SOCKET COMMUNICATION FB LIBRARY REFERENCE MANUAL

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Reference Manual Revision History

Reference Manual Number	Date	Description
FBM-M054-A	2011/03/22	First edition

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1. M+CPU-Socket_SndProcesureCtrl (Socket communication-Send with procedure)

FB Name

M+CPU-Socket_SndProcesureCtrl

Function Overview

Item	Description
Function overview	Provides the function equivalent to "Communication using fixed buffer with procedure" through the socket communication which uses built-in Ethernet port of the CPU module. The send data is sent to the connected external device via "Send with procedure". The send data is converted into ASCII codes if the communication data code is ASCII code, and then the data is sent. Then, this FB receives the response from the external device.
Symbol	 M+CPU-Socket_SndProcesureCtrl Execution command — B : FB_EN FB_ENO : B — Execution status Send connection No. — W : i_SConnection_No FB_OK : B — Completed without error Response monitoring timer value — W : i_Response_Time FB_ERROR : B — Error flag Communication data code — B : i_DataCode_Type ERROR_ID : W — Error code No. of send data — W : i_Num_Send_Data Send data — W : i_Send_Data
Applicable hardware and software	Hardware details <table><tr><td>Q series</td><td>Built-in Ethernet Port QCPU</td></tr><tr><td>L series</td><td>LCPU</td></tr></table> Compatible software: GX Works 2 Version 1.31H or later
Programming language	Ladder
Number of steps (maximum value)	For universal model CPU: 666* *The value is the number of steps in the label program, and is therefore stated as a reference value. For details, refer to the GX Works2 Version1 Operation Manual (Simple Project).

Item	Description
Function description	By turning ON FB_EN (Execution command), the send with procedure processing is performed via the following socket communication. 1) When the communication data code is binary, a subheader is added to the send data. When the communication data code is ASCII, the number of send data and send data are converted from binary to ASCII code and a subheader is added to the send data. Then, the send data is sent to the external device. 2) The FB waits for the response from the external device. When the receive data arrives at the socket communication receive area of the send connection number, the data is received and the response data is checked. 3) If there is no response data even when the response monitoring timer value has elapsed, a communication error occurs and the processing ends. 4) When the input value is not valid, the FB_ERROR output turns ON, processing is interrupted, and the error code is stored in ERROR_ID (Error code). 5) Even if FB_EN (Execution command) is turned OFF before FB operation is completed, the processing continues to operate until sending the data is completed or except when an error occurs.
FB operation type	Macro type
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) The FB cannot be used in an interrupt program. 3) This FB uses index registers Z9 and Z8. Please do not use these index registers in an interrupt program. 4) If a message stating "Insufficient word device points in device/label (VAR) automatic-assign setting" appears when a program is complied, adjust the automatically assigned device setting. 5) To perform the socket communication by using the TCP protocol, set Active for the connection method and establish the connection to TCP before executing this FB. 6) To use the UDP protocol, use the open completion signal of the socket communication as the interlock when executing this FB. 7) Make sure the open completion signal (SD1282) corresponding to the selected connection number is ON.
FB operation type	Pulsed execution (multiple scan execution type)
Application example	Refer to Appendix - Application examples.

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Item	Description
Timing chart	•Operation of I/O signals [When operation completes without error] [When an error occurs]
Relevant manuals	QnUCPU User's Manual (Communication via Built-in Ethernet Port) QCPU User's Manual (Hardware Design, Maintenance and Inspection)

Error codes

Error code list

Error codes	Description
10	i_SConnection_No (Send connection No.) is not valid. Set within the range (1 to 16), and turn OFF FB_EN and ON again.
11	i_Response_Time (Response monitoring timer value) is not valid. Set within the range (1 to 10), and turn OFF FB_EN and ON again.
12	i_Num_Data (No. of data) is not valid. Set within the range (1 to 1017 when the communication code is binary code, and 1 to 508 when ASCII code). Then turn OFF FB_EN and ON again.
13	A communication error occurred. Check if the connection to TCP is established.
14	Response subheader mismatch. Match the subheader value and send it again.
15	A timeout for receiving a response occurred. Check if the data is sent.
H41A1~41B9	A communication error occurred. For details, refer to "12.3.11 Error codes returned to request source during communication with CPU module" in QCPU User's Manual (Hardware Design, Maintenance and Inspection).

