MICROSMART COMMUNICATION PROTOCOL

This document describes communication commands for the MicroSmart micro programmable controller.

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Communication Command List

All communication commands available for the MicroSmart, OpenNet Controller (ONC), MICRO^3, and MICRO^{3}C are summarized in the table below. Some of the commands are the same as for different PLCs, with increased operands and operand number ranges.

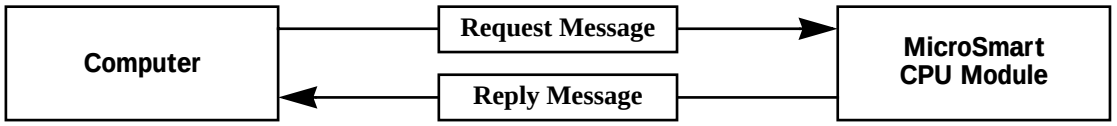
Command Name	MicroSmart	ONC	MICRO^{3}C	MICRO^3
Write User Program in ASCII Format	X	X	X	X
Write User Program in Binary Format	X	X	X	X
Read User Program in ASCII Format	X	X	X	X
Read User Program in Binary Format	X	X	X	X
Write N Bytes	X	X	X	X
Read N Bytes (Note)	X	X	X	X
Write 1 Bit	X	X	X	X
Read 1 Bit	X	X	X	X
Read High-speed Counter Preset and Current Values		X	X	X
Read Error Code	X	X	X	X
Clear Operand Data	X	X	X	X
Enable / Disable User Program Protection	X	X	X	X
Read PLC Operating Status	X	X	X	X
Read Scan Time	X	X	X	X
Read PLC System Program Version	X	X	X	X
Read User Communication Transmit / Receive Buffer		X	X	
Clear and Start User Communication Data Monitor			X	
Read User Communication Status		X	X	
Read Communication Mode		X		
Select Word Operands for Monitor		X		
Monitor Selected Word Operands		X		
Read Timer Information	X	X		
Read Counter Information	X	X		
Read Timer Preset Value Change Status	X	X		
Read Counter Preset Value Change Status	X	X		
Read FUN Area Settings		X		
Read Random Words		X		
Read Timeout Status	X			
Read Countout Status	X			
Confirm Changed Timer / Counter Preset Values	X			

Note: When timer / counter preset or current values are read out from the MicroSmart using the read N bytes command, the result is different from that read from the MICRO^3 because the MicroSmart has different timer and counter internal codes to enable 16-bit timers and counters. The MicroSmart has new commands for timers and counters; Read Timeout Status and Read Countout Status.

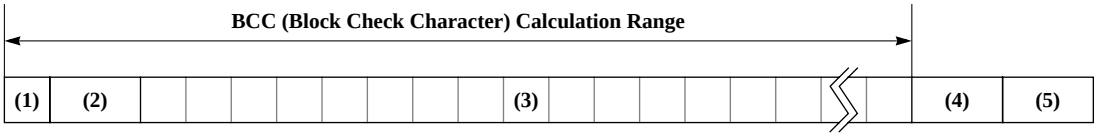
Communication Procedure

The computer and the MicroSmart CPU module communicate data by sending and receiving communication messages, which consist of request messages and reply messages. The request message is sent from the computer to write data to, read or clear data from the MicroSmart. The reply message is sent from the MicroSmart in response to the request message from the computer.

Communication is always initiated by the computer by sending a request message to the MicroSmart, which then returns a reply message to the computer. The MicroSmart cannot initiate communication in the computer link system. The MicroSmart can initiate communication using the user communication function.



Message Format

Communication Message					
(1)	Communication control character (1 byte)	Message start character	ENQ (05h)	Enquiry	Request message
			ACK (06h) NAK (15h)	Acknowledge Negative acknowledge	Reply message
(2)	Communication device number (2 bytes)	Device number to send request to	00 (0) through 1F (31)	Designates a PLC device number to which the computer sends a request message in the 1:N communication computer link system.	
			FF (255)	Used in the 1:1 communication computer link system. PLC of any device number receives request message.	
		Device number to send reply from	00 (0) through 1F (31)	Indicates the device number of the PLC which returns the reply message.	
(3)	Data (variable length)	Communication command, data type, etc.	Depends on each command. See “Request Messages” on page 3. See “Reply Messages” on page 5.		
(4)	BCC (2 bytes)	Block check character	Exclusive OR (XOR) of the BCC calculation range.		
(5)	Terminator (1 byte)	Message end code	CR (0Dh)	Default	

Request Messages

Like the ONC or MICRO^3, request messages are available in request message 1 and request message 2 with different data structures.

Request Message 1

Request message 1 is a command message to be sent from the computer to the PLC, containing a command. The data type code included in the request message determines the function. The data structure of request message 1 is shown below.

Request Message 1	ENQ																	BCC	Terminator
	05h	Device	(1)	(2)	(3)							(4)							

(1)	Continuation (1 byte)	0 (30h)	Discontinued (no message follows)					
		1 (31h)	Continued (another message follows)					
(2)	Command (1 byte)	W (57h)	Write data to PLC					
		R (52h)	Read data from PLC					
		C (43h)	Clear data from PLC					
(3)	Data type (1 byte)	X (58h)	Input	N-byte designation	t (74h)	Timer (current value)	N-byte designation	
		Y (59h)	Output		c (63h)	Counter (current value)		
		M (4Dh)	Internal relay		D (44h)	Data register		
		R (52h)	Shift register		x (78h)	Input	1-bit designation	
		T (54h)	Timer (preset value)		y (79h)	Output		
		C (43h)	Counter (preset value)		m (6Dh)	Internal relay		
					r (72h)	Shift register		
		E (45h)	Error code (read/clear)					
		I (49h)	Link formatting sequence (clear)					
		K (4Bh)	Scan time (read)					
		N (4Eh)	PLC system program version (read)					
		P (50h)	User program in ASCII format (read/write)					
		Q (51h)	Changed timer/counter preset values (write)					
		S (53h)	PLC operating status (read)					
		V (56h)	User program protection					
		W (57h)	Calendar/clock (read/write)					
		Z (5Ah)	System reset (clear)					
		_ (5Fh)	Timer information (read)					
		` (60h)	Counter information (read)					
		a (61h)	Timer preset value change status (read)					
		b (62h)	Counter preset value change status (read)					
		d (64h)	Timer timeout status (read)					
		e (65h)	Counter countout status (read)					
		p (70h)	User program in binary format (read/write)					
(4)	Data (variable length)	Data (depends on command and data type)						

