YASKAWA

FS100 OPTIONS
INSTRUCTIONS

FOR HIGH-SPEED ETHERNET SERVER FUNCTION

Upon receipt of the product and prior to initial operation, read these instructions thoroughly, and retain for future reference.

MOTOMAN INSTRUCTIONS

MOTOMAN-□□□ INSTRUCTIONS
FS100 INSTRUCTIONS
FS100 OPERATOR'S MANUAL
FS100 MAINTENANCE MANUAL

YASKAWA ELECTRIC CORPORATION

YASKAWA

MANUAL NO.
HW1481031

1/93

MANDATORY

- This manual explains the high-speed Ethernet server function of the FS100 system and general operations. Read this manual carefully and be sure to understand its contents before handling the FS100.
- General items related to safety are listed in Chapter 1: Safety of the FS100 Instructions. To ensure correct and safe operation, carefully read the FS100 Instructions before reading this manual.

CAUTION

- Some drawings in this manual are shown with the protective covers or shields removed for clarity. Be sure all covers and shields are replaced before operating this product.
- The drawings and photos in this manual are representative examples and differences may exist between them and the delivered product.
- YASKAWA may modify this model without notice when necessary due to product improvements, modifications, or changes in specifications.
- If such modification is made, the manual number will also be revised.
- If your copy of the manual is damaged or lost, contact a YASKAWA representative to order a new copy. The representatives are listed on the back cover. Be sure to tell the representative the manual number listed on the front cover.
- YASKAWA is not responsible for incidents arising from unauthorized modification of its products. Unauthorized modification voids your product's warranty.

Notes for Safe Operation

Read this manual carefully before installation, operation, maintenance, or inspection of the FS100.

In this manual, the Notes for Safe Operation are classified as “WARNING”, “CAUTION”, “MANDATORY”, or “PROHIBITED”.

 WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury to personnel.
 CAUTION	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury to personnel and damage to equipment. It may also be used to alert against unsafe practices.
 MANDATORY	Always be sure to follow explicitly the items listed under this heading.
 PROHIBITED	Must never be performed.

Even items described as “CAUTION” may result in a serious accident in some situations.

At any rate, be sure to follow these important items

To ensure safe and efficient operation at all times, be sure to follow all instructions, even if not designated as “CAUTION” and “WARNING”.

WARNING

- Before operating the manipulator, check that servo power is turned OFF when the emergency stop button on the programming pendant is pressed.
  When the servo power is turned OFF, the SERVO ON LED on the programing pendant is turned OFF.

Injury or damage to machinery may result if the emergency stop circuit cannot stop the manipulator during an emergency. The manipulator should not be used if the emergency stop button does not function.

Fig. : Emergency Stop Button

- In the case of not using the programming pendant, be sure to supply the emergency stop button on the equipment. Then before operating the manipulator, check to be sure that the servo power is turned OFF by pressing the emergency stop button.
  Connect the external emergency stop button to the 5-6 pin and 16-17 pin of the robot system signal connector (CN2).

- Upon shipment of the FS100, this signal is connected by a jumper cable in the dummy connector. To use the signal, make sure to supply a new connector, and then input it.

If the signal is input with the jumper cable connected, it does not function, which may result in personal injury or equipment damage.

- Once the emergency stop button is released, clear the cell of all items which could interfere with the operation of the manipulator. Then turn the servo power ON.

Injury may result from unintentional or unexpected manipulator motion.

Fig. : Release of Emergency Stop Button

- Observe the following precautions when performing teaching operations within the manipulator's operating range:
  - View the manipulator from the front whenever possible.
  - Always follow the predetermined operating procedure.
  - Ensure that you have a safe place to retreat in case of emergency.

Improper or unintended manipulator operation may result in injury.

WARNING

- Confirm that no person is present in the manipulator's operating range and that you are in a safe location before:
  - Turning ON the power for the FS100.
  - Moving the manipulator with the programming pendant.
  - Running the system in the check mode.
  - Performing automatic operations.

Injury may result if anyone enters the manipulator's operating range during operation. Always press an emergency stop button immediately if there are problems.
The emergency stop button is located on the programing pendant.

CAUTION

- Perform the following inspection procedures prior to teaching the manipulator. If problems are found, correct them immediately, and be sure that all other necessary tasks have been performed.
  - Check for problems in manipulator movement.
  - Check for damage to the insulation and sheathing of external wires.
- Return the programming pendant to a safe place after use.

If the programming pendant is inadvertently left on the manipulator, on a fixture, or on the floor, the manipulator or a tool may collide with the programming pendant during manipulator movement, which may result in personal injury or equipment damage.

- Read and understand the Explanation of Warning Labels in the FS100 Instructions before operating the manipulator.

Definition of Terms Used Often in This Manual

The MOTOMAN is the YASKAWA industrial robot product.

The MOTOMAN usually consists of the manipulator, the FS100 controller, manipulator cables, the FS100 programming pendant (optional), and the FS100 programming pendant dummy connector (optional).

In this manual, the equipment is designated as follows:

Equipment	Manual Designation
FS100 controller	FS100
FS100 programming pendant	Programming pendant
Cable between the manipulator and the controller	Manipulator Cable
FS100 programming pendant dummy connector	Programming pendant dummy connector

Descriptions of the programming pendant keys, buttons, and displays are shown as follows:

Equipment		Manual Designation
Programming Pendant	Character Keys	The keys which have characters printed on them are denoted with [ ]. ex. [ENTER]
	Symbol Keys	The keys which have a symbol printed on them are not denoted with [ ] but depicted with a small picture. ex. PAGE key  The Cursor is an exception, and a picture is not shown.
	Axis Keys Numeric Keys	“Axis Keys” and “Numeric Keys” are generic names for the keys for axis operation and number input.
	Keys pressed simultaneously	When two keys are to be pressed simultaneously, the keys are shown with a “+” sign between them, ex. SHIFT key  +COORD key 
	Mode Key	Three kinds of modes that can be selected by the mode key are denoted as follows: REMOTE, PLAY, or TEACH
	Button	Three buttons on the upper side of the programming pendant are denoted as follows: HOLD button START button EMERGENCY STOP button
	Displays	The menu displayed in the programming pendant is denoted with { }. ex. {JOB}
PC Keyboard		The name of the key is denoted ex. Ctrl key on the keyboard

Description of the Operation Procedure

In the explanation of the operation procedure, the expression "Select • • • " means that the cursor is moved to the object item and the SELECT key is pressed, or that the item is directly selected by touching the screen.

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1 Introductions

The high-speed Ethernet server function is a new communication protocol to enable high-speed Ethernet communication between the FS100 and external devices such as PC, etc.

Followings are the characteristics of this function.

(1) It becomes possible to communicate in more than two times higher peed than the present Ethernet server function and more then 5 times higher speed than the present Ethernet data transmission function.

(2) It combines the present Ethernet data transmission function (host control) and the present Ethernet server function. (except for some functions)

(3) It corresponds to the file receiving/transmission function to which the present Ethernet server function dose not correspond.

(4) It is incompatible to the present data transmission function (host control) and the present Ethernet server function. Therefore, MotoCom communication library (Ver3.6), which corresponds to the high-speed Ethernet server function, will be released at the same time.

(5) It is also possible to create a communication program without using MotoCom since this function is publishing its communication protocol.

(6) To maintain the compatibility with existing communication software, the present data transmission function and the present Ethernet server function are still available.

1.1 Preparation

This high-speed Ethernet server function is an expansion option to the FS100 Ethernet function. In this reason, when using this function, the PC should be ready to use the FS100 Ethernet function.

1.2 Restriction

- This function cannot use concurrently with MotoPlus function, PP customizing function, other Ethernet functions and the data transmission function (serial).
- To increase the speed, the protocol of this function was modified. Therefore, it has no compatibility with the data transmission function and the Ethernet server function.
  To retain the compatibility, MotoCom communication library (Ver3.6) will be released at the same time with this function. Please use MotoCom communication library of later version than Ver3.6.

2 System Setting

To use the high-speed Ethernet server function, configuration of the following settings are required.

2.1 Before using the System

The high-speed Ethernet server function is designed as an expansion option to the FS100 Ethernet function. Before using this function, it is required to make the FS100 Ethernet host control function available.

For more details, see “3 Ethernet Function Settings” in “FS100 OPTIONS INSTRUCTIONS FOR Ethernet FUNCTION”.

2.2 Parameter Setting

Set the following parameters before using this function.

Parameter	Details	Setting value
RS022	Instance 0 permitted (Instance 0 is used as the ordinal data)	1
RS029	A job during the playback operation, Loading of a variable	1
RS034	Timer to wait for a replay	200
RS035	Timer for monitoring end of text	200

2.3 Setting of Relevant Parameter

Parameter	Details	When shipping
S2C541	Specify the permission of variable and I/O input during the play mode (0: writing is allowed / 1: writing is not allowed)	1
S2C542	Specify the permission of variable and I/O input during the edit-lock status (0: writing is allowed / 1: writing is not allowed)	1

NOTE

When setting 0 toS2C541 (writing is allowed), writing is possible even during the playback operation. However, please be noted that this setting may affect the manipulator’s cycle time due to some writing timings or their frequencies.

NOTE

Following are the status to which specifying of the “edit-lock status” is permitted by S2C542 parameter.

- During an alarm
- When an external memory device is operated
- When the data transmission function is used
- Specific input EDIT_LOCK (#40064) is turned ON

3 Transmission Procedure

3.1 Packet Format

Transmission packet of the high-speed Ethernet server function is composed of header part (32 byte) + data part (changeable: 479 byte at max.)

The transmission packet consists of “request”, which transmits the data from the PC to the FS100, and “answer”, which transmits the data from the FS100 to the PC.

The sub-header setting composition of “request” and “answer” are different. And the setting value of the “answer” varies in accordance with the replying contents.

Followings are the format of each packet.

Request (the PC to the FS100)

4 Byte

Type	Byte 0	Byte 1	Byte 2	Byte 3
Identifier	Fixed character strings for identification (YERC)			
Data size	Header part size (fixed to 0x20)		Data part size (variable value)	
Reserve 1 / processing division	Reserve 1 (fixed to “3”)	Processing division	ACK	Request ID
Block No.				
Reserve 2	Reserve2 (fixed to “99999999”)			
Sub-header	Command No.		Instance	
	Attribute	Service (when requested)	Padding	
Data division	Data division (variable:479Byte at maximum)			

Header part (fixed to 32Byte)

Answer (the FS100 to the PC)

4 Byte

Type	Byte 0	Byte 1	Byte 2	Byte 3
Identifier	Fixed character strings for identification (YERC)			
Data size	Header part size (fixed to 0x20)		Data part size (variable value)	
Reserve 1 / processing division	Reserve 1 (fixed to “3”)	Processing division	ACK	Request ID
Block No.	Allocate the block number from 0 to0x7fff_ffff Add 0x8000_0000 to the last block			
Reserve 2	Reserve 2 (fixed to “99999999”)			
Sub-header	Service (when replying)	Status: When normal operation:0x00 When abnor-mal operation: other than 0x00	Added status size	Padding
	Added status size[1)]		Padding	
Data division	Data division (variable:479Byte at maximum)			

Header part (fixed to 32Byte)

1 For the details of added status, please refer to *chapter 4 “Added Status Code”* .

Item		Data size	Settings
Identifier		4byte	Fixed to “YERC”
Header part size		2byte	Size of header part (fixed to 0x20)
Data part size		2byte	Size of data part (variable)
Reserve 1		1byte	Fixed to “3”
Processing division		1byte	1: robot control 2: file control
ACK		1byte	Request: 0 Other than request: 1
Request ID		1byte	Identifying ID for command session (increment this ID every time the client side outputs a command. In reply to this, server side answers the received value.)
Block No.		4byte	Request: 0 Answer: add 0x8000_0000 to the last packet. Data transmission other than above: add 1 (max: 0x7FFF_FFFF)
Reserve 2		8byte	Fixed to “99999999”
Sub-header (request)	Command No.	2byte	Execute processing by this command. (conforms to “Class” of CIP communication protocol)
	Instance	2byte	Define SECTION to execute a command. (conforms to “Padding” of CIP communication protocol)
	Attribute	1byte	Define SUB SECTION for executing a command. Attribute: (conforms to “Attribute” of CIP communication protocol)
	Service (request)	1byte	Define data accessing method.
Sub-header (answer)	Service (answer)	1byte	Add 0s80 to service (request).
	Status	1byte	0x00: normal reply Other than 0x00: abnormal reply
	Added status size	1byte	Size of added status (0: not specified / 1: 1 WORD data / 2: 2 WORD data)
	Added status	2byte	Error code specified by added status size For details, refer to *chapter 4 “Added Status Code”* .
Padding		Variable	Reserve area

Details of sub-header

• Sub header (request)

Sub header (request)	Command No.		Instance
	Attribute	Service (request)	Padding

• Sub header (answer/ no added status)

Sub header (request)	Service (answer)	Status: normal: 0x00	Added status: size: 0x00	Padding
	Added status:0x14810310		Padding	

• Sub header (answer/ with added status)

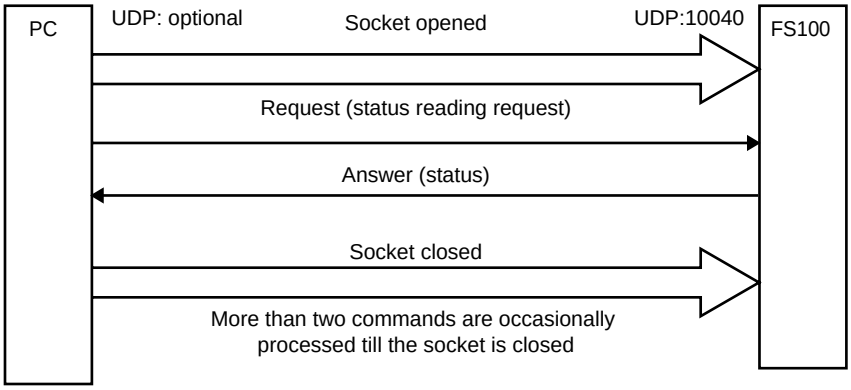
Sub header (request)	Service (answer)	Status: abnormal: other than 0x00	Added status: size:0x01	Padding
	Added status:0x00001010		Padding	

3.2 Outline

The transmission/receiving flow of the transmission packet is divided into robot control and file control. Please refer to *chapter 3.3 "Respective Commands for Robot Control" at page 3-18* for the details of respective robot control commands (request/answer) and *chapter 3.4 "File Control Command" at page 3-75* for the details of respective file control commands.