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Labels

■Input labels

Name	Variable name	Data type	Setting range	Description
Execution command	FB_EN	B	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Send connection No.	i_SConnection_No	W	1~16	Specify the connection number used to perform the send operation.
Response monitoring timer value	i_Response_Time	W	1~60 (sec)	Specify the waiting time for a response from the external device.
Communication data code	i_DataCode_Type	B	ON, OFF	OFF: Binary code communication ON: ASCII code communication
No. of send data	i_Num_Send_Data	W	1~1017	The number of words of the send data. 　Binary code: 1~1017 　ASCII code: 1~508
Send data	i_Send_Data	W	Valid device range	Data to be sent. The send data is binary regardless of the communication data code.

■Output labels

Name	Variable name	Data type	Initial value	Description
Execution status	FB_ENO	B	OFF	ON: The FB is being executed. OFF: The FB is not executed.
Completed without error	FB_OK	B	OFF	When ON, it indicates that the processing is completed.
Error flag	FB_ERROR	B	OFF	When ON, it indicates that an error has occurred.
Error codes	ERROR_ID	W	0	FB error code output.

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1) When the communication data code is binary, subheader information is added to the send data and the data is
   sent to the external device.

   Send data type (communication data code=binary)
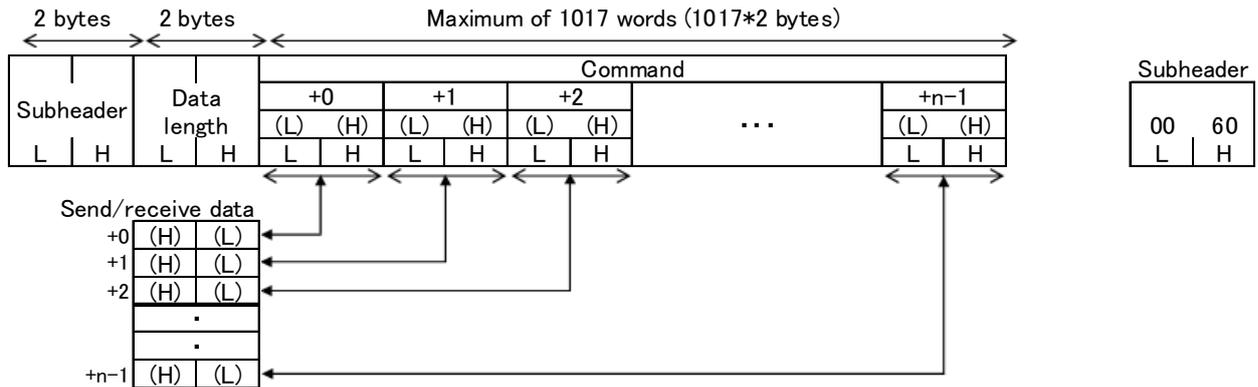
2) When the communication data code is ASCII, the number of send data and send data are converted from binary to
   hexadecimal ASCII code. Then, subheader information is added and they are sent to the external device.

