	'201(h)'	3	6	O			O			
	Unit type	'XX(h)'	2	8	O			O		0 = Main CPU application / 1 = Main CPU core / 2 = Driver CPU /3 = Mounted SIO	
	Device number	'X(h)'	1	9	O			O		Number that specifies the device (0 ~)	
	SC	'XX(h)'	2	11	O			O			
	CR	0Dh	1	12	O			O			
	LF	0Ah	1	13	O			O			
Normal response	Header	'#'	1	1	O			O			
	Station	'XX(h)'	2	3	O			O			
	Message ID	'201(h)'	3	6	O			O			
	Unit type	'XX(h)'	2	8	O			O		0 = Main CPU application / 1 = Main CPU core / 2 = Driver CPU /3 = Mounted SIO	
	Device number	'X(h)'	1	9	O			O		Number that specifies the device (0 ~)	
	Model code	'XX(h)'	2	11	O			O			
	Unit code	'XX(h)'	2	13	O			O			
	Version number	'XXXX(h)'	4	17	O			O			
	Time	'XXXX(h)'	4	21	O			O		Year (4 digits, hexadecimal ASCII code)	
	Time	'XX(h)'	2	23	O			O		Month (1 to 12, hexadecimal ASCII code)	
	Time	'XX(h)'	2	25	O			O		Day (1 to 31, hexadecimal ASCII code)	
	Time	'XX(h)'	2	27	O			O		Hours (0 to 23, hexadecimal ASCII code)	
	Time	'XX(h)'	2	29	O			O		Minutes (0 to 59, hexadecimal ASCII code)	
	Time	'XX(h)'	2	31	O			O		Seconds (0 to 59, hexadecimal ASCII code)	
	SC	'XX(h)'	2	33	O			O			
	CR	0Dh	1	34	O			O			
	LF	0Ah	1	35	O			O			
Error response	Error response format	Refer to the error response format.	10	10	O			O			

(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)

	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	O			O			
	Station	'XX(h)'	2	3	O			O			
	Message ID	'208(h)'	3	6	O			O			
	SC	'XX(h)'	2	8	O			O			
	CR	0Dh	1	9	O			O			
	LF	0Ah	1	10	O			O			
Normal response	Header	'#'	1	1	O			O			
	Station	'XX(h)'	2	3	O			O			
	Message ID	'208(h)'	3	6	O			O			
	Number of effective point data	'XXX(h)'	3	9	O			O			
	SC	'XX(h)'	2	11	O			O			
	CR	0Dh	1	12	O			O			
	LF	0Ah	1	13	O			O			
Error response	Error response format	Refer to the error response format.	10	10	O			O			

Function: Query the number of effective point data.

(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)

	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian Big	Endian Little	Sign extension Yes	Sign extension No	Unit	Description	Remarks
	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.										
Command	Header	'!'	1	1	O			O			
Command	Station	'XX(h)'	2	3	O			O			
Command	Message ID	'209(h)'	3	6	O			O			
Command	Query head point number	'XXX(h)'	3	9	O			O			
Command	Number of query records	'XXX(h)'	3	12	O			O		The number of records will be limited based on the send/receive buffers.	
Command	SC	'XX(h)'	2	14	O			O			
Command	CR	0Dh	1	15	O			O			
Command	LF	0Ah	1	16	O			O			
Normal response	Header	'#'	1	1	O			O			
Normal response	Station	'XX(h)'	2	3	O			O			
Normal response	Message ID	'209(h)'	3	6	O			O			
Normal response	Number of effective records	'XXX(h)'	3	9	O			O		The number of records will be limited based on the send/receive buffers.	
Normal response / Point data (*1)	Point number	'XXX(h)'	3	12	O			O			
Normal response / Point data (*1)	Axis pattern	'XX(h)'	2	14	O			O			
Normal response / Point data (*1)	Acceleration	'XXXX(h)'	4	18	O			O	0.01 G		
Normal response / Point data (*1)	Deceleration	'XXXX(h)'	4	22	O			O	0.01 G		
Normal response / Point data (*1)	Speed	'XXXX(h)'	4	26	O			O	mm/sec		
Normal response / Point data (*1)	Position data (*2)	'XXXXXXXX(h)'	8	34	O		O		0.001 mm		
Normal response / Point data (*1)	Position data repetition for remaining effective axes	Data indicated by *2 for the number of remaining effective axes	MAX 56	MAX 90	O		O		0.001 mm	Data indicated by *2 x Number of remaining effective axes = 8 bytes x (Max 8 – 1) axes = Max 56 bytes	
Normal response	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	
Normal response	SC	'XX(h)'	2	MAX 243011	O			O			
Normal response	CR	0Dh	1	MAX 243012	O			O			
Normal response	LF	0Ah	1	MAX 243013	O			O			
Error response	Error response format	Refer to the error response format.	10	10	O			O			
	(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)