[Ex. When Reading]

3.2.1 Robot Control/Status Reading



Request <Format>

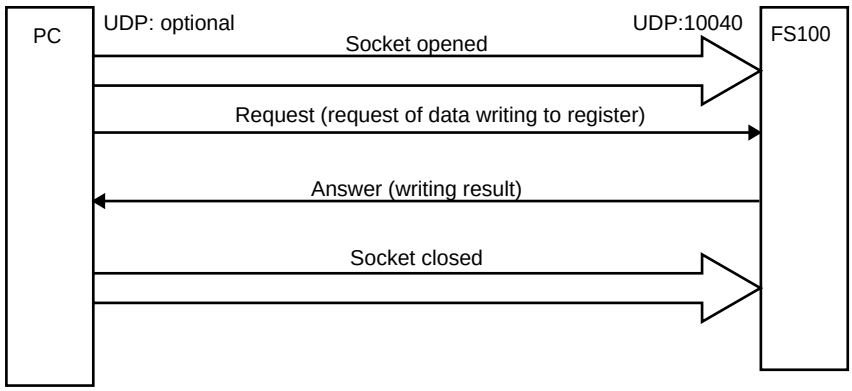
"YERC"				Identifier			
0x0020		0x0000		Header part size		Data part size	
3	1	0x00	0x00	Reserve 1	Processing division	ACK	Request ID
0x0000_0000				Block No.			
"99999999"				Reserve 2			
0x0072		0x0001		Command No.		Instance	
0x00	0x01	0x0000		Attribute	Service	Padding	

Answer <Format>

"YERC"				Identifier			
0x0020		0x0000		Header part size		Data part size	
3	1	0x01	0x00	Reserve 1	Processing division	ACK	Request ID
0x8000_0000				Block No.			
"99999999"				Reserve 2			
0x81	0x00	0x00	0x00	Service	Status	Added status size	Padding
0x0000		0x0000		Added status		Padding	
Status data 1				Reading value 1			
Status data 2				Reading value 2			

[Ex. When Writing]

3.2.2 Robot Control/Data Writing to Register



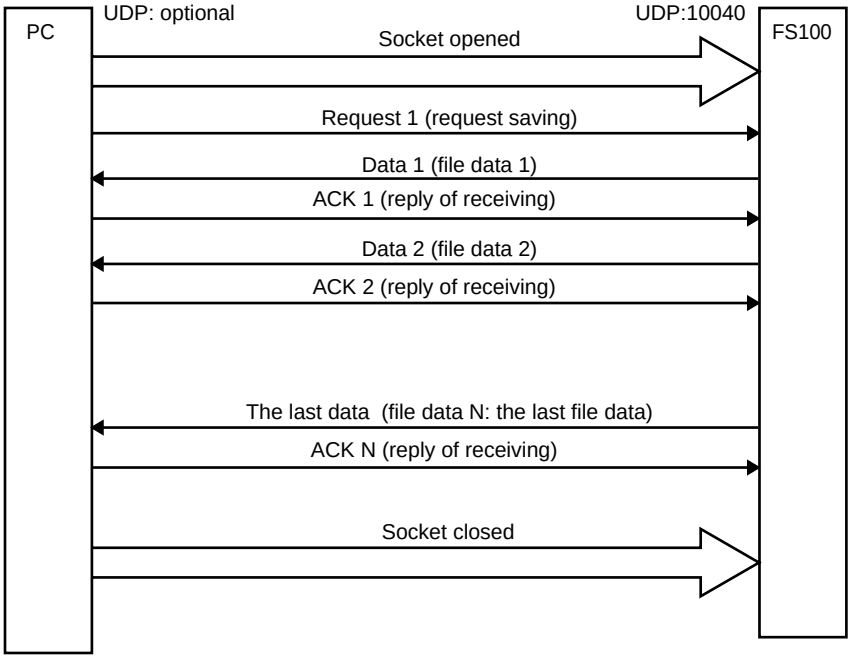
Request <Format>

“YERC”				Identifier			
0x0020		0x0002		Header part size		Data part size	
3	1	0x00	0x01	Reserve 1	Processing division	ACK	Request ID
0x0000_0000				Block No.			
‘99999999’				Reserve 2			
0x0079		Register No.		Command No.		Instance	
0x00	0x02	0x0000		Attribute	Service	Padding	
Register data				Writing value			

Answer <Format>

‘YERC’				Identifier			
0x0020		0x0000		Header part size		Data part size	
3	1	0x01	0x01	Reserve 1	Processing division	ACK	Request ID
0x8000_0000				Block No.			
‘99999999’				Reserve 2			
0x82	0x00	0x00	0x00	Service	Status	Added status size	Padding
0x0000		0x0000		Added status		Padding	

3.2.3 File Control



Request 1 <Format>

“YERC”				Identifier			
0x0020		0x000B		Header part size		Data part size	
3	2	0x00	0x02	Reserve 1	Processing division	ACK	Request ID
0x0000_0000				Block No.			
“99999999”				Reserve 2			
0x00		0x0000		Command No.		Instance	
0x00	0x16	0x00		Attribute	Service	Padding	
T	E	S	T	File name			
J	O	B	.				
J	B	I					

Data 1 <Format>

“YERC”				Identifier			
0x0020		0x01d f		Header part size		Data part size	
3	2	0x01	0x02	Reserve 1	Processing division	ACK	Request ID
0x0000_0001				Block No.			
“99999999”				Reserve 2			
0x96	0x00	0x00	0x00	Service	Status	Added status size	Padding
0x0000		0x0000		Added status		Padding	
File data 1				File data 1			

ACK1 <Format>

“YERC”				Identifier			
0x0020		0x0000		Header part size		Data part size	
3	2	0x01	0x03	Reserve 1	Processing division	ACK	Request ID
0x0000_0001				Block No.			
“99999999”				Reserve 2			
0x00		0x0000		Command No.		Instance	
0x00	0x16	0x00		Attribute	Service	Padding	

Data 2 <Format>

“YERC”				Identifier			
0x0020		0x01d?		Header part size		Data part size	
3	2	0x01	0x03	Reserve 1	Processing division	ACK	Request ID
0x0000_0002				Block No.			
“99999999”				Reserve 2			
0x96	0x00	0x00	0x00	Service	Status	Added status size	Padding
0x0000		0x0000		Added status		Padding	
File data 2				File data 2			

ACK2 <Format>

“YERC”				Identifier			
0x0020		0x0000		Header part size		Data part size	
3	2	0x01	0x03	Reserve 1	Processing division	ACK	Request ID
0x0000_0002				Block No.			
“99999999”				Reserve 2			
0x00		0x0000		Command No.		Instance	
0x00	0x16	0x00		Attribute	Service	Padding	

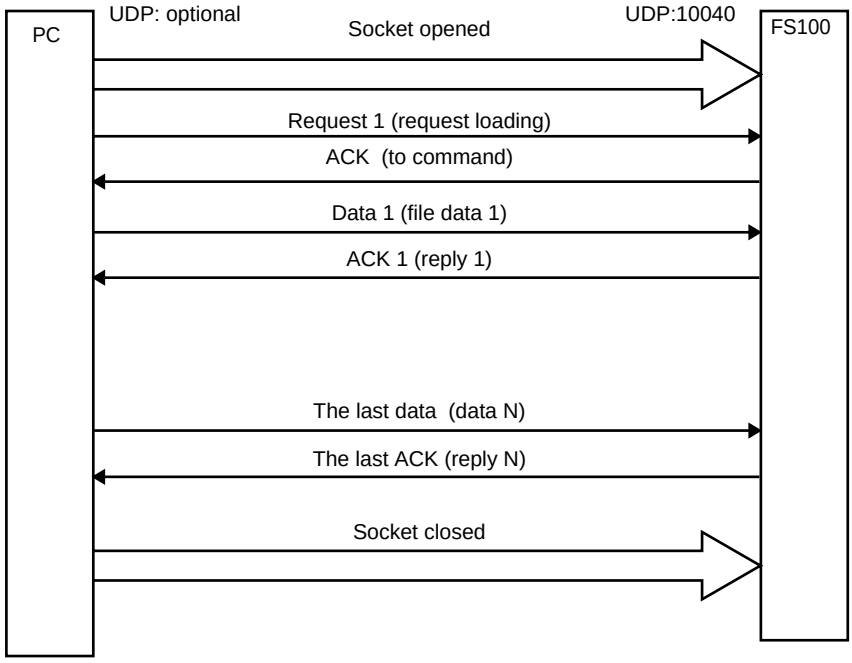
The last data (N) <Format>

“YERC”				Identifier			
0x0020		0x0008		Header part size		Data part size	
3	2	0x01	0x04	Reserve 1	Processing division	ACK	Request ID
0x8000_000N				Block No.			
“99999999”				Reserve 2			
0x96	0x00	0x00	0x00	Service	status	Added status size	Padding
0x0000		0x0000		Added status		Padding	
File data N				File data N			

The last ACK (N) <Format>

“YERC”				Identifier			
0x0020		0x0000		Header part size		Data part size	
3	2	0x01	0x04	Reserve 1	Processing division	ACK	Request ID
0x8000_000N				Block No.			
“99999999”				Reserve 2			
0x00		0x0000		Command No.		Instance	
0x00	0x16	0x00		Attribute	Service	Padding	

3.2.4 File Control (File Loading)



Request 1 <Format>

"YERC"				Identifier			
0x0020		0x000B		Header part size		Data part size	
3	2	0x00	0x05	Reserve 1	Processing division	ACK	Request ID
0x0000_0000				Block No.			
"99999999"				Reserve 2			
0x00		0x0000		Command No.		Instance	
0x0000	0x15	0x00		Attribute	Service	Padding	
T	E	S	T	File name			
J	O	B	.				
J	B	I					

ACK (to request) <Format>

"YERC"				Identifier			
0x0020		0x0000		Header part size		Data part size	
3	2	0x01	0x05	Reserve 1	Processing division	ACK	Request ID
0x0000_0000				Block No.			
"99999999"				Reserve 2			
0x95	0x00	0x00	0x00	Service	Status	Added status size	Padding
0x0000		0x0000		Added status		Padding	

Data 1 <Format>

“YERC”				Identifier			
0x0020		0x01d?		Header part size		Data part size	
3	2	0x01	0x06	Reserve 1	Processing division	ACK	Request ID
0x0000_0001				Block No.			
“99999999”				Reserve 2			
0x00		0x0000		Command No.		Instance	
0x0000	0x15	0x00		Attribute	Service	Padding	
File data 1				File data 1			

ACK1 <Format>

“YERC”				Identifier			
0x0020		0x0000		Header part size		Data part size	
3	2	0x01	0x06	Reserve 1	Processing division	ACK	Request ID
0x0000_0001				Block No.			
“99999999”				Reserve 2			
0x95	0x00	0x00	0x00	Service	Status	Added status size	Padding
0x0000		0x0000		Added status		Padding	