   Send data type (communication data code=ASCII code)
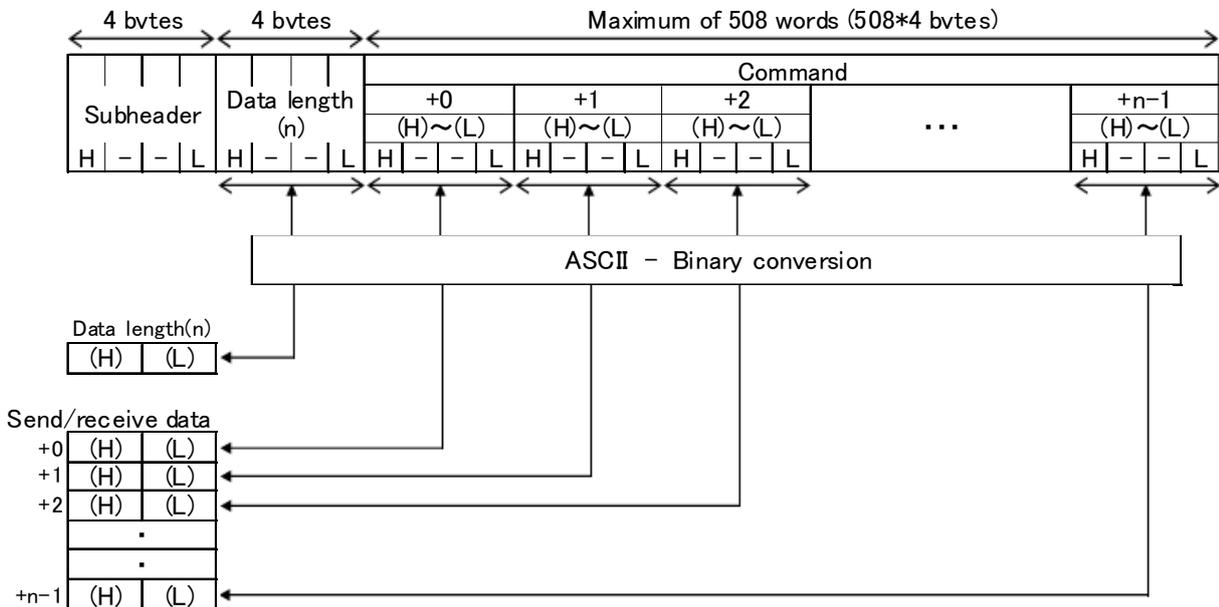
3) The FB waits for a response from the external device.

   If there is no response even when the response monitoring timer has elapsed, the processing abnormally ends.

4) When the receive data is received, the response data is checked.

Receive data type (communication data code=binary)

1 byte | 1 byte

| Subheader | End code |

Subheader

| ED |

End code

| 00/50/54 |
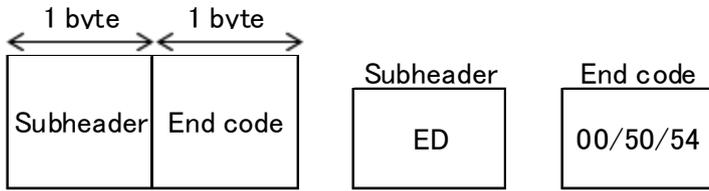
00 Completed without error
50 Subheader type not within specifications

Receive data type (communication data code=ASCII code)
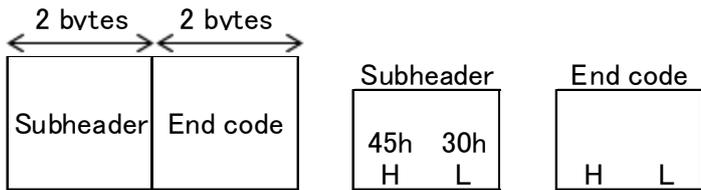
2 bytes | 2 bytes

| Subheader | End code |

Subheader

| 45h | 30h |
| H | L |

End code

| | |
| H | L |

3030h Completed without error
3530h Subheader type not within specifications
3534h Binary code conversion error
　　　(only when using ASCII code)

Version Upgrade History

Version	Date	Description
1.00A	2011/03/22	First edition

Note

This chapter includes information related to the M+CPU-Socket_SndProcesureCtrl function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

Before using any Mitsubishi products, please read all the relevant manuals.

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2. M+CPU-Socket_RcvProcesureCtrl (Socket communication-Receive with procedure)

FB Name

M+CPU-Socket_RcvProcesureCtrl

Function Overview

Item	Description
Function overview	Provides the function equivalent to "Communication using fixed buffer with procedure" through the socket communication which uses built-in Ethernet port of the CPU module. The data that was sent by the connected external device via "Send with procedure" is received, and the response is sent to the external device. The receive data is converted into binary codes when the communication data code is ASCII code, and then the data is stored.