	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	O			O			
	Station	'XX(h)'	2	3	O			O			
	Message ID	'20B(h)'	3	6	O			O			
	Query start port number	'XXXX(h)'	4	10	O			O		Be sure to specify "Category head port number + Multiple of 8."	
	Number of query ports	'XXXX(h)'	4	14	O			O		The number of ports will be limited based on the send/receive buffers.	
	SC	'XX(h)'	2	16	O			O			
	CR	0Dh	1	17	O			O			
	LF	0Ah	1	18	O			O			
Normal response	Header	'#'	1	1	O			O			
	Station	'XX(h)'	2	3	O			O			
	Message ID	'20B(h)'	3	6	O			O			
	Response start port number	'XXXX(h)'	4	10	O			O			
	Number of response ports	'XXXX(h)'	4	14	O			O		The number of ports will be limited based on the send/receive buffers.	
	Input port data (*1)	'XX(h)'	2	16	O			O		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	O			O		Remaining input port data = 2 bytes x (Max 8192 – 1) = 16382 bytes	
	SC	'XX(h)'	2	MAX 16400	O			O			
	CR	0Dh	1	MAX 16401	O			O			
	LF	0Ah	1	MAX 16402	O			O			
Error response	Error response format	Refer to the error response format.	10	10	O			O			

(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)

	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	○			○			

Function: Query output ports.

(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)

	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	○			○			

Function: Query flags.

(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)

	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	○		○			(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	○			○			

Function: Query integer variables for the number of query data from the query start variable number.

(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)

	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.	
	Selected in accordance with the condition — [Format supported in X-SEL-J/K V0.41 or earlier, or when Bit0 to 3 of Other parameter No. 46 = 0]										
	Real variable data (*1)	"XXXXXXXXXXXXXXXX(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' (0x3839414243444546303132333435363 (binary))	
	Format supported in conditions other than the above										
	Real variable data (*1)	"XXXXXXXXXXXXXXXX(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' (0x3031323334353637383941424344 4546 (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)

	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	○			○			

Function: Query string variables for the number of query data from the query start variable number.

(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)

	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian Big	Endian Little	Sign extension Yes	Sign extension No	Unit	Description	Remarks
Function: Query the axis status											
Command	Header	'!'	1	1	O			O			
Command	Station	'XX(h)'	2	3	O			O			
Command	Message ID	'212(h)'	3	6	O			O			
Command	Query axis pattern	'XX(h)'	2	8	O			O			
Command	SC	'XX(h)'	2	10	O			O			
Command	CR	0Dh	1	11	O			O			
Command	LF	0Ah	1	12	O			O			
Normal response	Header	'#'	1	1	O			O			
Normal response	Station	'XX(h)'	2	3	O			O			
Normal response	Message ID	'212(h)'	3	6	O			O			
Normal response	Axis pattern	'XX(h)'	2	8	O			O			No axis pattern is the same as "driver not connected."
Normal response — Single-axis status (*1)	Axis status	'XX(h)'	2	10	O			O		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 (Home return): 0 = Not yet performed / 1 = Returning to home / 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.	