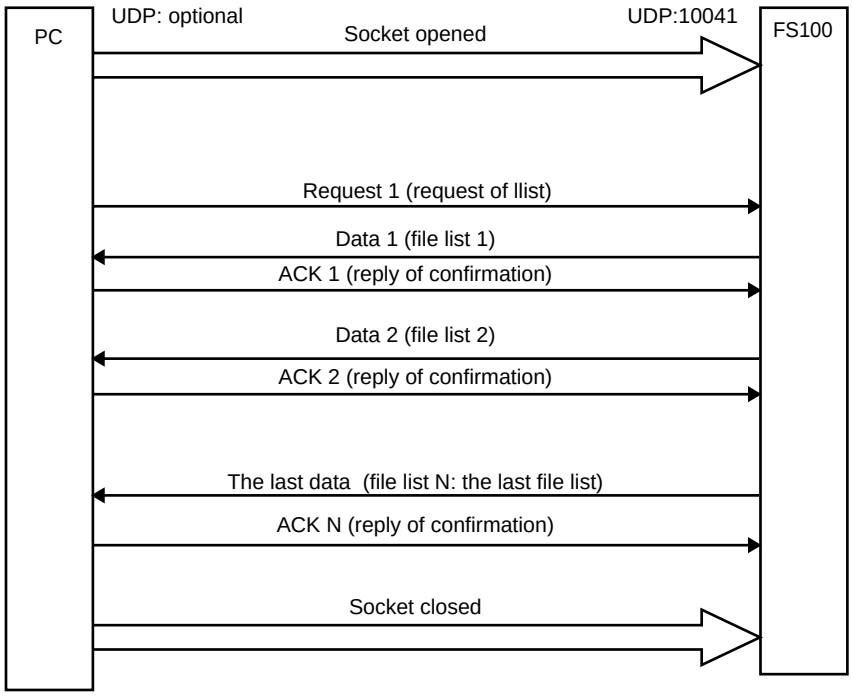
The last data (N) <Format>

“YERC”				Identifier			
0x0020		0x0008		Header part size		Data part size	
3	2	0x01	0x07	Reserve 1	Processing division	ACK	Request ID
0x8000_000N				Block No.			
“99999999”				Reserve 2			
0x00		0x0000		Command No.		Instance	
0x0000	0x15	0x00		Attribute	Service	Padding	
File data N				File data N			

The last ACK (N) <Format>

“YERC”				Identifier			
0x0020		0x0000		Header part size		Data part size	
3	2	0x01	0x07	Reserve 1	Processing division	ACK	Request ID
0x8000_000N				Block No.			
“99999999”				Reserve 2			
0x95	0x00	0x00	0x00	Service	Status	Added status size	Padding
0x0000		0x0000		Added status		Padding	

3.2.5 File Control (File list)



Request 1 <Format>

“YERC”				Identifier			
0x0020		0x0005		Header part size		Data part size	
3	2	0x00	0x08	Reserve 1	Processing division	ACK	Request ID
0x0000_0000				Block No.			
“99999999”				Reserve 2			
0x00		0x0000		Command No.		Instance	
0x00	0x32	0x0000		Attribute	Service	Padding	
*	.	J	B	File identification (refer to data details)			
I							

Data 1 <Format>

“YERC”				Identifier			
0x0020		0x01d?		Header part size		Data part size	
3	2	0x01	0x08	Reserve 1	Processing division	ACK	Request ID
0x0000_0001				Block No.			
“99999999”				Reserve 2			
0xB2	0x00	0x00	0x00	Service	Status	Added status size	Padding
0x0000		0x0000		Added status		Padding	
File list 1				File list 1 (refer to “Details of data”)			

ACK1 <Format>

“YERC”				Identifier			
0x0020		0x0000		Header part size		Data part size	
3	2	0x01	0x08	Reserve 1	Processing division	ACK	Request ID
0x0000_0001				Block No.			
“99999999”				Reserve 2			
0x00		0x0000		Command No.		Instance	
0x00	0x32	0x0000		Attribute	Service	Padding	

Data 2 <Format>

“YERC”				Identifier			
0x0020		0x01d?		Header part size		Data part size	
3	2	0x01	0x09	Reserve 1	Processing division	ACK	Request ID
0x0000_0002				Block No.			
“99999999”				Reserve 2			
0xB2	0x00	0x00	0x00	Service	Status	Added status size	Padding
0x0000		0x0000		Added status		Padding	
File list 2				File list 2			

ACK2 <Format>

“YERC”				Identifier			
0x0020		0x0000		Header part size		Data part size	
3	2	0x01	0x09	Reserve 1	Processing division	ACK	Request ID
0x0000_0002				Block No.			
“99999999”				Reserve 2			
0x00		0x0000		Command No.		Instance	
0x00	0x32	0x0000		Attribute	Service	Padding	

The last data (N) <Format>

“YERC”“YERC”				Identifier			
0x0020		0x0008		Header part size		Data part size	
3	2	0x01	0x0a	Reserve 1	Processing division	ACK	Request ID
0x8000_000N				Block No.			
“99999999”				Reserve 2			
0xB2	0x00	0x00	0x00	Service	Status	Added status size	Padding
0x0000		0x0000		Added status		Padding	
File list N				File list N			

The last ACK (N) <Format>

“YERC”				Identifier			
0x0020		0x0000		Header part size		Data part size	
3	2	0x01	0x07	Reserve 1	Processing division	ACK	Request ID
0x8000_000N				Block No.			
“99999999”				Reserve 2			
0x00		0x0000		Command No.		Instance	
0x00	0x32	0x0000		Attribute	Service	Padding	

Detail of data

Not specified	JBI list
.	JBI list
*.JBI	JBI list
*.DAT	DAT file list
*.CND	CND file list
*.PRM	PRM file list
*.SYS	SYS file list
*.LST	LST file list

Output form of the list

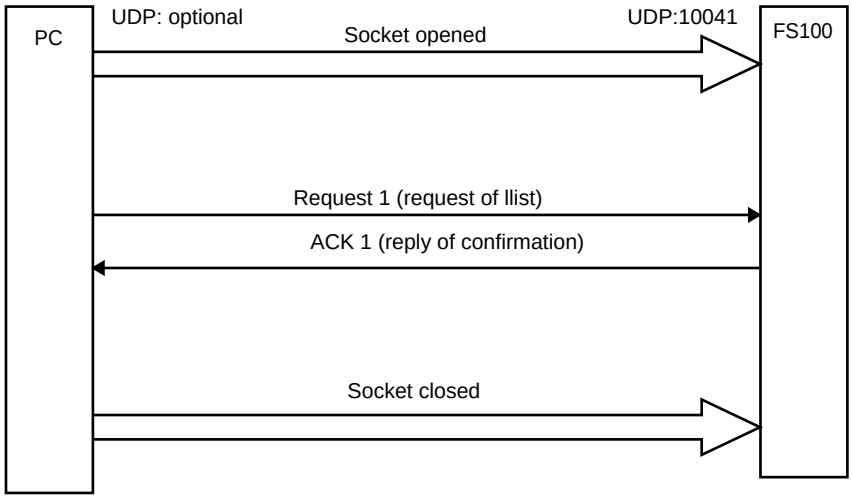
The list is described in the form of “file name” + <CR> + <LF> consecutively

<Ex.>

‘1’	‘.’	‘J’	‘B’
‘I’	<CR>	<LF>	‘2’
‘2’	‘.’	‘J’	‘B’
‘I’	<CR>	<LF>	‘3’
‘3’	‘3’	‘.’	‘J’
‘B’	‘I’	<CR>	<LF>
‘4’	‘4’	‘4’	‘4’
‘.’	‘J’	‘B’	‘I’
<CR>	<LF>		

<CR><LF> means end-of -line
<CR> : Carriage Return
<LF> : Line Feed

3.2.6 File Control (Deleting of file)



Request 1 <Format>

“YERC”				Identifier			
0x0020		0x000B		Header part size		Data part size	
3	2	0x00	0x0b	Reserve 1	Processing division	ACK	Request ID
0x0000_0000				Block No.			
“99999999”				Reserve 2			
0x00		0x0000		Command No.		Instance	
0x00	0x09	0x00		Attribute	Service	Padding	
T	E	S	T	File name			
J	O	B	.				
J	B	I					

ACK 1 <Format>

‘YERC’				Identifier			
0x0020		0x0000		Header part size		Data part size	
3	2	0x01	0x0b	Reserve 1	Processing division	ACK	Request ID
0x8000_0000				Block No.			
“99999999”				Reserve 2			
0x89	0x00	0x00	0x00	Service	Status	Added status size	Padding
0x0000		0x0000		Added status		Padding	

3.3 Respective Commands for Robot Control

Follows are robot controlling commands which can use in the high-speed Ethernet communication.

Table 3-1: List of Robot Control Command

No.	Command No.	Name	Reference chapter
1	0x70	Alarm data reading command	Refer to *chapter 3.3.1 at page 3-20* .
2	0x71	Alarm history reading command	Refer to *chapter 3.3.2 at page 3-23* .
3	0x72	Status information reading command	Refer to *chapter 3.3.3 at page 3-26* .
4	0x73	Executing job information reading command	Refer to *chapter 3.3.4 at page 3-27* .
5	0x74	Axis configuration information reading command	Refer to *chapter 3.3.5 at page 3-29* .
6	0x75	Robot position data reading command	Refer to *chapter 3.3.6 at page 3-31* .
7	0x76	Position error reading command	Refer to *chapter 3.3.7 at page 3-34* .
8	0x77	Torque data reading command	Refer to *chapter 3.3.8 at page 3-35* .
9	0x78	I/O data reading / writing command	Refer to *chapter 3.3.9 at page 3-36* .
10	0x79	Register data reading / writing command	Refer to *chapter 3.3.10 at page 3-37* .
11	0x7A	Byte variable (B) reading / writing command	Refer to *chapter 3.3.11 at page 3-38* .
12	0x7B	Integer type variable (I) reading / writing command	Refer to *chapter 3.3.12 at page 3-39* .
13	0x7C	Double precision integer type variable (B) reading / writing command	Refer to *chapter 3.3.13 at page 3-40* .
14	0x7D	Real type variable (R) reading / writing command	Refer to *chapter 3.3.14 at page 3-41* .
15	0x7E	Character type variable (S) reading / writing command	Refer to *chapter 3.3.15 at page 3-42* .
16	0x7F	Robot position type variable (P) reading / writing command	Refer to *chapter 3.3.16 at page 3-43* .
17	0x80	Base position type variable (BP) reading / writing command	Refer to *chapter 3.3.17 at page 3-46* .
18	0x81	External axis type variable (EX) reading / writing command	Refer to *chapter 3.3.18 at page 3-48* .
19	0x82	Alarm reset / error cancel command	Refer to *chapter 3.3.19 at page 3-50* .
20	0x83	HOLD / servo ON/OFF command	Refer to *chapter 3.3.20 at page 3-51* .
21	0x84	Step / cycle / continuous switching command	Refer to *chapter 3.3.21 at page 3-52* .
22	0x85	Character string display command to the programming pendant	Refer to *chapter 3.3.22 at page 3-53* .

Table 3-1: List of Robot Control Command

No.	Command No.	Name	Reference chapter
23	0x86	Start-up (job START) command	Refer to *chapter 3.3.23 at page 3-54* .
24	0x87	Job select command	Refer to *chapter 3.3.24 at page 3-55* .
25	0x88	Management time acquiring command	Refer to *chapter 3.3.25 at page 3-57* .
26	0x89	System information acquiring command	Refer to *chapter 3.3.26 at page 3-58* .
27	0x300	Plural I/O data reading / writing command	Refer to *chapter 3.3.27 at page 3-59* .
28	0x301	Plural register data reading / writing command	Refer to *chapter 3.3.28 at page 3-61* .
29	0x302	Plural byte type variable (B) reading / writing command	Refer to *chapter 3.3.29 at page 3-62* .
30	0x303	Plural integer type variable (I) reading / writing command	Refer to *chapter 3.3.30 at page 3-64* .
31	0x304	Plural double precision integer type variable (B) reading / writing command	Refer to *chapter 3.3.31 at page 3-65* .
32	0x305	Plural real type variable (R) reading / writing command	Refer to *chapter 3.3.32 at page 3-66* .
33	0x306	Plural character type variable (S) reading / writing command	Refer to *chapter 3.3.33 at page 3-67* .
34	0x307	Plural robot position type variable (P) reading / writing command	Refer to *chapter 3.3.34 at page 3-69* .
35	0x308	Plural base position type variable (BP) reading / writing command	Refer to *chapter 3.3.35 at page 3-71* .
36	0x309	Plural external axis type variable (EX) reading / writing command	Refer to *chapter 3.3.36 at page 3-73* .

3.3.1 Alarm Data Reading Command

Request

Sub header part

<Details>

Command No.	0x70	
Instance	Specify one out of followings 1: The latest alarm 2: The second alarm from the latest 3: The third alarm from the latest 4: The fourth alarm from the latest	Four alarms are displayed on the P.P display at a time. Specify one out of them.
Attribute	Specify one out of followings 1: Alarm code 2: Alarm data 3: By alarm type 4: Alarm occurring time 5: Alarm character string name	Alarm code means the alarm No. Alarm data means the sub code which supports the alarm contents. There are some cases that the sub code for the occurring alarm would not appear.
Service	• Get_Attribute_Single: 0x0E • Get_Attribute_All: 0x01	Specify the accessing method to the data. 0x0E: Read out data of the specified element number 0x01: Read out data of all the element number (In this case, specify0 to the element number.)

Data part

No data part

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: not specified • 1: 1 WORD • 2: 2 WORD	"1" indicates 1 WORD of added status data, and "2" indicates 2 WORD of added status data.
Added status	Error code specified by the added status size	The error code of 1 WORD exists if the added status code is "1" and that of 2 WORD exists if the code is "2".