Symbol	M+CPU–Socket_RcvProcesureCtrl
	
	Execution command —— B : FB_EN FB_ENO : B —— Execution status
	Receive connection No. —— W : i_RConnection_No FB_OK : B —— Completed without error
	Response monitoring timer value —— W : i_Response_Time FB_ERROR : B —— Error flag
	Communication data code —— B : i_DataCode_Type ERROR_ID : W —— Error code
	                                    o_Num_Recv_Data : W —— Receive data length
	                                      o_Recv_Data : W —— Receive data

Applicable hardware and software	Hardware details | Q series	Built-in Ethernet Port QCPU
L series	LCPU | Compatible software: GX Works 2 Version 1.31H or later
Programming language	Ladder
Number of steps (maximum value)	For universal model CPU: 801* *The value is the number of steps in the label program, and is therefore stated as a reference value. For details, refer to the GX Works2 Version1 Operation Manual (Simple Project).

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Item	Description
Function description	By turning ON FB_EN (Execution command), the receive with procedure processing is performed via the following socket communication. 1) The receive data at the socket communication receive area of the receive connection number is read. 2) The subheader and data length are read first, and the receive processing continues until the receive data for the data length is received. 3) The subheader in the receive data is checked, and the response is sent to the external device. 4) When the processing of up to 3) is completed, out of the data which was read at 1), the data except for the subheader is stored in the receive data. When the communication data code is ASCII code, the receive data is stored after converting it from ASCII code to binary code. 5) When the input value is not valid, the FB_ERROR output turns ON, processing is interrupted, and the error code is stored in ERROR_ID (Error code). 6) Even if FB_EN (Execution command) is turned OFF before FB operation is completed, the processing continues to operate until receiving the data is completed or except when an error occurs.
FB operation type	Macro type
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) The FB cannot be used in an interrupt program. 3) This FB uses index registers Z9, Z8, and Z7. Please do not use these index registers in an interrupt program. 4) If a message stating "Insufficient word device points in device/label (VAR) automatic-assign setting" appears when a program is complied, adjust the automatically assigned device setting. 5) Establish the connection to TCP before executing this FB. 6) To perform the socket communication by using the TCP protocol, set Passive for the connection method, and use the open completion ON signal corresponding to the selected connection number as the interlock when executing this FB. 7) When using UDP protocol, use the open completion signal as the interlock when executing this FB. 8) Make sure the open completion signal (SD1282) corresponding to the selected connection number is ON before executing.
FB operation type	Pulsed execution (multiple scan execution type)

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Item	Description
Application example	Refer to Appendix - Application examples.
Timing chart	•Operation of I/O signals [When operation completes without error] [When an error occurs]
Relevant manuals	QnUCPU User's Manual (Communication via Built-in Ethernet Port) QCPU User's Manual (Hardware Design, Maintenance and Inspection)

Error codes

■Error code list

Error codes	Description
10	i_RConnection_No (Receive connection No.) is not valid. Set within the range (1 to 16), and turn OFF FB_EN and then ON again.
11	i_Response_Time (Response monitoring timer value) is not valid. Set within the range (1 to 10), and turn OFF FB_EN and then ON again.
12	A timeout error for receiving the receive data. Check if the data is sent.
13	A communication error occurred. Check if the connection to TCP is established.
14	Response subheader mismatch. Match the subheader value and send it again.
H41A1~41B9	A communication error occurred. For details, refer to "12.3.11 Error codes returned to request source during communication with CPU module" in QCPU User's Manual (Hardware Design, Maintenance and Inspection).

Labels

■Input labels

Name	Variable name	Data type	Setting range	Description
Execution command	FB_EN	B	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.

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Name	Variable name	Data type	Setting range	Description
Receive connection No.	i_RConnection_No	W	1~16	Specify the connection number used to perform the receive operation.
Response monitoring timer value	i_Response_Time	W	1~60 (second)	Specify the waiting time for a response from the external device.
Communication data code	i_DataCode_Type	B	ON, OFF	OFF: Binary code communication ON: ASCII code communication

■Output labels

Name	Variable name	Data type	Initial value	Description
Execution status	FB_ENO	B	OFF	ON: The FB is being executed. OFF: The FB is not executed.
Completed without error	FB_OK	B	OFF	When ON, it indicates that the processing is completed.
Error flag	FB_ERROR	B	OFF	When ON, it indicates that an error has occurred.
Error codes	ERROR_ID	W	0	FB error code output.