		Item	Data	Bytes	Byte					Unit	Description	
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 (Home 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	(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	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)

	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	'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) Bit 0 (Start): 0 = Not started / 1 = Started	
	Executing program step number	'XXXX(h)'	4	13	○			○		Invalid if 0	
	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	○			○			

Function: Query the program status.

(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)

	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 * When the X-SEL (P/Q series) (Cartesian/SCARA)/SSEL/ASEL/PSEL controller is used, this bit indicates the status of an enable switch (deadman switch/enable switch). Bit 1 (TP enable switch status): 0 = ON / 1 = OFF * When the X-SEL (P/Q series) (Cartesian/SCARA)/SSEL/ASEL/PSEL controller is used, this bit is invalid (fixed to 0). 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.

Function: Query the system status.

	Name	Data	Bytes	Position					Description	Note
Normal response (Continued from the previous page)	System status byte 3	'XX(h)'	2	19	○			○	Bit5 to 7 (Reserved for system use) Bit4 (Operation mode): 0 = Program mode / 1 = Positioner mode 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)

	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	○			○			
	LF	0Ah	1	MAX 349	○			○			
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.

4-3-16. <u>Servo ON/OFF (232H)</u>

	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	O			O			
	Station	'XX(h)'	2	3	O			O			
	Message ID	'232(h)'	3	6	O			O			
	Axis pattern	'XX(h)'	2	8	O			O			
	Operation type	'X(h)'	1	9	O			O		Bit 1 to 3 (Reserved for system use) Bit 0 (Servo ON/OFF): 0 = OFF / 1 = ON	
	SC	'XX(h)'	2	11	O			O			
	CR	0Dh	1	12	O			O			
	LF	0Ah	1	13	O			O			
Normal response	Header	'#'	1	1	O			O			
	Station	'XX(h)'	2	3	O			O			
	Message ID	'232(h)'	3	6	O			O			
	SC	'XX(h)'	2	8	O			O			
	CR	0Dh	1	9	O			O			
	LF	0Ah	1	10	O			O			
Error response	Error response format	Refer to the error response format.	10	10	O			O			

Function: Turn on/off the servo.

(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.　Home Return (233H)

	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Function: Perform home return. * With the SCARA (axis) type, this message can be used only by IAI as a "Z-axis ABS reset position movement" command.											
Command	Header	'!'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'233(h)'	3	6	○			○			
	Axis pattern	'XX(h)'	2	8	○			○		For the X-SEL-PX/QX series, specify only direct-acting axes.	
	End search speed at home return	'XXX(h)'	3	11	○			○	mm/sec	The parameter setting becomes effective if zero.	
	Creep speed at home 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)

	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	O			O			
	Station	'XX(h)'	2	3	O			O			
	Message ID	'234(h)'	3	6	O			O			
	Axis pattern	'XX(h)'	2	8	O			O			
	Acceleration	'XXXX(h)'	4	12	O			O	0.01 G	The parameter setting becomes effective if zero.	
	Deceleration	'XXXX(h)'	4	16	O			O	0.01 G	The parameter setting becomes effective if zero.	
	Speed	'XXXX(h)'	4	20	O			O	mm/sec	The parameter setting becomes effective if zero. (Safety limit applies depending on the mode.)	
	Absolute coordinate data (*1)	'XXXXXXXX(h)'	8	28	O		O		0.001 mm		
	Remaining absolute coordinate data	Data indicated by *1 for the number of remaining axes	MAX 56	MAX 84	O		O		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	O			O			
	CR	0Dh	1	MAX 87	O			O			
	LF	0Ah	1	MAX 88	O			O			
Normal response	Header	'#'	1	1	O			O			
	Station	'XX(h)'	2	3	O			O			
	Message ID	'234(h)'	3	6	O			O			
	SC	'XX(h)'	2	8	O			O			
	CR	0Dh	1	9	O			O			
	LF	0Ah	1	10	O			O			
Error response	Error response format	Refer to the error response format.	10	10	O			O			

Function: Move the actuator to the specified absolute coordinates.