Data part

32bit integer	Byte 0	Byte 1	Byte 2	Byte3	<Details>
1	Alarm code				Range is from 0x0001 to 0x270F(decimal value: 9999)
2	Alarm data				Setting values vary in accordance with the contents of the alarm type. Also, some alarms are not displayed with the sub code. In this case, the value is zero (0x0).
3	Alarm type				0 : No alarm 1 : Decimal UNSIGNED SHORT type (display example: [1]) 2 : UNSIGNED CHAR bit pattern (display example: [0000_0001]) 3 : User axis type (display example: [SLURBT]) 4 : Spacial coordinate type (display example: [XYZ]) 5 : Robot coordinate type (display example: [XYZRxRyRz]) 6 : Conveyor characteristic file (display example: [123]) 8 : Control group type (display example: [R1R2S1S2]) robot & station 9 : Decimal SHORT type (display example: [-1]) 10 : UNSIGNED SHORT bit pattern (display example: [0000_0000_0000_0001]) 11 : Control group type (display example: [R1]) for robot only 12 : Control group type (display example:[R1S1B1]) for robot, station and base 20 : Control group LOW/HIGH logical axis (display example: [R1:LOW SLURBT, HIGH SLURBT]) 21 : Control group MIN/MAX logical axis (display example: [R1: MIN SLURBT, MAX SLURBT]) 22 : Control group MIN/MAX spacial coordinate (display example: [R1: MIN XYZ, MAX XYZ]) 23 : Logical axis of both control group 1 and control group 2 (display example: [R1: SLURBT, R2: SLURBT]) 24 : Logical axis 1 and 2 of the control group (display example: [R1: SLURBT, SLURBT]) 25 : Logical axis of the control group and UNSIGNED CHAR type (display example: [R1: SLURBT, 1]) 27 : Control group and UNSIGNED CHAR type (display example: [R1: 1])
4	Alarm occurring time (Character strings of 16 letters) Ex.2011/10/10 15:49				
5					
6					
7					
8	Alarm character strings name (character strings: 32 letters)				It is transmitted in the form of the character strings whose language code was selected by the programming pendant and half- and full-width characters are mixed.
9					
10					
11					
12					
13					
14					
15					

NOTE

For the alarm character strings name, it is transmitted in the form of the character strings whose language code was selected by the programming pendant.

Use the same language code as the FS100, or the characters corrupt in case the client side dose not correspond to its language code.

3.3.2 Alarm History Reading Command

Request

Sub header part

<Details>

Command No.	0x71	
Instance	Specify one out of followings • 1 to 100 • 1001 to 1100 • 2001 to 2100 • 3001 to 3100 • 4001 to 4100	Specify the alarm number 1 to 100 : Major failure 1001 to 1100: Monitor alarm 2001 to 2100: User alarm (system) 3001 to 3100: User alarm (user) 4001 to 4100: OFF line alarm
Attribute	Specify one out of followings 1: Alarm code 2: Alarm data 3: Alarm type 4: Alarm occurring time 5: Alarm character strings name	Alarm code means the alarm No. Alarm data means the sub code which supports the alarm content. There are some cases that the sub code for the occurring alarm would not appear.
Service	• Get_Attribute_Single: 0x0E • Get_Attribute_All: 0x01 Specify the accessing method to the data	Specify the accessing method to the data. 0x0E: Read out data of the specified element number 0x01: Read out data of all the element number (In this case, specify0 to the element number.)

Data part

No data part

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: not specified • 1: 1 WORD • 2: 2 WORD	“1” indicates 1 WORD of added status data, and “2” indicates 2 WORD of added status data.
Added status	Error code specified by the added status size	The error code of 1 WORD exists if the added status code is “1” and that of 2 WORD exists if the code is “2”.

Data part

32bit Integer	Byte 0	Byte 1	Byte 2	Byte3	<Details>
1	Alarm code				Range is from 0x0001 to 0x270F(decimal value: 9999)
2	Alarm data				Setting values vary in accordance with the contents of the alarm type. Also, some alarm are not displayed with the sub code. In this case, the value is 0 :0x0).
3	Alarm type				0 : No alarm 1 : Decimal UNSIGNED SHORT type (display example: [1]) 2 : UNSIGNED CHAR bit pattern (display example: [0000_0001]) 3 : User axis type (display example: [SLURBT]) 4 : Spacial coordinate type (display example: [XYZ]) 5 : Robot coordinate type (display example: [XYZRxRyRz]) 6 : Conveyor characteristic file (display example: [123]) 8 : Control group type (display example: [R1R2S1S2]) robot & station 9 : Decimal SHORT type (display example: [-1]) 10 : UNSIGNED SHORT bit pattern (display example: [0000_0000_0000_0001]) 11 : Control group type (display example: [R1]) for robot only 12 : Control group type (display example:[R1S1B1]) for robot, station and base 20 : Control group LOW/HIGH logical axis (display example: [R1: LOW SLURBT, HIGH SLURBT]) 21 : Control group MIN/MAX logical axis (display example: [R1: MIN SLURBT, MAX SLURBT]) 22 : Control group MIN/MAX spacial coordinate (display example: [R1: MIN XYZ, MAX XYZ]) 23 : Logical axis of both control group 1 and control group 2 (display example: [R1: SLURBT, R2: SLURBT]) 24 : Logical axis 1 and 2 of the control group (display example: [R1:SLURBT, SLURBT]) 25 : Logical axis of the control group and UNSIGNED CHAR type (display example: [R1: SLURBT, 1]) 27 : Control group and UNSIGNED CHAR type (display example: [R: 1])
4	Alarm occurring time (Character strings of 16 letters) Ex.2011/10/10 15:49				
5					
6					
7					
8	Alarm character strings name (character strings: 32 letters)				It is transmitted in the form of the character strings whose language code was selected by the programming pendant and half- and full-width characters are mixed.
9					
10					
11					
12					
13					
14					
15					

NOTE

For the alarm character strings name, it is transmitted in the form of the character strings whose language code was selected by the programming pendant.

Use the same language code as the FS100, or the characters corrupt in case the client side dose not correspond to its language code.

3.3.3 Status Information Reading Command

Request

Sub header part

<Details>

Command No.	0x72	
Instance	Fixed to “1”.	Specify “1”.
Attribute	Specify one out of followings 1: Data 1 2: Data 2	Specify the status data number. For the details of Data1 and Data 2, refer to “Details of data”.
Service	• Get_Attribute_Single: 0x0E • Get_Attribute_All: 0x01	Specify the accessing method to the data. 0x0E: Read out data of the specified element number 0x01: Read out data of all the element number (In this case, specify0 to the element number.)

Data part

No data part

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: not specified • 1: 1 WORD • 2: 2 WORD	“1” indicates 1 WORD of added status data, and “2” indicates 2 WORD of added status data.
Added status		The error code of 1 WORD exists if the added status code is “1” and that of 2 WORD exists if the code is “2”.

Data part

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**	**<Details>**
1	Data 1				Refer to “Details of data”.
2	Data 2				Refer to “Details of data”.

Details of data

Data 1	bit0	Step	Data 2	bit0	
	bit1	1 cycle		bit1	In hold status (by programming pendant)
	bit2	Automatic and continuous		bit2	In hold status (externally)
	bit3	Running		bit3	In hold status (by command)
	bit4	In-guard safe operation		bit4	Alarming
	bit5	Teach		bit5	Error occurring
	bit6	Play		bit6	Servo ON
	bit7	Command remote		bit7	

3.3.4 Executing Job Information Reading Command

Request

Sub header part

<Details>

Command No.	0x73	
Instance	Specify one out of followings 1: Master task 2: Sub task 1 3: Sub task 2 4: Sub task 3 5: Sub task 4 6: Sub task 5	
Attribute	Specify one out of followings 1: Job name 2: Line number 3: Step number 4: Speed override value	Specify the status data number of the executing job information.
Service	• Get_Attribute_Single: 0x0E • Get_Attribute_All: 0x01	Specify the accessing method to the data. 0x0E: Read out data of the specified element number 0x01: Read out data of all the element number (In this case, specify0 to the element number)

Data part

No data part

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 :respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: not specified • 1: 1 WORD • 2: 2 WORD	“1” indicates 1 WORD of added status data, and “2” indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is “1” and that of 2 WORD exists if the code is “2”.

Data part

32bit integer	Byte 0	Byte 1	Byte 2	Byte3	<Details>
1	Job name (character strings: 32 letters)				Job name Half-width character: 32 characters Full-width character: 16 characters
2					
3					
4					
5					
6					
7					
8					
9	Line No. (0 to 9999)				Job line number
10	Step No. (1 to 9998)				Job step number
11	Speed override value				Speed override value

NOTE

For the alarm character strings name, it is transmitted in the form of the character strings whose language code was selected by the programming pendant.

Use the same language code as the FS100, or the characters corrupt in case the client side dose not correspond to its language code.

3.3.5 Axis Configuration Information Reading Command

Request

Sub header part

<Details>

Command No.	0x74	
Instance	Specify one out of followings • 1 to 2 • 11 to 12 • 21 to 23 • 101 to 102 • 111 to 112	Specify the control group 1 : R1 to 2: : R2 …Robot (pulse value) 11 : B1 to 12 : B2 …Base (pulse value) 21 : S1 to 23: : S23 …Station (pulse value) 101 : R1 to 102 : R2 …Robot (cartesian coordinate) 111 : B1 to 112 : B2 …Base (cartesian coordinate)
Attribute	Specify one out of followings 1: “Axis name” of the first axis 2: “Axis name” of the second axis 3: “Axis name” of the third axis 4: “Axis name” of the fourth axis 5: “Axis name” of the fifth axis 6: “Axis name” of the sixth axis 7: “Axis name” of the seventh axis 8: “Axis name” of the eighth axis	Specify the data number of axis information. Each axis is justified for setting. “0” is set to nonexistent axis.
Service	•Get_Attribute_Single:0x0E •Get_Attribute_All: 0x01	Specify the accessing method to the data. 0x0E: Read out data of the specified element number. 0x01: Read out data of all the element number. (In this case, specify0 to the element number.)

Data part

No data part

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 :respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: not specified • 1: 1 WORD • 2: 2 WORD	“1” indicates 1 WORD of added status data, and “2” indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is “1” and that of 2 WORD exists if the code is “2”.

Data part

32bit integer	Byte 0	Byte 1	Byte 2	Byte3	<Details>
1	First coordinate name				“S” (R*: pulse)/“X” (R*/B*: cartesian value)/ “1” (B*/S*: pulse)
2	Second coordinate name				“L” (R*: pulse)/“Y” (R*/B*: cartesian value)/ “2” (B*/S*: pulse)
3	Third coordinate name				“U” (R*: pulse)/“Z” (R*/B*: cartesian value) “3” (B*/S*: pulse)
4	Fourth coordinate name				“R” (R*: pulse)/“Rx” (R*: cartesian value)/ “4” (B*/S*: pulse)
5	Fifth coordinate name				“B” (R*: pulse)/“Ry” (R*: cartesian value)/ “5” (B*/S*: pulse)
6	Sixth coordinate name				“T” (R*: pulse)/“Rz” (R*: cartesian value)/ “6” (B*/S*: pulse)
7	Seventh coordinate name				“E” (R*: pulse)/“Rz” (R*: cartesian value)/ “7” (B*/S*: pulse)
8	Eighth coordinate name				

*: Each control group number.
R: Robot (R1 to R2)

S: Station (S1 to S3)

B: Base (B1 to B2)

3.3.6 Robot Position Data Reading Command

Cartesian value can select the base coordinate only. (It cannot select the robot, user and tool coordinates.)

Request

Sub header part

<Details>

Command No.	0x75	
Instance	Specify one out of followings • 1 to 2 • 11 to 12 • 21 to 23 • 101 to 102	Specify the control group 1 : R1 to 2 : R2 … Robot (pulse value) 11 : B1 to 12 : B2 … Base (pulse value) 21 : S1 to 23 : : S23 … Station (pulse value) 101 : R1 to 102 : R2 … Robot (cartesian coordinate)
Attribute	Specify one out of followings 1: Data type 2: Form 3: Tool number 4: User coordinate number 5: Extended form 6: First axis data 7: Second axis data 8: Third axis data 9: Fourth axis data 10: Fifth axis data 11: Sixth axis data 12: Seventh axis data 13: Eighth axis data	Specify the position information data number. 1 0: pulse value/16: base coordinate value 2 As for the form, refer to the “Details of data”. 3 Tool number 4 User coordinate number 5 As for the extended form, refer to the “Details of data”. 6 First axis data 7 Second axis data 8 Third axis data 9 Fourth axis data 10 Fifth axis data 11 Sixth axis data 12 Seventh axis data 13 Eighth axis data Each axis data is output by the same sequence as mentioned in *chapter 3.3.5 “Axis Configuration Information Reading Command” at page 3-29*, and “0” is set to nonexistent axis.
Service	•Get_Attribute_Single: 0x0E •Get_Attribute_All: 0x01	Specify the accessing method to the data. 0x0E: Read out data of the specified element number 0x01: Read out data of all the element number (In this case, specify0 to the element number.)