Receive data length	o_Num_Recv_Data	W	0	Store the number of receive words of the receive data.
				    Binary code: 1~1017
				    ASCII code: 1~508

Receive data	o_Recv_Data	W	Valid device range	The receive data that is taken out from the socket communication receive area (except for subheader and data length). The receive data is binary regardless of the communication data code.

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1) The receive data is read from the socket communication receive area of the specified receive connection number.

   Receive data type

Application data		
Subheader	Data length	Text (Command)

The receive data is read from the socket communication receive area until the command data for the data length is received.

2) A communication error occurs if the receive data cannot be received even when the response monitoring time has elapsed.

3) The start byte of the read data is checked, and the subheader is checked for errors.

Communication data code: Binary code   Communication data code: ASCII code
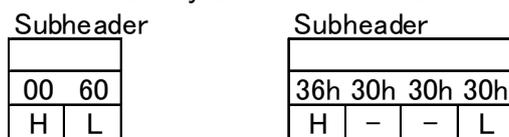
Subheader

00	60
H	L

Subheader

36h	30h	30h	30h
H	–	–	L

4) The response is sent to the external device.

Communication data code: binary code

1 byte	1 byte
Subheader	End code

Subheader

ED

End code

00/50/54

00 Completed without error
50 Subheader type not within specifications

Communication data code: ASCII code

2 bytes	2 bytes
Subheader	End code

Subheader

45h	30h
H	L

End code

H	L
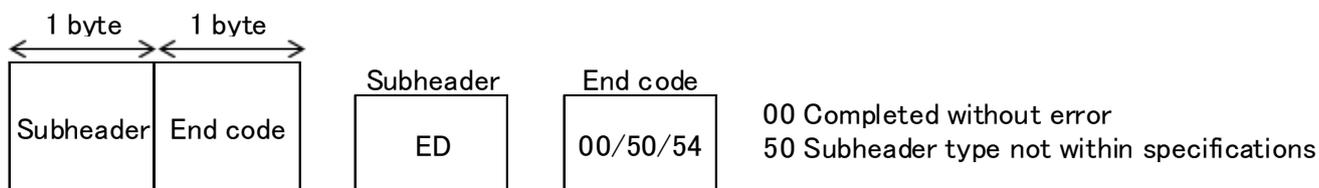
3030h Completed without error
3530h Subheader type not within specifications
3534h Binary code conversion error
　　　(only when using ASCII code)
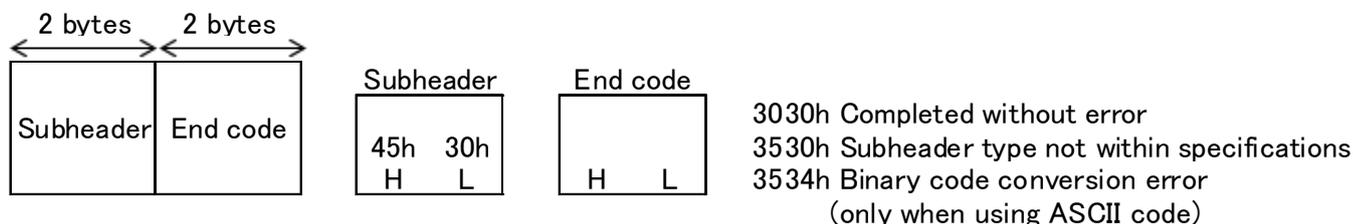
5) The receive data read at 1) is stored in the following data.