(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)

	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	'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	○			○			

Function: Move the actuator to the relative coordinates specified with respect to the current position.

(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)

	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Function: Move by jogging/inching.											
Command	Header	'!'	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. For the X-SEL-PX/QX series, SCARA and direct-acting axes cannot be specified simultaneously.	
	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)

	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
Function: Move the actuator to the position of the specified point number.					Big	Little	Yes	No			
Command	Header	'!'	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)

	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
	Function: Stop/cancel the operation (including servo command/output cancellation while interlock is on hold)										
Command	Header	'!'	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)

	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		'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	14	○			○			
		Acceleration	'XXXX(h)'	4	18	○			○	0.01 G		
		Deceleration	'XXXX(h)'	4	22	○			○	0.01 G		
		Speed	'XXXX(h)'	4	26	○			○	mm/sec		
		Position data (*2)	'XXXXXXXX(h)'	8	34	○		○		0.001mm		
		Position data repetition for remaining effective axes	Data indicated by *2 for the number of remaining effective axes	MAX 56	MAX 90	○		○		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	MAX 234012	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	○			○			

Function: Change point data for the number of change points from the change start point number.

(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)

	Data name		Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian Big	Endian Little	Sign extension Yes	Sign extension No	Unit	Description	Remarks
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	12	○			○			
		Axis pattern	'XX(h)'	2	14							
		Acceleration	'XXXX(h)'	4	18	○			○	0.01 G		
		Deceleration	'XXXX(h)'	4	22	○			○	0.01 G		
		Speed	'XXXX(h)'	4	26	○			○	mm/sec		
		Position data (*2)	'XXXXXXXX(h)'	8	34	○		○		0.001mm		
		Position data repetition for remaining effective axes	Data indicated by *2 for the number of remaining effective axes	MAX 56	MAX 90	○		○		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	MAX 243009	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	○			○			

Function: Change the specified point data for the number of change points from the change start point number.

(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)**

	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)

	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)

	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)

	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)	
	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	○			○			

Function: Change integer variables for the number of change data from the change start variable number.

(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)

	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian Big	Endian Little	Sign extension Yes	Sign extension No	Unit	Description	Remarks
	Function: Change real variables for the number of change data from the change start variable number.										
Command	Header	'!'	1	1	O			O			
Command	Station	'XX(h)'	2	3	O			O			
Command	Message ID	'24D(h)'	3	6	O			O			
Command	Program number	'XX(h)'	2	8	O			O		'00' in the case of a global variable	
Command	Change start variable number	'XXX(h)'	3	11	O			O			
Command	Number of change variable data	'XX(h)'	2	13	O			O		The number of data will be limited based on the send/receive buffers.	
Command	Real variable data (*1)	'XXXXXXXXXXXXXXX(h)'	16	29	O		O			Hexadecimal ASCII code of double-type data	
Command	Remaining real variable data	Data indicated by *1 for the number of remaining data	MAX 4064	MAX 4093	O		O			Data indicated by *1 x Number of remaining data = 16 bytes x Max (FFh – 1) = Max 4064 bytes	
Command	SC	'XX(h)'	2	MAX 4095	O			O			
Command	CR	0Dh	1	MAX 4096	O			O			
Command	LF	0Ah	1	MAX 4097	O			O			
Normal response	Header	'#'	1	1	O			O			
Normal response	Station	'XX(h)'	2	3	O			O			
Normal response	Message ID	'24D(h)'	3	6	O			O			
Normal response	Program number	'XX(h)'	2	8	O			O		'00' in the case of a global variable	
Normal response	Change start variable number	'XXX(h)'	3	11	O			O			
Normal response	Number of changed data	'XX(h)'	2	13	O			O		The number of data will be limited based on the send/receive buffers.	
Normal response	SC	'XX(h)'	2	15	O			O			
Normal response	CR	0Dh	1	16	O			O			
Normal response	LF	0Ah	1	17	O			O			
Error response	Error response format	Refer to the error response format.	10	10	O			O			

(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)

	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	○			○			

Function: Change string variable values for the number of change strings from the change start string variable number.