Data part

No data part

Detail of data

Please refer “3.9.5 Flip/ No flip” in “FS100 OPERATOR’S MANUAL” prepared for each application.

Form	bit0	0: Front	1: Back	Extended form	bit0	0:ϴL<180,	1: ϴL ≥180
	bit1	0: Upper arm	1: Lower arm		bit1	0:ϴU<180,	1: ϴU ≥180
	bit2	0: Flip	1:No flip		bit2	0:ϴB<180,	1: ϴB ≥180
	bit3	0: ϴR < 180,	1: ϴR ≥180		bit3	0:ϴE<180,	1: ϴE ≥180
	bit4	0: ϴT<180,	1: ϴT ≥180		bit4	0:ϴW<180,	1: ϴW ≥180
	bit5	0: ϴS<180,	1: ϴS ≥180		bit5	Reserve	
	bit6	0: Redundant front	1: Redundant back		bit6	Reserve	
	bit7	0: Previous step regarded reverse conversion specified 1: Form regarded reverse conversion specified			bit7	Reserve	

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	“1” indicates 1 WORD of added status data, and “2” indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is “1” and that of 2 WORD exists if the code is “2”.

Data part

32bit integer	Byte 0	Byte 1	Byte 2	Byte3
1	Data type			
2	Form			
3	Tool number			
4	User coordinate number			
5	Extended form			
6	First axis data			
7	Second axis data			
8	Third axis data			
9	Fourth axis data			
10	Fifth axis data			
11	Sixth axis data			
12	Seventh axis data			
13	Eighth axis data			

<Details>
0: Pulse value/ 16: Base coordinate value
For the form, refer to “Details of data”.
Tool number
User coordinate number
For the extended form, refer to “Details of data”.

Details of data

Please refer “3.9.5 Flip/ No flip” in “FS100 OPERATOR’S MANUAL” prepared for each application.

Form	bit0	0: Front	1: Back
	bit1	0: Upper arm	1: Lower arm
	bit2	0: Flip	1: No flip
	bit3	0: ϴR < 180,	1: ϴR ≥180
	bit4	0: ϴT<180,	1: ϴT ≥180
	bit5	0: ϴS<180,	1: ϴS ≥180
	bit6	0: Redundant front	1: Redundant back
	bit7	0: Previous step regarded reverse conversion specified	1: Form regarded reverse conversion specified

Extended form	bit0	0:ϴL<180,	1: ϴL ≥180
	bit1	0:ϴU<180,	1: ϴU ≥180
	bit2	0:ϴB<180,	1: ϴB ≥180
	bit3	0:ϴE<180,	1: ϴE ≥180
	bit4	0:ϴW<180,	1: ϴW ≥180
	bit5	Reserve	
	bit6	Reserve	
	bit7	Reserve	

3.3.7 Position Error Reading Command

Request

Sub header part

<Details>

Command No.	0x76	
Instance	Specify one out of followings • 1 to 2 • 11 to 12 • 21 to 23	Specify the control group 1 : R1 to 2 : R2 … Robot axis 11 : B1 to 12 : B2 … Base axis 21 : S1 to 23 : S23 … Station axis
Attribute	Specify one out of followings 1: First axis data 2: Second axis data 3: Third axis data 4: Fourth axis data 5: Fifth axis data 6: Sixth axis data 7: Seventh axis data 8: Eighth axis data	Specify the axis number. Each axis data is output by the same sequence as mentioned in *chapter 3.3.5 "Axis Configuration Information Reading Command" at page 3-29*, and "0" is set to nonexistent axis.
Service	• Get_Attribute_Singlel: 0x0E • Get_Attribute_All:0x01	Specify the accessing method to the data. 0x0E: Read out data of the specified element number 0x01: Read out data of all the element number (In this case, specify0 to the element number.)

Data part

No data part

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	"1" indicates 1 WORD of added status data, and "2" indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is "1" and that of 2 WORD exists if the code is "2".

Data part

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**
1	First axis data			
2	Second axis data			
3	Third axis data			
4	Fourth axis data			
5	Fifth axis data			
6	Sixth axis data			
7	Seventh axis data			
8	Eighth axis data			

<Details>

Position variable data of each axis can be read out.

3.3.8 Torque Data Reading Data

Request

Sub header part

<Details>

Command No.	0x77	
Instance	Specify one out of followings • 1 to 2 • 11 to 12 • 21 to 23	Specify the control group 1 : R1 to 2 : R2 … Robot axis 11 : B1 to 12 : B2 … Base axis 21 : S1 to 23 : S23 … Station axis
Attribute	Specify one out of followings 1: First axis data 2: Second axis data 3: Third axis data 4: Fourth axis data 5: Fifth axis data 6: Sixth axis data 7: Seventh axis data 8: Eighth axis data	Specify the axis number. Each axis data is output by the same sequence as mentioned in *chapter 3.3.5 "Axis Configuration Information Reading Command" at page 3-29*, and "0" is set to nonexistent axis.
Service	• Get_Attribute_Single: 0x0E • Get_Attribute_All:0x01	Specify the accessing method to the data. 0x0E: Read out data of the specified element number 0x01: Read out data of all the element number (In this case, specify0 to the element number.)

Data part

No data part

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	"1" indicates 1 WORD of added status data, and "2" indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is "1" and that of 2 WORD exists if the code is "2".

Data part

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**
1	First axis data			
2	Second axis data			
3	Third axis data			
4	Fourth axis data			
5	Fifth axis data			
6	Sixth axis data			
7	Seventh axis data			
8	Eighth axis data			

<Details>

Torque data of each axis can be read out.

3.3.9 I/O Data Reading / Writing Command

Request

Sub header part

<Details>

Command No.	0x78	
Instance	Specify one out of followings • 1 to 128 • 1001 to 1227 • 2001 to 2128 • 2501 to 2628 • 3001 to 3128 • 3501 to 3628 • 4001 to 4160 • 5001 to 5200 • 6001 to 6064 • 7001 to 7999 • 8001 to 8064 • 8201 to 8220	Specify logical number /10 • 1 to 128 : Robot user input • 1001 to 1127: Robot user output • 2001 to 2127: External input • 2501 to 2628: Network input • 3001 to 3128: External output • 3501 to 3628: Network output • 4001 to 4160: Robot system input • 5001 to 5200: Robot system output • 6001 to 6064: Interface panel input • 7001 to 7999: Auxiliary relay • 8001 to 8064: Robot control status signal • 8201 to 8220: Pseudo input
Attribute	Fixed to “1”.	Specify “1”.
Service	• Get_Attribute_Single: 0x0E • Set_Attribute_Single: 0x10	Specify the accessing method to the data. 0x0E: Read out of all I/O data is enabler 0x01: Only network input signal is writable.

Data part

(Data exists during the writing operation only)

32bit integer	Byte 0	Byte 1	Byte 2	Byte3
1	IO data			

<Details>

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	“1” indicates 1 WORD of added status data, and “2” indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is “1” and that of 2 WORD exists if the code is “2”.

Data part

(Data exists during the writing operation only)

32bit integer	Byte 0	Byte 1	Byte 2	Byte3
1	IO data			

<Details>

I/O data exists only when requested by the client.

3.3.10 Register Data Reading / Writing Command

Request

Sub header part

<Details>

Command No.	0x79	
Instance	Specify one out of followings • 0 to 999	Specify the register number 0 to 999 (writable register: 0 to 559)
Attribute	Fixed to “1”.	Specify “1”.
Service	• Get_Attribute_Single: 0x0E • Set_Attribute_Single: 0x10	Specify the accessing method to the data. 0x0E: Read out the specified register data 0x01: Register 0 to 599 is writable

Data part

(Data exists during the writing operation only)

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**
1	Register data			

<Details>

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	“1” indicates 1 WORD of added status data, and “2” indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is “1” and that of 2 WORD exists if the code is “2”.

Data part

(Data exists during the writing operation only)

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**
1	Register data			

<Details>

Register data exists only when requested by the client.

3.3.11 Byte Variable (B) Reading / Writing Command

Request

Sub header part

<Details>

Command No.	0x7A	
Instance	Specify one out of followings • 0 to 99 (for standard setting)	Specify the variable number. Since the extended variable is an optional function, follow the numbers of the variables specified by the parameter when specifying the number.
Attribute	Fixed to “1”.	Specify “1”.
Service	• Get_Attribute_Single: 0x0E • Get_Attribute_All: 0x01 • Set_Attribute_Single: 0x10 • Set_Attribute_All: 0x02	Specify the accessing method to the data. 0x0E/0x01: Read out data of the specified element number 0x10/0x02: Write the data to the specified variable

Data part

(Data exists during the writing operation only)

32bit integer	Byte 0	Byte 1	Byte 2	Byte3
1	B variable			

<Details>

Set the data when writing.

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	“1” indicates 1 WORD of added status data, and “2” indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is “1” and that of 2 WORD exists if the code is “2”.

Data part

(Data exists during the writing operation only)

32bit integer	Byte 0	Byte 1	Byte 2	Byte3
1	B variable			

<Details>

The data exists only when requested by the client.

3.3.12 Integer Type Variable (I) Reading / Writing Command

Request

Sub header part

<Details>

Command No.	0x7B	
Instance	Specify one out of followings • 0 to 99 (for standard setting)	Specify the variable number. Since the extended variable is an optional function, follow the numbers of the variables specified by the parameter when specifying the number.
Attribute	Fixed to “1”.	Specify “1”.
Service	• Get_Attribute_Single: 0x0E • Get_Attribute_All: 0x01 • Set_Attribute_Single: 0x10 • Set_Attribute_All: 0x02	Specify the accessing method to the data. 0x0E/0x01: Read out data of the specified element number 0x10/0x02: Write the data to the specified variable

Data part

(Data exists during the writing operation only)

32bit integer	Byte 0	Byte 1	Byte 2	Byte3	<Details>
1	I variable				Set the data when writing.

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	“1” indicates 1 WORD of added status data, and “2” indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is “1” and that of 2 WORD exists if the code is “2”.

Data part

(Data exists during the writing operation only)

32bit integer	Byte 0	Byte 1	Byte 2	Byte3	<Details>
1	I variable				The data exists only when requested by the client.

3.3.13 Double Precision Integer Type Variable (B) Reading / Writing Command

Request

Sub header part

<Details>

Command No.	0x7C	
Instance	Specify one out of followings • 0 to 99 (for standard setting)	Specify the variable number. Since the extended variable is an optional function, follow the numbers of the variables specified by the parameter when specifying the number.
Attribute	Fixed to “1”.	Specify “1”.
Service	• Get_Attribute_Single: 0x0E • Get_Attribute_All: 0x01 • Set_Attribute_Single: 0x10 • Set_Attribute_All: 0x02	Specify the accessing method to the data. 0x0E/0x01: Read out data of the specified element number 0x10/0x02: Write the data to the specified variable

Data part

(Data exists during the writing operation only)

32bit integer	Byte 0	Byte 1	Byte 2	Byte3
1	D variable			

<Details>
Set the data when writing.

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	“1” indicates 1 WORD of added status data, and “2” indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is “1” and that of 2 WORD exists if the code is “2”.

Data part

(Data exists during the writing operation only)

32bit integer	Byte 0	Byte 1	Byte 2	Byte3
1	D variable			

<Details>
The data exists only when requested by the client.

3.3.14 Real Type Variable (R) Reading / Writing Command

Request

Sub header part

<Details>

Command No.	0x7D	
Instance	Specify one out of followings • 0 to 99 (for standard setting)	Specify the variable number. Since the extended variable is an optional function, follow the numbers of the variables specified by the parameter when specifying the number.
Attribute	Fixed to “1”.	Specify “1”.
Service	• Get_Attribute_Single: 0x0E • Get_Attribute_All: 0x01 • Set_Attribute_Single: 0x10 • Set_Attribute_All: 0x02	Specify the accessing method to the data. 0x0E/0x01: Read out data of the specified element number 0x10/0x02: Write the data to the specified variable

Data part

(Data exists during the writing operation only)

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**	<Details>
1	R variable				Set the data when writing.

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	“1” indicates 1 WORD of added status data, and “2” indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is “1” and that of 2 WORD exists if the code is “2”.

Data part

(Data exists during the writing operation only)

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**	<Details>
1	R variable				The data exists only when requested by the client.

3.3.15 Character Type Variable (S) Reading Writing Command

Request

Sub header part

<Details>

Command No.	0x7E	
Instance	Specify one out of followings • 0 to 99 (for standard setting)	Specify the variable number. Since the extended variable is an optional function, follow the numbers of the variables specified by the parameter when specifying the number
Attribute	Fixed to “1”.	Specify “1”.
Service	• Get_Attribute_Single: 0x0E • Get_Attribute_All: 0x01 • Set_Attribute_Single: 0x10 • Set_Attribute_Al: 0x02	Specify the accessing method to the data. 0x0E/0x01: Read out data of the specified element number 0x10/0x02: Write the data to the specified variable

Data part

(Data exists during the writing operation only)

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**	<Details>
1	S variable				Set the data when writing.
2					
3					
4					

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	“1” indicates 1 WORD of added status data, and “2” indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is “1” and that of 2 WORD exists if the code is “2”.