   Receive data length (o_Num_Recv_Data): Data length

   Receive data (o_Recv_Data): Text (command)

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* Communication data code: binary code
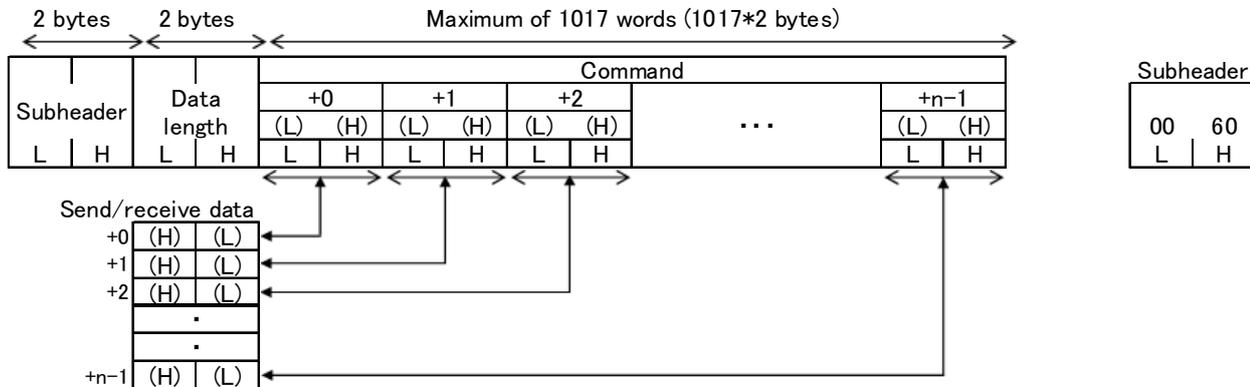
*Communication data code: ASCII code
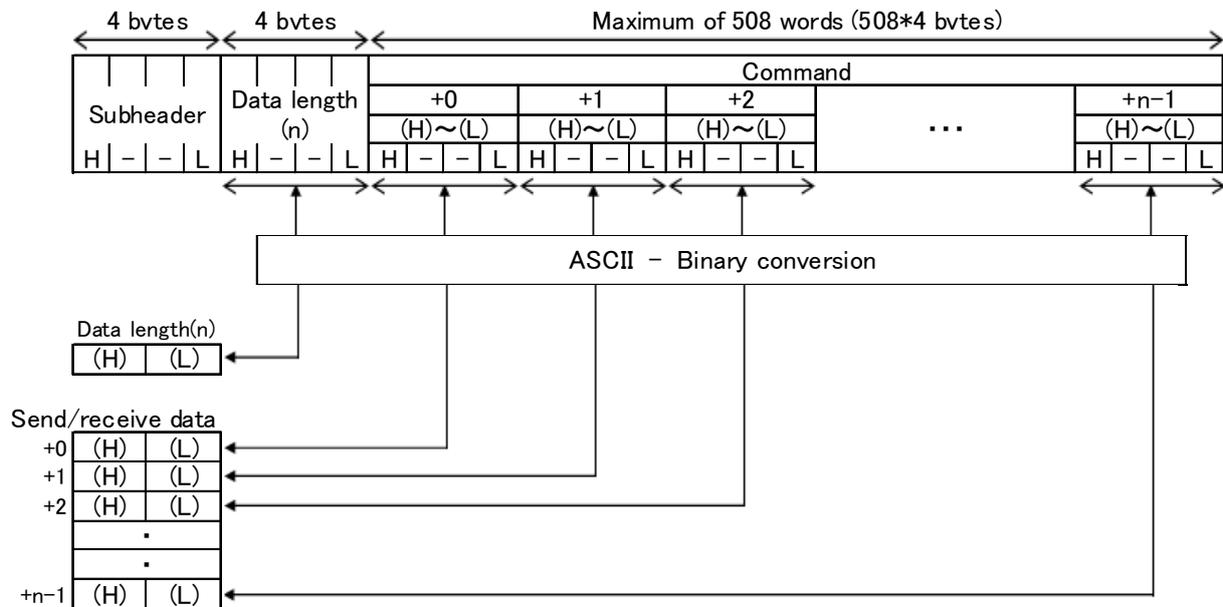
The data length and receive data are both converted from hexadecimal ASCII to binary, and the converted data are stored in the receive data length and receive data.