(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)

	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)

	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	O			O			
	Station	'XX(h)'	2	3	O			O			
	Message ID	'XXX(h)'	3	6	O			O			
	Program number	'XX(h)'	2	8	O			O		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	O			O			
	CR	0Dh	1	11	O			O			
	LF	0Ah	1	12	O			O			
Normal response	Header	'#'	1	1	O			O			
	Station	'XX(h)'	2	3	O			O			
	Message ID	'XXX(h)'	3	6	O			O			
	SC	'XX(h)'	2	8	O			O			
	CR	0Dh	1	9	O			O			
	LF	0Ah	1	10	O			O			
Error response	Error response format	Refer to the error response format.	10	10	O			O			

Function: Run, end, run one step of, pause between steps of, or resume the specified program.

(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)

	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	'25B(h)'	3	6	○			○			
	SC	'XX(h)'	2	8	○			○			
	CR	0Dh	1	9	○			○			
	LF	0Ah	1	10	○			○			
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	○			○			

(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)

<table>
<tr><td colspan="2">Function: Request recovery of the drive source.</td><td rowspan="2">Data size [bytes]</td><td rowspan="2">Cumulative bytes [bytes]</td><td colspan="2">Endian</td><td colspan="2">Sign extension</td><td rowspan="2">Unit</td><td rowspan="2">Description</td><td rowspan="2">Remarks</td></tr>
<tr><td></td><td>Data name</td><td>Data range (value)</td><td>Big</td><td>Little</td><td>Yes</td><td>No</td></tr>
<tr><td rowspan="6">Command</td><td>Header</td><td>'!'</td><td>1</td><td>1</td><td>○</td><td></td><td></td><td>○</td><td></td><td></td><td></td></tr>
<tr><td>Station</td><td>'XX(h)'</td><td>2</td><td>3</td><td>○</td><td></td><td></td><td>○</td><td></td><td></td><td></td></tr>
<tr><td>Message ID</td><td>'25C(h)'</td><td>3</td><td>6</td><td>○</td><td></td><td></td><td>○</td><td></td><td></td><td></td></tr>
<tr><td>SC</td><td>'XX(h)'</td><td>2</td><td>8</td><td>○</td><td></td><td></td><td>○</td><td></td><td></td><td></td></tr>
<tr><td>CR</td><td>0Dh</td><td>1</td><td>9</td><td>○</td><td></td><td></td><td>○</td><td></td><td></td><td></td></tr>
<tr><td>LF</td><td>0Ah</td><td>1</td><td>10</td><td>○</td><td></td><td></td><td>○</td><td></td><td></td><td></td></tr>
<tr><td rowspan="6">Normal response</td><td>Header</td><td>'#'</td><td>1</td><td>1</td><td>○</td><td></td><td></td><td>○</td><td></td><td></td><td></td></tr>
<tr><td>Station</td><td>'XX(h)'</td><td>2</td><td>3</td><td>○</td><td></td><td></td><td>○</td><td></td><td></td><td></td></tr>
<tr><td>Message ID</td><td>'25C(h)'</td><td>3</td><td>6</td><td>○</td><td></td><td></td><td>○</td><td></td><td></td><td></td></tr>
<tr><td>SC</td><td>'XX(h)'</td><td>2</td><td>8</td><td>○</td><td></td><td></td><td>○</td><td></td><td></td><td></td></tr>
<tr><td>CR</td><td>0Dh</td><td>1</td><td>9</td><td>○</td><td></td><td></td><td>○</td><td></td><td></td><td></td></tr>
<tr><td>LF</td><td>0Ah</td><td>1</td><td>10</td><td>○</td><td></td><td></td><td>○</td><td></td><td></td><td></td></tr>
<tr><td>Error response</td><td>Error response format</td><td>Refer to the error response format.</td><td>10</td><td>10</td><td>○</td><td></td><td></td><td>○</td><td></td><td></td><td></td></tr>
<tr><td colspan="12">(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.</td></tr>
</table>

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

	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	○			○			

Function: Request cancellation of operation pause.