Data part

(Data exists during the writing operation only)

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**	<Details>
1	S variable				The data exists only when requested by the client.
2					
3					
4					

3.3.16 Robot Position Type Variable (P) Reading / Writing Command

Request

Sub header part

		<Details>
Command No.	0x7F	
Instance	Specify one out of followings • 0 to 127 (for standard setting)	Specify the variable number. Since the extended variable is an optional function, follow the numbers of the variables specified by the parameter when specifying the number.
Attribute	Specify one out of followings 1: Data type 2: Form 3: Tool number 4: User coordinate number 5: Extended form 6: “Coordinated data” of the first axis 7: “Coordinated data” of the second axis 8: “Coordinated data” of the third axis 9: “Coordinated data” of the fourth axis 10: “Coordinated data” of the fifth axis 11: “Coordinated data” of the sixth axis 12: “Coordinated data” of the seventh axis 13: “Coordinated data” of the eighth axis	Specify the axis information data number. Followings are the data type. 0: Pulse value 16: Base coordinated value 17: Robot coordinated value 18: User coordinated value 19: Tool coordinated value
Service	• Get_Attribute_All: 0x01 • Set_Attribute_All: 0x02	Specify the accessing method to the data. 0x0E/0x01: Read out data of the specified element number 0x10/0x02: Write the data to the specified variable

Data part

(Data exists during the writing operation only)

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**	<Details>
1	Data type				0: Pulse value 16: Base coordinated value 17: Robot coordinated value 18: User coordinated value 19: Tool coordinated value
2	Form				For the form, refer to “Details of data”.
3	Tool number				Tool number
4	User coordinate number				User coordinate number
5	Extended form				For the extended form, refer to “Details of data”.
6	First coordinate data				
7	Second coordinate data				
8	Third coordinated data				
9	Fourth coordinate data				
10	Fifth coordinate data				
11	Sixth coordinate data				
12	Seventh coordinate data				
13	Eighth coordinate data				

Details of data

Please refer “3.9.5 Flip/ No flip” in “FS100 OPERATOR’S MANUAL” prepared for each application.

Form	bit0	0: Front	1: Back	Extended form	bit0	0:ϴL<180,	1: ϴL ≥180
	bit1	0: Upper arm	1: Lower arm		bit1	0:ϴU<180,	1: ϴU ≥180
	bit2	0: Flip	1:No flip		bit2	0:ϴB<180,	1: ϴB ≥180
	bit3	0: ϴR < 180,	1: ϴR ≥180		bit3	0:ϴE<180,	1: ϴE ≥180
	bit4	0: ϴT<180,	1: ϴT ≥180		bit4	0:ϴW<180,	1: ϴW ≥180
	bit5	0: ϴS<180,	1: ϴS ≥180		bit5	Reserve	
	bit6	0: Redundant front	1: Redundant back		bit6	Reserve	
	bit7	0: Previous step regarded reverse conversion specified 1: Form regarded reverse conversion specified			bit7	Reserve	

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	“1” indicates 1 WORD of added status data, and “2” indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is “1” and that of 2 WORD exists if the code is “2”.

Data part

(Data exists during the writing operation only)

32bit integer	Byte 0	Byte 1	Byte 2	Byte3	<Details>
1	Data type				0: Pulse value 16: Base coordinated value 17: Robot coordinated value 18: User coordinated value 19: Tool coordinated value
2	Form				For the form, refer to “Details of data”.
3	Tool number				Tool number
4	User coordinate number				User coordinate number
5	Extended form				For the extended form, refer to “Details of data”.
6	First coordinate data				
7	Second coordinate data				
8	Third coordinated data				
9	Fourth coordinate data				
10	Fifth coordinate data				
11	Sixth coordinate data				
12	Seventh coordinate data				
13	Eighth coordinate data				

Details of data

Please refer “3.9.5 Flip/ No flip” in “FS100 OPERATOR’S MANUAL” prepared for each application.

Form	bit0	0: Front	1: Back	Extended form	bit0	0:ϴL<180,	1: ϴL ≥180
	bit1	0: Upper arm	1: Lower arm		bit1	0:ϴU<180,	1: ϴU ≥180
	bit2	0: Flip	1:No flip		bit2	0:ϴB<180,	1: ϴB ≥180
	bit3	0: ϴR<180,	1: ϴR ≥180		bit3	0:ϴE<180,	1: ϴE ≥180
	bit4	0: ϴT<180,	1: ϴT ≥180		bit4	0:ϴW<180,	1: ϴW ≥180
	bit5	0: ϴS<180,	1: ϴS ≥180		bit5	Reserve	
	bit6	0: Redundant front	1: Redundant back		bit6	Reserve	
	bit7	0: Previous step regarded reverse conversion specified 1: Form regarded reverse conversion specified			bit7	Reserve	

3.3.17 Base Position Type Variable (Bp) Reading / Writing Command

Request

Sub header part

		<Details>
Command No.	0x80	
Instance	Specify one out of followings • 0 to 127 (for standard setting)	Specify the variable number. Since the extended variable is an optional function, follow the numbers of the variables specified by the parameter when specifying the number.
Attribute	Specify one out of followings 1: Data type 2: “Coordinated data” of the first axis 3: “Coordinated data” of the second axis 4: “Coordinated data” of the third axis 5: “Coordinated data” of the fourth axis 6: “Coordinated data” of the fifth axis 7: “Coordinated data” of the sixth axis 8: “Coordinated data” of the seventh axis 9: “Coordinated data” of the eighth axis	Specify the axis information data number. Followings are the data type. 0: Pulse value 16: Base coordinated value
Service	• Get_Attribute_Single :0x0E • Get_Attribute_All :0x01 • Set_Attribute_Single :0x10 • Set_Attribute_All :0x02	Specify the accessing method to the data. 0x0E: Read out the specified data 0x01: Read out the data 0x10: Write a specified data. If it is not an object element, keep the data previous to writing operation. 0x02: Write the data

Data part

(Data exists during the writing operation only)

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**
1	Data type			
2	First coordinate data			
3	Second coordinate data			
4	Third coordinated data			
5	Fourth coordinate data			
6	Fifth coordinate data			
7	Sixth coordinate data			
8	Seventh coordinate data			
9	Eighth coordinate data			

<Details>

0: Pulse value
16: Base coordinated value

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	“1” indicates 1 WORD of added status data, and “2” indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is “1” and that of 2 WORD exists if the code is “2”.

Data part

(Data exists during the writing operation only)

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**
1	Data type			
2	First coordinate data			
3	Second coordinate data			
4	Third coordinated data			
5	Fourth coordinate data			
6	Fifth coordinate data			
7	Sixth coordinate data			
8	Seventh coordinate data			
9	Eighth coordinate data			

<Details>
0: Pulse value
16: Base coordinated value

3.3.18 External Axis Type Variable (Ex) Reading / Writing Command

Request

Sub header part

<Details>

Command No.	0x81	
Instance	Specify one out of followings • 0 to 127 (for standard setting)	Specify the variable number. Since the extended variable is an optional function, follow the numbers of the variables specified by the parameter when specifying the number.
Attribute	Specify one out of followings 1: Data type 2: “Coordinated data” of the first axis 3: “Coordinated data” of the second axis 4: “Coordinated data” of the third axis 5: “Coordinated data” of the fourth axis 6: “Coordinated data” of the fifth axis 7: “Coordinated data” of the sixth axis 8: “Coordinated data” of the seventh axis 9: “Coordinated data” of the eighth axis	Specify the axis information data number. Followings are the data type. 0: Pulse value
Service	• Get_Attribute_Single :0x0E • Get_Attribute_All :0x01 • Set_Attribute_Single :0x10 • Set_Attribute_All :0x02	Specify the accessing method to the data. 0x0E : Read out the specified data 0x01 : Read out the data 0x10 :Write a specified data. If it is not an object element, keep the data previous to writing operation. 0x02 : Write the data

Data part

(Data exists during the writing operation only)

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**
1	Data type			
2	First coordinate data			
3	Second coordinate data			
4	Third coordinated data			
5	Fourth coordinate data			
6	Fifth coordinate data			
7	Sixth coordinate data			
8	Seventh coordinate data			
9	Eighth coordinate data			

<Details>

0: Pulse value

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	"1" indicates 1 WORD of added status data, and "2" indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is "1" and that of 2 WORD exists if the code is "2".

Data part

(Data exists during the writing operation only)

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**	<Details>
1	Data type				0: Pulse value
2	First coordinate data				
3	Second coordinate data				
4	Third coordinated data				
5	Fourth coordinate data				
6	Fifth coordinate data				
7	Sixth coordinate data				
8	Seventh coordinate data				
9	Eighth coordinate data				

3.3.19 Alarm Reset / Error Cancel Command

Request

Sub header part

<Details>

Command No.	0x82	
Instance	Specify one out of followings 1: Resetting of alarm 2: Cancelling of error	Specify the type of reset/cancel 1: RESET (resetting of alarm) 2: CANCEL (cancelling of error)
Attribute	Fixed to “1”.	Specify “1”.
Service	• Set_Attribute_Single: 0x10	Specify the accessing method to the data. 0x10 : Execute the specified request

Data part

(Data exists during the writing operation only)

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**	<Details>
1	Data 1				Fixed to “1”.

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	“1” indicates 1 WORD of added status data, and “2” indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is “1” and that of 2 WORD exists if the code is “2”.

Data part

No data part

3.3.20 Hold / Servo On/off Command

Request

Sub header part

<Details>

Command No.	0x83	
Instance	Specify one out of followings 1: HOLD 2: Servo ON 3: HLOCK	Specify the type of OFF/ON command 1: HOLD 2: Servo ON 3: HLOCK (Refer to “Details of data”.)
Attribute	Fixed to “1”.	Specify “1”.
Service	• Set_Attribute_Single: 0x10	Specify the accessing method to the data. 0x10 : Execute the specified request

Data part

(Data exists during the writing operation only)

32bit integer	Byte 0	Byte 1	Byte 2	Byte3	<Details>
1	1:ON 2:OFF				Specify ON/OFF

Details of data

■ **HLOCK**

This data interlocks the P.P and I/O operation system signals. Only the following operations are available while the interlock operation is ON.

- Emergency stop for the programming pendant
- Inputting signals excluding I/O mode switching, external start, external servo ON, cycle switch, inhibit I/O, inhibit PP/PANEL and master calling up.

HLOCK is invalid while the programming pendant is in edit mode or it is file accessing using other functions.

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	“1” indicates 1 WORD of added status data, and “2” indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is “1” and that of 2 WORD exists if the code is “2”.

3.3.21 Step / Cycle / Continuous Switching Command

Request

Sub header part

<Details>

Command No.	0x84	
Instance	Specify the following ・2	Specify the type of status switch command 2: CYCLE (switching of STEP/CYCLE/CONTINUE)
Attribute	Fixed to “1”.	Specify “1”.
Service	・Set_Attribute_Single: 0x10	Specify the accessing method to the data. 0x10 : Execute the specified request

Data part

(Data exists during the writing operation only)

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**
1	Data 1			

<Details>

CYCLE = 1: STEP/2: 1 CYCLE/3:CONTINUE

Answer

Sub header part

<Details>

Status	Respond by one in the followings ・0x00 : respond normally ・Other than 0x00 : respond abnormally	
Added status size	・0: no added status ・1: 1 WORD ・2: 2 WORD	“1” indicates 1 WORD of added status data, and “2” indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is “1” and that of 2 WORD exists if the code is “2”.

Data part

No data part

3.3.22 Character String Display Command To The Programming Pendant

Request

Sub header part

		<Details>
Command No.	0x85	
Instance	Fixed to “1”.	Specify “1”.
Attribute	Fixed to “1”.	Specify “1”.
Service	• Set_Attribute_Single: 0x10	Specify the accessing method to the data. 0x10 : Execute the specified request

Data part

(Data exists during the writing operation only)

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**	<Details>
1	Displaying message				Set the character strings to be indicated on the programming pendant Half-width character: 30 characters Full-width character: 15 characters
2					
3					
4					
5					
6					
7					
8					

Answer

Sub header part

		<Details>
Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	“1” indicates 1 WORD of added status data, and “2” indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is “1” and that of 2 WORD exists if the code is “2”.

Data part

No data part

For the alarm character strings name, it is transmitted in the form of the character strings whose language code was selected by the programming pendant.

Use the same language code as the FS100, or the characters corrupt in case the client side dose not correspond to its language code.

3.3.23 Start-up (Job Start) Command

Request

Sub header part

<Details>

Command No.	0x86	
Instance	Fixed to “1”.	Specify “1”.
Attribute	Fixed to “1”.	Specify “1”.
Service	• Set_Attribute_Single: 0x10	Specify the accessing method to the data. 0x10 : Execute the specified request

Data part

(Data exists during the writing operation only)

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**	<Details>
1	Data 1				Fixed to “1”.

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	“1” indicates 1 WORD of added status data, and “2” indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is “1” and that of 2 WORD exists if the code is “2”.