Version Upgrade History

Version	Date	Description
1.00A	2011/03/22	First edition

Socket Communication FB Library Reference Manual
FBM-M054-A

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This chapter includes information related to the M+CPU-Socket_RcvProcesureCtrl function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

Before using any Mitsubishi products, please read all the relevant manuals.

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Appendix 1 - Application Examples

Socket communication FB application examples

System configuration

Power supply module	CPU Module	QX40 (X00~X0F)	QY40 (Y10~Y1F)

Device list

External input (commands)

Device	FB function name	Application (ON details)
X00	Socket communication-Send with procedure	Communication data code (ASCII data when ON)
X01	Socket communication-Receive with procedure	Communication data code (ASCII data when ON)

External output (checks)

Device	FB function name	Application (ON details)
Y10	Socket communication-Send with procedure	Socket communication-Send with procedure FB error
Y11	Socket communication-Receive with procedure	Socket communication-Receive with procedure FB error

Data register

Device	FB function name	Application (ON details)
D15	Socket communication-Send with procedure	Send data
D30		Send with procedure FB error code
D101		Receive with procedure FB error code
D102	Socket communication-Receive with procedure	Receive data length
D103		Receive data

Relay

Device	FB function name	Application (ON details)
M0		Send with procedure request
M1	Socket communication-Send with procedure	Send with procedure FB ready
M2		Send with procedure complete
M3		Receive with procedure request
M4	Socket communication-Receive with procedure	Receive with procedure FB ready
M5		Receive with procedure complete

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M+CPU-Socket_SndProcesureCtrl (Socket communication-Send with procedure)

	B:FB_EN Execution command	SndProcesureCtr	FB_ENO:B Execution status	(M1) Send with procedure FB ready
M0 Send with procedure request				
[K2]	W:i_SConnection_No Connection No.		FB_OK:B Completed without error	(M2) Send with procedure complete
[K10]	W:i_Response_Time Response monitoring timer value		FB_ERROR:B Error flag	(Y10) Socket comm.-Send w/ proc FB err
X0 Comm. data code (ASCII at ON)	B:i_DataCode_Type Communication data code		ERROR_ID:W [D30] Error code	Send with procedure FB err code
[K2]	W:i_Num_Send_Data No. of send data			
[D15] Send data	W:i_Send_Data Send data			

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M+CPU-Socket_RcvProcesureCtrl (Socket communication-Receive with procedure)

```
       M3                          ┌──────────RcvProcesureCtr──────────┐
      ─┤ ├──────────────────────────┤B:FB_EN              FB_ENO:B├──────────────────(M4    )─
      Receive                       │Executio            Executio│                   Receive
      with pro                      │n comman            n status│                   with pro
      cedure r                      │d                           │                   cedure F
      equest                        │                            │                   B ready
                                    │                            │
                      ─[K1    ]─────┤W:i_RConnection_No    FB_OK:B├──────────────────(M5    )─
                                    │Receive             Complete│                   Receive
                                    │connecti            d withou│                   with pro
                                    │on No.              t error │                   cedure c
                                    │                            │                   omplete
                                    │                            │
                      ─[K10   ]─────┤W:i_Response_Time  FB_ERROR:B├──────────────────(Y11   )─
                                    │Response            Error fl │                   Socket c
                                    │ monitor            ag       │                   omm-Rcv
                                    │ing time                     │                   w/ proc
                                    │r value                      │                   FB err
       X1                           │                            │
      ─┤ ├──────────────────────────┤B:i_DataCode_Type  ERROR_ID:W├─[D101   ]──────────
      Comm. da                      │Communic            Error co │  Receive
      ta code                       │ation da            de       │  with pro
      (ASCII a                      │ta code                      │  c FB err
      t ON)                         │                             │   code
                                    │                             │
                                    │          o_Num_Recv_Data:W├─[D102   ]──────────
                                    │                    Receive  │  Receive
                                    │                    data len │  data len
                                    │                    gth      │  gth
                                    │                             │
                                    │              o_Recv_Data:W├─[D103   ]──────────
                                    │                    Receive  │  Receive
                                    │                    data     │  data
                                    └─────────────────────────────┘
```