(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)

	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Command		Function: Chang the operating speed of the servo axis.									
Command	Header	'!'	1	1	○			○			
Command	Station	'XX(h)'	2	3	○			○			
Command	Message ID	'262(h)'	3	6	○			○			
Command	Axis pattern	'XX(h)'	2	8	○			○		For the X-SEL-PX/QX series, specification of SCARA axes is prohibited.	
Command	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.	
Command	SC	'XX(h)'	2	14	○			○			
Command	CR	0Dh	1	15	○			○			
Command	LF	0Ah	1	16	○			○			
Normal response	Header	'#'	1	1	○			○			
Normal response	Station	'XX(h)'	2	3	○			○			
Normal response	Message ID	'262(h)'	3	6	○			○			
Normal response	SC	'XX(h)'	2	8	○			○			
Normal response	CR	0Dh	1	9	○			○			
Normal response	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 Big	Endian Little	Sign extension Yes	Sign extension No	Unit	Description	Remarks
Command	Header	'!'	1	1	○			○			
Command	Station	'XX(h)'	2	3	○			○			
Command	Message ID	'2A0(h)'	3	6	○			○			
Command	Type	'X(h)'	1	7	○			○		0 = Work coordinate system definition data / 1 = Tool coordinate system definition data	
Command	Query-target head coordination system definition data number	'XX(h)'	2	9	○			○		Work/tool coordinate system definition data number (0 ~)	
Command	Number of query records	'XX(h)'	2	11	○			○		The number of records will be limited based on the send/receive buffers.	
Command	SC	'XX(h)'	2	13	○			○			
Command	CR	0Dh	1	14	○			○			
Command	LF	0Ah	1	15	○			○			
Normal response	Header	'#'	1	1	○			○			
Normal response	Station	'XX(h)'	2	3	○			○			
Normal response	Message ID	'2A0(h)'	3	6	○			○			
Normal response	Type	'X(h)'	1	7	○			○		0 = Work coordinate system definition data / 1 = Tool coordinate system definition data	
Normal response	Response start coordinate system definition data number	'XX(h)'	2	9	○			○		Work/tool coordinate system definition data number (0 ~)	
Normal response	Number of response records	'XX(h)'	2	11	○			○		The number of records will be limited based on the send/receive buffers.	
Normal response — Coordinate system definition data (*1)	Coordinate offset (*2)	''XXXXXXXX(h)'	8	19	○		○		0.001 mm	X-axis data	
Normal response — Coordinate system definition data (*1)	Remaining coordinate offset	Date indicated by *2 for the remaining 3 axes	24	43	○		○		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	
Normal response	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	
Normal response	SC	'XX(h)'	2	MAX 4109	○			○			
Normal response	CR	0Dh	1	MAX 4110	○			○			
Normal response	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)

	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian		Sign extension		Unit	Description	Remarks
					Big	Little	Yes	No			
Function: Query the axis status (SCARA).											
Command	Header	'!'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'2A1(h)'	3	6	○			○			
	Query axis pattern	'XX(h)'	2	8	○			○		For the X-SEL-PX/QX series, status of direct-acting axes can be queried (simultaneous specification with SCARA axes is permitted).	
	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 (Home return): 0 = Not yet performed / 1 = Returning to home / 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 (Home 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 × Number of remaining effective axes = 16 bytes × (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)　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.

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

	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 coordinate effective axis pattern	'XX(h)'	2	12	○			○			
	Simple-interference-check-zone definition coordinate 1 (*2)	'XXXXXXXX(h)'	8	20	○		○		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 coordinate data	Date indicated by *2 for the number of remaining effective axes	MAX 24	MAX 44	○		○		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	MAX 52	○		○		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 coordinate data	Date indicated by *3 for the number of remaining effective axes	MAX 24	MAX 76	○		○		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	

Function: Query the definition data for simple interference check zone.