Data part

No data part

3.3.24 Job Select Command

Request

Sub header part

<Details>

Command No.	0x87	
Instance	Specify one out of followings 1: Set the executing job 10: Set the master job (task 0) 11: Set the master job (task 1) 12: Set the master job (task 2) 13: Set the master job (task 3) 14: Set the master job (task 4) 15: Set the master job (task 5)	Specify the type.
Attribute	Specify one out of followings 1: Job name 2: Line number (valid only when executing job setting.)	Specify the setting content.
Service	• Set_Attribute_All: 0x02	Specify the accessing method to the data. 0x02: Read out data of all the element number (In this case, specify0 to the element number.)

Data part

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**	<Details>
1	Job name (Character strings: 32 characters)				Job name Half-width character: 32 characters Full-width character: 16 characters
2					
3					
4					
5					
6					
7					
8					
9	Line number (0 to 9999)				Line number

NOTE

For the alarm character strings name, it is transmitted in the form of the character strings whose language code was selected by the programming pendant.

Use the same language code as the FS100, or the characters corrupt in case the client side dose not correspond to its language code.

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	“1” indicates 1 WORD of added status data, and “2” indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is “1” and that of 2 WORD exists if the code is “2”.

Data part

No data part

3.3.25 Management Time Acquiring Command

Request

Sub header part

<Details>

Command No.	0x88	
Instance	Specify one out of followings • 1 • 10 • 11 to 18 • 21 to 44 • 110 • 111 to 118 • 121 to 144 • 210 • 211 to 218 • 221 to 244 • 301 to 308	Specify the type of the management time 1 :Control power ON time 10 :Servo power ON time (TOTAL) 11 to 18 :Servo power ON time (R1 to R8) 21 to 44 :Servo power ON time (S1 to S24) 110 :Play back time (TOTAL) 111 to 118 :Play back time (R1 to R8) 121 to 144 :Play back time (S1 to S24) 210 :Motion time (TOTAL) 211 to 218 :Motion time (R1 to R8) 221 to 244 :Motion time (S1 to S24) 301 to 308 :Operation time (application 1 to 8)
Attribute	Specify one out of followings 1: Operation start time 2: Elapse time	Specify the type of the management time
Service	• Get_Attribute_Single: 0x0E • Get_Attribute_All: 0x01	Specify the accessing method to the data. 0x0E : Read out data of the specified element number 0x01 : Read out data of all the element number (In this case, specify0 to the element number.)

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	“1” indicates 1 WORD of added status data, and “2” indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is “1” and that of 2 WORD exists if the code is “2”.

Data part

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**	<Details>
1	Operation start time (Character strings: 16 characters) Ex. 2011/10/10 15:49				Operation start time
2					
3					
4					
5	Elapse time (Character strings: 12 characters) Ex. 000000:00'00				Elapse time
6					
7					

3.3.26 System Information Acquiring Command

Request

Sub header part

<Details>

Command No.	0x89	
Instance	Specify one out of followings • 11 to 12 • 21 to 23 • 101	Specify the type of system type. 11 to 12: Type information (R1 to R2) 21 to 23: Type information (S1 to s23) 101: Application information (User application only)
Attribute	Specify one out of followings 1: System software version 2: Model name / application 3: Parameter version	Specify the type of system information
Service	• Get_Attribute_Single: 0x0E • Get_Attribute_Al: 0x01	Specify the accessing method to the data. 0x0E: :Read out data of the specified element number 0x01 : Read out data of all the element number (In this case, specify0 to the element number)

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	“1” indicates 1 WORD of added status data, and “2” indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is “1” and that of 2 WORD exists if the code is “2”.

Data part

<Details>

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**	
1	System software version (Character strings: 24 characters) Ex. FS1.03.00A (JP/US) -00				The same character strings are returned even if either 11 to 12, 21 to 23 or 101 is specified to the instance in the request sub-header part.
2					
3					
4					
5					
6					
7	Model name / application (Character strings: 16 characters) Ex. (For model) ES0165D-A0* (For application) ARC WELDING				The model name is returned when it is R1 to R2, and NULL character is returned when it is S1 to S3. Also, application name is returned when it is an application use.
8					
9					
10					
11	Parameter version (Character strings: 8 characters) Ex. 12.34				R1 to R2: Parameter version When it is nonexistent control group, it is returned in NULL characters.
12					

3.3.27 Plural I/o Data Reading / Writing Command

Request

Sub header part

<Details>

Command No.	0x89	
Instance	Specify one out of followings • 1 to 128 • 1001 to 1127 • 2001 to 2128 • 2501 to 2628 • 3001 to 3128 • 3501 to 3628 • 4001 to 4160 • 5001 to 5200 • 6001 to 6064 • 7001 to 7999 • 8001 to 8064 • 8201 to 8220	Specify logical number /10 • 1 to 128 : Robot user input • 1001 to 1127: Robot user output • 2001 to 2128: External input • 2501 to 2628: Network input • 3001 to 3128: External output • 3501 to 3628: Network output • 4001 to 4160: Robot system input • 5001 to 5200: Robot system output • 6001 to 6064: Interface panel input • 7001 to 7999: Auxiliary relay • 8001 to 8064: Robot control status signal • 8201 to 8220: Pseudo input
Attribute	Fixed to “0”.	Specify “0”.
Service	0x33:Read plural data 0x34:Write plural data	Specify the accessing method to the data. 0x33: Read out the fixed size specified by the data part. 0x34: Write the fixed size specified by the data part. Only the network input signal can be writable.

Data part

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**	<Details>
1	Number				Maximum: 474 *It can specify by a multiple of 2 only.
2	I/O data 1	I/O data 2	I/O data 3	I/O data 4	I/O data part is valid only when writing. Only the number of data is valid when reading.
:					
120	I/O data 473	I/O data 474			

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	“1” indicates 1 WORD of added status data, and “2” indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is “1” and that of 2 WORD exists if the code is “2”.

Data part

(Data exists during the writing operation only)

32bit integer	Byte 0	Byte 1	Byte 2	Byte3
1	Number			
2	I/O data 1	I/O data 2	I/O data 3	I/O data 4
	:			
120	I/O data 473	I/O data 474		

<Details>
Maximum: 474
*It can specify by a multiple of 2 only.

I/O data part is valid only when writing.
Only the number of data is valid when reading.

3.3.28 Plural Register Data Reading / Writing Command

Request

Sub header part

<Details>

Command No.	0x301	
Instance	Specify one out of followings • 0 to 999	Specify the variable number (the first number with which reading/writing is executed) 0 to 999 (writable register: 0 to 559)
Attribute	Fixed to “0”	Specify “0”
Service	0x33 : Read plural data 0x34 : Write plural data	Specify the accessing method to the data. 0x33: Read out the fixed size specified by the data part. 0x34: Write the fixed size specified by the data part.

Data part

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**
1	Number			
2	Register data 1		Register data 2	
	:			
120	Register data 237			

<Details>
Maximum: 237
I/O data part is valid only when writing. Only the number of data is valid when reading.

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	“1” indicates 1 WORD of added status data, and “2” indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is “1” and that of 2 WORD exists if the code is “2”.

Data part

(Data exists during the writing operation only)

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**
1	Number			
2	Register data 1		Register data 2	
	:			
120	Register data 237			

<Details>
Maximum: 237
The data part is valid only when requested by the client.

3.3.29 Plural Byte Type Variable (B) Reading / Writing Command

Request

Sub header part

<Details>

Command No.	0x302	
Instance	Specify one out of followings • 0 to 99 (for standard setting)	Specify the variable number (the first number with which reading/writing is executed) Follow the numbers of the variable specified by the parameter since the extended variable is an optional function.
Attribute	Fixed to “0”.	Specify “0”.
Service	0x33 : Read plural data 0x34 : Write plural data	Specify the accessing method to the data. 0x33: Read out the fixed size specified by the data part. 0x34: Write the fixed size specified by the data part.

Data part

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**
1	Number			
2	B variable 1	B variable 2	B variable 3	B variable 4
:				
120	B variable 473	B variable 474		

<Details>

Maximum: 474
*It can specify by a multiple of 2 only.

Variable data part is valid only when writing. Only the number of data is valid when reading.

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	“1” indicates 1 WORD of added status data, and “2” indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is “1” and that of 2 WORD exists if the code is “2”.

Data part

(Data exists during the writing operation only)

32bit integer	Byte 0	Byte 1	Byte 2	Byte3
1	Number			
2	B variable 1	B variable 2	B variable 3	B variable 4
	:			
120	B variable 473	B variable 474		

<Details>

Maximum: 474
*It can specify by a multiple of 2 only. (invalid if specified by other than a multiple of 2)

3.3.30 Plural Integer Type Variable (I) Reading / Writing Command

Request

Sub header part

<Details>

Command No.	0x303	
Instance	Specify one out of followings • 0 to 99 (for standard setting)	Specify the variable number (the first number with which reading/writing is executed) Follow the numbers of the variable specified by the parameter since the extended variable is an optional function.
Attribute	Fixed to “0”	Specify “0” Only batch access of all elements is valid
Service	0x33 : Read plural data 0x34 : Write plural data	Specify the accessing method to the data. 0x33: Read plural data. 0x34: Write plural data

Data part

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**
1	Number			
2	I variable 1		I variable 2	
	:			
120	I variable 237			

<Details>
Maximum: 237
Variable data part is valid only when writing. Only the number of data is valid when reading.

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	“1” indicates 1 WORD of added status data, and “2” indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is “1” and that of 2 WORD exists if the code is “2”.

Data part

(Data exists during the writing operation only)

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**
1	Number			
2	I variable 1		I variable 2	
	:			
120	I variable 237			

<Details>
Maximum: 237

3.3.31 Plural Double Precision Integer Type Variable (B) Reading / Writing Command

Request

Sub header part

<Details>

Command No.	0x304	
Instance	Specify one out of followings • 0 to 99 (for standard setting)	Specify the variable number (the first number with which reading/writing is executed) Follow the numbers of the variable specified by the parameter since the extended variable is an optional function.
Attribute	Fixed to “0”	Specify “0” Only batch access of all elements is valid
Service	0x33 : Read plural data 0x34 : Write plural data	Specify the accessing method to the data. 0x33: Read plural data 0x34: Write plural data

Data part

32bit integer	Byte 0	Byte 1	Byte 2	Byte3
1	Number			
2	D variable 1			
	:			
119	D variable 118			

<Details>
Maximum: 118
Variable data part is valid only when writing. Only the number of data is valid when reading.

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	“1” indicates 1 WORD of added status data, and “2” indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is “1” and that of 2 WORD exists if the code is “2”.

Data part

(Data exists during the writing operation only)

32bit integer	Byte 0	Byte 1	Byte 2	Byte3
1	Number			
2	D variable 1			
	:			
119	D variable 118			

<Details>
Maximum: 118

3.3.32 Plural Real Type Variable (R) Reading / Writing Command

Request

Sub header part

<Details>

Command No.	0x305	
Instance	Specify one out of followings • 0 to 99 (for standard setting)	Specify the variable number (the first number with which reading/writing is executed) Follow the numbers of the variable specified by the parameter since the extended variable is an optional function.
Attribute	Fixed to “0”	Specify “0” Only batch access of all elements is valid
Service	0x33 : Read plural data 0x34 : Write plural data	Specify the accessing method to the data. 0x33: Read plural data 0x34: Write plural data

Data part

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**
1	Number			
2	R variable 1			
	:			
119	R variable 118			

<Details>
Maximum: 118
Variable data part is valid only when writing. Only the number of data is valid when reading.

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	“1” indicates 1 WORD of added status data, and “2” indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is “1” and that of 2 WORD exists if the code is “2”.

Data part

(Data exists during the writing operation only)

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**
1	Number			
2	R variable 1			
	:			
119	R variable 118			

<Details>
Maximum: 118

3.3.33 Plural Character Type Variable (S) Reading / Writing Command

Request

Sub header part

<Details>

Command No.	0x306	
Instance	Specify one out of followings • 0 to 99 (for standard setting)	Specify the variable number (the first number with which reading/writing is executed) Follow the numbers of the variable specified by the parameter since the extended variable is an optional function.
Attribute	Fixed to “0”	Specify “0” Only batch access of all elements is valid
Service	0x33 : Read plural data 0x34 : Write plural data	Specify the accessing method to the data. 0x33: Read plural data 0x34: Write plural data

Data part

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**
1	Number			
2	S variable 1			
3				
4				
5				
:				
114	S variable 29			
115				
116				
117				

<Details>
Maximum: 29
Variable data part is valid only when writing.
Only the number of data is valid when reading.

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	“1” indicates 1 WORD of added status data, and “2” indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is “1” and that of 2 WORD exists if the code is “2”.