		Item	Data	Bytes	Position						Remarks	
Normal response (Continued from the previous page)	Simple-interference-check-zone definition data (Continued from the previous page) (**)	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	○			○			
	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	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)

	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian Big	Endian Little	Sign extension Yes	Sign extension No	Unit	Description	Remarks
Function: Move to the specified absolute coordinates (SCARA).											
Command	Header	'!'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'2D4(h)'	3	6	○			○			
	Axis pattern	'XX(h)'	2	8	○			○		For the X-SEL-PX/QX series, simultaneous specification of SCARA and direct-acting axes is prohibited (direct-acting axes can be specified).	
	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	○			○		(Invalid for non-SCARA axes) 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	○			○			
	CR	0Dh	1	MAX 89	○			○			
	LF	0Ah	1	MAX 90	○			○			
Normal response	Header	'#'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'2D4(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.

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

	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian Big	Endian Little	Sign extension Yes	Sign extension No	Unit	Description	Remarks
Function: Move to the relative coordinates specified with respect to the current position (SCARA).											
Command	Header	'!'	1	1	○			○			
	Station	'XX(h)'	2	3	○			○			
	Message ID	'2D5(h)'	3	6	○			○			
	Axis pattern	'XX(h)'	2	8	○			○		For the X-SEL-PX/QX series, simultaneous specification of SCARA and direct-acting axes is prohibited (direct-acting axes can be specified).	
	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	○			○		(Invalid for non-SCARA axes) 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)

	Data name	Data range (value)	Data size [bytes]	Cumulative bytes [bytes]	Endian Big	Endian Little	Sign extension Yes	Sign extension No	Unit	Description	Remarks
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. For the X-SEL-PX/QX series, simultaneous specification of SCARA and direct-acting axes is prohibited (direct-acting axes can be specified).	
	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	○			○		(Invalid for non-SCARA axes) 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

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

Revision number	Date	Content of change	Page	Changed by
First edition	Nov. 19, '02	-		Kaimoto
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, P56	Kaimoto
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, P56	Kaimoto
Fourth edition	Aug. 24, '06	• Added note under "System Status Query." Added note on use of the X-SEL (P/Q series) (Cartesian/SCARA)/SSEL/ASEL/PSEL controller.	P29	Shinbo
″	Aug. 24, '06	• Changed specification under "Version Code Query." Added "Mounted SIO" for "Unit type."	P16	Shinbo
″	Aug. 24, '06	• Changed description. Changed all references to "long-type data (hexadecimal ASCII code)" to "hexadecimal ASCII code." (Changed under "Integer Variable Query," "Axis Status Query" and "Integer Variable Change.")	P22, P27, P45	Shinbo
″	Aug. 24, '06	• Added description under "Home Return." • Changed "* With the SCARA (axis) type, this message can be used only by IAI as a "Z-axis ABS reset position movement" command in the "Description" field. • Added "For the X-SEL-PX/QX series, specify only direct-acting axes" for "Axis pattern."	P34	Shinbo
″	Aug. 24, '06	• Changed/added note for "Axis pattern" under "Jogging/Inching." • Changed to "Only one SCARA axis can be specified for the SCARA type (multiple axes cannot be specified)." • Changed to "With the SCARA type, a jogging/inching command can be issued only when none of the SCARA servo axes are operating." • Added "For the X-SEL-PX/QX series, SCARA and direct-acting axes cannot be specified simultaneously.	P37	Shinbo
″	Aug. 24, '06	• Changed note under "SCARA Absolute-Coordinate Specification Movement," "SCARA Relative-Coordinate Specification Movement" and "SCARA Point-Number Specification Movement." • Added "For the X-SEL-PX/QX series, simultaneous specification of SCARA and direct-acting axes is prohibited (direct-acting axes can be specified)" for "Axis pattern." • Added "(Invalid for non-SCARA axes)" for "Positioning operation type."	P59, P60, P61	Shinbo