Data part

(Data exists during the writing operation only)

32bit integer	Byte 0	Byte 1	Byte 2	Byte3
1	Number			
2	S variable 1			
3				
4				
5				
:				
114	S variable 29			
115				
116				
117				

<Details>

Maximum: 29

3.3.34 Plural Robot Position Type Variable (P) Reading / Writing Command

Request

Sub header part

<Details>

Command No.	0x307	
Instance	Specify one out of followings • 0 to 127 (for standard setting)	Specify the variable number (the first number with which reading/writing is executed) Follow the numbers of the variable specified by the parameter since the extended variable is an optional function.
Attribute	Fixed to “0”	Specify “0” Only batch access of all elements is valid
Service	0x33 : Read plural data 0x34 : Write plural data	Specify the accessing method to the data. 0x33: Read plural data 0x34: Write plural data

Data part

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**	<Details>
1	Number				Maximum: 9
2 to 14	Data type				0: Pulse value 16: Base coordinated value 17: Robot coordinated value 18: User coordinated value 19: Tool coordinated value
	Form				Form
	Tool number				Tool number
	User coordinate number				User coordinate number
	Extended form				
	First coordinate data				
	Second coordinate data				
	Third coordinated data				
	Fourth coordinate data				
	Fifth coordinate data				Variable data part is valid only when writing.
	Sixth coordinate data				Only the number of data is valid when reading.
	Seventh coordinate data				
	Eighth coordinate data				
	:				
106 to 118	Data type				0: Pulse value 16: Base coordinated value 17: Robot coordinated value 18: User coordinated value 19: Tool coordinated value
	Form				Form
	Tool number				Tool number
	User coordinate number				User coordinate number
	Extended form				
	First coordinate data				
	Second coordinate data				
	Third coordinated data				
	Fourth coordinate data				
	Fifth coordinate data				
	Sixth coordinate data				
	Seventh coordinate data				
	Eighth coordinate data				

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	"1" indicates 1 WORD of added status data, and "2" indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is "1" and that of 2 WORD exists if the code is "2".

Data part

(Data exists during the writing operation only)

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**	<Details>
1	Number				Maximum: 9
2 to 14	Data type				0: Pulse value 16: Base coordinated value 17: Robot coordinated value 18: User coordinated value 19: Tool coordinated value
	Form				Form
	Tool number				Tool number
	User coordinate number				User coordinate number
	Extended form				
	First coordinate data				
	Second coordinate data				
	Third coordinated data				
	Fourth coordinate data				
	Fifth coordinate data				Variable data part is valid only when writing.
	Sixth coordinate data				Only the number of data is valid when
	Seventh coordinate data				reading.
	Eighth coordinate data				

:

106 to 118	Data type	0: Pulse value 16: Base coordinated value 17: Robot coordinated value 18: User coordinated value 19: Tool coordinated value
	Form	Form
	Tool number	Tool number
	User coordinate number	User coordinate number
	Extended form	
	First coordinate data	
	Second coordinate data	
	Third coordinated data	
	Fourth coordinate data	
	Fifth coordinate data	
	Sixth coordinate data	
	Seventh coordinate data	
	Eighth coordinate data	

3.3.35 Plural Base Position Type Variable (Bp) Reading / Writing Command

Request

Sub header part

<Details>

Command No.	0x308	
Instance	Specify one out of followings • 0 to 127 (for standard setting)	Specify the variable number (the first number with which reading/writing is executed) Follow the numbers of the variable specified by the parameter since the extended variable is an optional function.
Attribute	Fixed to “0”.	Specify “0”.
Service	0x33 : Read plural data 0x34 : Write plural data	Specify the accessing method to the data. 0x33: Read plural data 0x34: Write plural data

Data part

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**	<Details>
1	Number				Maximum: 13
2 (Replying data is determined by the value specified by the element number.)	Data type				0x00 : Pulse value 0x10 : Base coordinate value
	First coordinate data				
	Second coordinate data				
	Third coordinated data				
	Fourth coordinate data				
	Fifth coordinate data				Variable data part is valid only when writing.
	Sixth coordinate data				Only the number of data is valid when
	Seventh coordinate data				reading.
	Eighth coordinate data				
:					
119	Data type				0x00 : Pulse value 0x10 : Base coordinate value
	First coordinate data				
	Second coordinate data				
	Third coordinated data				
	Fourth coordinate data				
	Fifth coordinate data				
	Sixth coordinate data				
	Seventh coordinate data				
	Eighth coordinate data				

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	“1” indicates 1 WORD of added status data, and “2” indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is “1” and that of 2 WORD exists if the code is “2”.

Data part

(Data exists during the writing operation only)

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**	<Details>
1	Number				Maximum: 13
2 to 10 (Replying data is determined by the value specified by the element number.)	Data type				0x00 : Pulse value 0x10 : Base coordinate
	First coordinate data				
	Second coordinate data				
	Third coordinated data				
	Fourth coordinate data				
	Fifth coordinate data				Variable data part is valid only when writing. Only the number of data is valid when reading.
	Sixth coordinate data				
	Seventh coordinate data				
	Eighth coordinate data				

:

119	Data type	0x00 : Pulse value 0x10 : Base coordinate
	First coordinate data	
	Second coordinate data	
	Third coordinated data	
	Fourth coordinate data	
	Fifth coordinate data	
	Sixth coordinate data	
	Seventh coordinate data	
	Eighth coordinate data	

3.3.36 Plural External Axis Type Variable (Ex) Reading / Writing Command

Request

Sub header part

<Details>

Command No.	0x309	
Instance	Specify one out of followings • 0 to 127 (for standard setting)	Specify the variable number (the first number with which reading/writing is executed) Follow the numbers of the variable specified by the parameter since the extended variable is an optional function.
Attribute	Fixed to “0”	Specify “0”.
Service	0x33 : Read plural data 0x34 : Write plural data	Specify the accessing method to the data. 0x33: Read plural data 0x34: Write plural data

Data part

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**	<Details>
1	Number				Maximum: 13
2 to 10	Data type				0 : Pulse value
	First coordinate data				
	Second coordinate data				
	Third coordinated data				
	Fourth coordinate data				
	Fifth coordinate data				Variable data part is valid only when writing.
	Sixth coordinate data				Only the number of data is valid when
	Seventh coordinate data				reading.
	Eighth coordinate data				

:

110 to 118	Data type	0 : Pulse value
	First coordinate data	
	Second coordinate data	
	Third coordinated data	
	Fourth coordinate data	
	Fifth coordinate data	
	Sixth coordinate data	
	Seventh coordinate data	
	Eighth coordinate data	

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	"1" indicates 1 WORD of added status data, and "2" indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is "1" and that of 2 WORD exists if the code is "2".

Data part

(Data exists during the writing operation only)

32bit integer	**Byte 0**	**Byte 1**	**Byte 2**	**Byte3**	<Details>
1	Number				Maximum: 13
2 to 10	Data type				0: Pulse value
	First coordinate data				
	Second coordinate data				
	Third coordinated data				
	Fourth coordinate data				
	Fifth coordinate data				Variable data part is valid only when writing.
	Sixth coordinate data				Only the number of data is valid when
	Seventh coordinate data				reading.
	Eighth coordinate data				

:

110 to 118	Data type	0: Pulse value
	First coordinate data	
	Second coordinate data	
	Third coordinated data	
	Fourth coordinate data	
	Fifth coordinate data	
	Sixth coordinate data	
	Seventh coordinate data	
	Eighth coordinate data	

3.4 File Control Command

Followings are respective commands used in the high-speed Ethernet communication.

Table 3-2: List of File Control Command

No.	Command No.	Instance	Attribute	Service	Command name	Reference
1	0x0	0x0	0x0	0x09	File delete	Refer to *chapter 3.4.1 at page 3-76* .
2				0x15	File loading command (the PC to the FS100)	Refer to *chapter 3.4.2 at page 3-77* .
3				0x16	File saving command (the FS100 to the PC)	Refer to *chapter 3.4.3 at page 3-78* .
4				0x32	File list acquiring command	Refer to *chapter 3.4.4 at page 3-79* .

3.4.1 File Deleting Command

Request

Sub header part

<Details>

Command No.	0x0
Instance	0x0
Attribute	0x0
Service	0x09

File deleting process

Data part

32bit integer	Byte 0	Byte 1	Byte 2	Byte3
	T	E	S	T
	J	O	B	.
	J	B	I	

<Details>
Specify the job name to be deleted

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	“1” indicates 1 WORD of added status data, and “2” indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is “1” and that of 2 WORD exists if the code is “2”.

Data part

No data part

3.4.2 File Loading Command

Request

Sub header part

<Details>

Command No.	0x0
Instance	0x0
Attribute	0x0
Service	0x15

File loading process

Data part

32bit integer	Byte 0	Byte 1	Byte 2	Byte3
	T	E	S	T
	J	O	B	.
	J	B	I	

<Details>
Specify the job name to be loaded

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	"1" indicates 1 WORD of added status data, and "2" indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is "1" and that of 2 WORD exists if the code is "2".

Data part

No data part

3.4.3 File Saving Command

Request

Sub header part

<Details>

Command No.	0x0
Instance	0x0
Attribute	0x0
Service	0x16

File saving process

Data part

32bit integer	Byte 0	Byte 1	Byte 2	Byte3
	T	E	S	T
	J	O	B	.
	J	B	I	

<Details>
Specify the job names to be saved.

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	"1" indicates 1 WORD of added status data, and "2" indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is "1" and that of 2 WORD exists if the code is "2".

Data part

No data part

3.4.4 File List Acquiring Command

Request

Sub header part

<Details>

Command No.	0x0
Instance	0x0
Attribute	0x0
Service	0x32

File list accruing process

Data part

32bit integer	Byte 0	Byte 1	Byte 2	Byte3
	*	.	J	B
	l			

<Details>
Refer to “Details of data” for the file type.

Details of data

No specification	JBI list
.	JBI list
*.JBI	JBI list
*.DAT	DAT file list
*.CND	CND file list
*.PRM	PRM file list
*.SYS	SYS file list
*.LST	LST file list

Answer

Sub header part

<Details>

Status	Respond by one in the followings • 0x00 : respond normally • Other than 0x00 : respond abnormally	
Added status size	• 0: no added status • 1: 1 WORD • 2: 2 WORD	“1” indicates 1 WORD of added status data, and “2” indicates 2 WORD of added status data.
Added status	The error code specified by the added status size	The error code of 1 WORD exists if the added status code is “1” and that of 2 WORD exists if the code is “2”.

Data part

32bit integer	Byte 0	Byte 1	Byte 2	Byte3	<Details>
	1	.	J	B	File name + <CR><LF> to input consecutively
	I	<CR>	<LF>	2	
	2	.	J	B	
	I	<CR>	<LF>	3	
	3	3	.	J	
	B	I	<CR>	<LF>	
	T	E	S	T	
	0	1	.	J	
	B	I	<CR>	<LF>	

4 Added Status Code

Added status code	Details
1010	Command error
1011	Error in number of command operands
1012	Command operand value range over
1013	Command operand length error
1020	Disk full of files
2010	Manipulator operating
2020	Hold by programming pendant
2030	Hold by playback panel
2040	External hold
2050	Command hold
2060	Error/alarm occurring
2070	Servo OFF
2080	Incorrect mode
2090	File accessing by other function
2100	Command remote not set
2110	This data cannot be accessed
2120	This data cannot be loaded
2130	Editing
3010	Turn ON the servo power
3040	Perform home positioning
3050	Confirm positions
3070	Current value not made
3220	Panel lock; mode/cycle prohibit signal is ON
3230	Panel lock; start prohibit signal is ON
3350	User coordinate is not taught
3360	User coordinate is destroyed
3370	Incorrect control group
3380	Incorrect base axis data
3390	Relative job conversion prohibited (at CVTRJ)
3400	Master job call prohibited (parameter)
3410	Master job call prohibited (lamp ON during operation)
3420	Master job call prohibited (teach lock)
3430	Robot calibration data not defined
3450	Servo power cannot be turned ON
3460	Coordinate system cannot be set
4010	Insufficient memory capacity (job registered memory)
4012	Insufficient memory capacity (position data registered memory)
4020	Job editing prohibited
4030	Same job name exists
4040	No specified job
4060	Set an execution job

Added status code	Details
4120	Position data is destroyed
4130	Position data not exist
4140	Incorrect position variable type
4150	END instruction for job which is not master job
4170	Instruction data is destroyed
4190	Invalid character in job name
4200	Invalid character in the label name
4230	Invalid instruction in this system
4420	No step in job to be converted
4430	Already converted
4480	Teach user coordinate
4490	Relative job/ independent control function not permitted
5110	Syntax error (syntax of instruction)
5120	Position data error
5130	No NOP or END
5170	Format error (incorrect format)
5180	Incorrect number of data
5200	Data range over
5310	Syntax error (except instruction)
5340	Error in pseudo instruction specification
5370	Error in condition file data record
5390	Error in JOB data record
5430	System data not same
5480	Incorrect welding function type
A000	Undefined command
A001	Instance error
A002	Attribute error
A101	Replying data part size error (hardware limit)
B001	Replying data part size error (software limit)
B002	Data use prohibited
B003	Requiring data size error
B004	Outside the data
B005	Data undefined
B006	Specified application unregistered
B007	Specified type unregistered
C001	Address error
C002	System error
C003	System error
C800	System error
CFFF	Other error
E2B3	File is not found
E2B4	Pass name too long

FS100 OPTIONS
INSTRUCTIONS

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