Revision number	Date	Content of change	Page	Changed by

″	Aug. 24, '06	• Changed note under "SCARA Axis Status Query."
		• Added "For the X-SEL-PX/QX series, status of direct-acting axes can be queried (simultaneous specification with SCARA axes is permitted)" for "Axis pattern."
		• Changed bit name for "Type" (name only).
		  • Bit0, 1 "(Current position type)" → "(SCARA-axis current position type)"
		• Changed bit name for "Common axis status" (name only).
		  • Bit0, 1 "(Current arm system)" → "(SCARA-axis current arm system)"
		    • Bit2, 3 "(Current position coordinate system type)" → "(SCARA-axis current position coordinate system type)"
			P55	Shinbo

″	Aug. 24, '06	• Added Bit4 to system status byte 3 under "System Status Query." Bit4 (Operation mode): 0 = Program mode / 1 = Positioner mode	P29	Shinbo
″	Aug. 24, '06	• Changed note under "Real Variable Query." • Changed "Format supported in X-SEL (Cartesian) main application V0.41 or earlier…" as follows: → "Format supported in X-SEL-J/K V0.41 or earlier, or when Bit0 to 3 of Other parameter No. 46 = 0"	P23	Shinbo
″	Aug. 24, '06	• Added note under "Speed Change." • Added "For the X-SEL-PX/QX series, specification of SCARA axes is prohibited" for "Axis pattern."	P53	Shinbo
″	Aug. 24, '06	• Changed the description of *1 at the end of 4-1, "Message List."	P13	Shinbo
″	Aug. 24, '06	• Changed "X-SEL (Cartesian/IX SCARA) Serial Communication Protocol Specification (Format B)" to "X-SEL Serial Communication Protocol Specification (Format B)" on the cover. • Added "X-SEL-P/Q, X-SEL-PX/QX, TT, SSEL, ASEL and PSEL" as applicable models on the cover.	P1	Shinbo
″	Sep. 12, '06	• Changed "As of June 26, 2001, the maximum receivable size of the controller is 1023 bytes, while the maximum transmittable size is 1024 bytes" to "As of September 12, 2006, the maximum receivable size and maximum transmittable size of the controller are as follows: X-SEL (J/K/JX/KX), TT: The maximum receivable size is 1023 bytes, while the maximum transmittable size is 1024 bytes. X-SEL (P/Q/PX/QX), SSEL/ASEL/PSEL: The maximum receivable size is 2051 bytes, while the maximum transmittable size is 2048 bytes" in 4-3, "Message Details."	P14	Iwakiri

Revision number	Date	Content of change	Page	Changed by

"	Sep. 12, '06	• In 1, "Overview":
		  • Changed "X-SEL controller (Cartesian/IX SCARA)" and "X-SEL controller" to "X-SEL controller, TT or SSEL/ASEL/PSEL controller."
		  • Changed "Usage of user-open channel 1" to "Usage of user-open channel 1 (X-SEL (P/Q/PX/QX); Usage of user-open channel 0 for SSEL/ASEL/PSEL."
		  • Changed "host connector" to "PC connector or teaching connector." In line with this change, also added note regarding connectors ("Whether to use the PC connector…refer to 2, "Transmission Control Procedure."
			P6	Iwakiri

"	Sep. 12, '06	• Under "Controller Setting":
		  • Change the content of note [1]. Moved [2] to [5], and added [2] through [4].
		  • Changed "host connector" to "controller" in [5].
			P7	Iwakiri

"	Sep. 12, '06	• Under "Message Transmission Timing," changed "User-open SIO channel 1, IAI-protocol response minimum delay time" to "User-open SIO channel 1, IAI-protocol response minimum delay time (X-SEL (P/Q/PX/QX); User-open SIO channel 0, IAI-protocol response minimum delay time for SSEL/ASEL/PSEL)."	P8	Iwakiri
"	Sep. 12, '06	• Under 3, "Outline of Message," changed "User-open SIO channel 1, station code" to "User-open SIO channel 1, station code (X-SEL (P/Q/PX/QX); User-open SIO channel 0, station code for SSEL/ASEL/PSEL)."	P10	Iwakiri

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