(1) "Continued" is used in request message 1 for writing the user program to inform the PLC that another request message will be sent successively. In all other request messages, "discontinued" is used. When "continued" is specified, the computer sends a request message, receives a reply message, and sends another request message.

(2) The command code is available in three types; write data, read data, and clear data.

(3) The data type code selects an operand or function. Upper- and lower-case characters have different functions.

(4) The data specifies the operand number, the quantity of bytes of the data for reading or writing, etc. depending on the command and data type.

Request Message 2

Request message 2 is a command message used for writing and reading user programs. The data structure of request message 2 is shown below:

Request Message 2	ENQ	05h	Device	(1)							(2)							BCC	Terminator

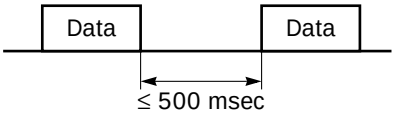
(1)	Continuation (1 byte)	0 (30h)	Discontinued (no message follows)
(2)	Data (variable length)	User program (write user program)	
	Data (1 byte)	R (52h)	Read user program

(1) "Discontinued" is used for both writing and reading user programs to inform the PLC that no request message will be sent successively.

(2) The data length is variable for writing user programs and is 1-byte long ("R") for reading user programs.

Receive Timeout

When a request message contains an interval of 500 msec or more between one-byte character data and the next one-byte character data, the PLC understands that the communication is canceled and does not return a reply message.



When the interval is 500 msec or more, extend the receive timeout value using WindLDR. The receive timeout can be selected between 10 and 2540 msec in 10-msec increments. To enable the optional communication mode, turn on the mode selection input designated on the Communication Parameters page in WindLDR.

To access the Communication Parameters page from the WindLDR menu bar, select **Configure** > **Function Area Settings**. In the Function Area Setting dialog box, click the **Communication** tab, and select **Maintenance Protocol** in the Port 1 or 2 pull-down list.

Click the **Configure** button. The Communication Parameters dialog box appears. Change settings, if required.

Baud Rate (bps)	1200, 2400, 4800, 9600, 19200
Data Bits	7 or 8
Parity	None, Odd, Even
Stop Bits	1 or 2
Receive Timeout (ms)	10 to 2540 (10-msec increments) (Receive timeout is disabled when 2550 is selected.)
Device Number	0 to 31
Mode Selection Input	Any input number

Note: Only when the mode selection input is turned on, the selected communication parameters are enabled. Otherwise, default communication parameters take effect; 9600 bps, 7 data bits, even parity, 1 stop bit, receive timeout 500 msec.

For details, see the MicroSmart User's Manual EM342, page 25-2.

Reply Messages

Reply messages are available in ACK reply message and NAK reply message with different data structures.

ACK Reply Message

The ACK reply message is a reply or response to the request message and is sent from the PLC to the computer when communication is completed normally.

<table>
<tr><td>ACK Reply Message</td><td colspan="5">ACK
<table><tr><td>06h</td><td>Device</td><td>(1)</td><td></td><td></td><td></td><td></td><td></td><td></td><td>(2)</td><td></td><td></td><td></td><td></td><td></td><td></td><td>BCC</td><td>Termi-nator</td></tr></table></td></tr>
<tr><td rowspan="3">(1)</td><td rowspan="3">Command (1 byte)</td><td>0 (30h)</td><td colspan="2">OK: Discontinued</td><td>All communication is completed normally (end of processing).</td></tr>
<tr><td>1 (31h)</td><td colspan="2">OK: Continued</td><td>Communication in reply to request is completed normally and another reply message follows when reading a user program.</td></tr>
<tr><td>2 (32h)</td><td colspan="2">NG: Error</td><td>Communication device number, command, data type, data, or continuation code is not within the range supported by the PLC or does not match its status. When this error occurs, communication is halted without regard to the continuation code.</td></tr>
<tr><td rowspan="3">(2)</td><td rowspan="3">Data (variable length)</td><td rowspan="3">0 (30h) to 9 (39h)
or
A (41h) to F (46h)</td><td>OK reply</td><td>When request command is W or C</td><td>No data exists. (0 byte)</td></tr>
<tr><td></td><td>When request command is R</td><td>The data length depends on the request command (variable length).</td></tr>
<tr><td>NG reply</td><td colspan="2">NG code (2 bytes)
<table><tr><th>NG Code</th><th>Error</th><th>Cause</th></tr><tr><td>01</td><td>Program size error</td><td>Improper write/read program size</td></tr><tr><td>02</td><td>Protect error</td><td>Protected against write/read in the PLC</td></tr><tr><td>03</td><td>RUN error</td><td>Writing user program is attempted while the PLC is running</td></tr><tr><td>04</td><td>CRC error</td><td>User program CRC code does not match</td></tr><tr><td>05</td><td>Protect code error</td><td>Protect code in the request message does not match that set in the PLC. Attempt was made to enable protection on a protected user program.</td></tr><tr><td>06</td><td>Data range error</td><td>Invalid data range designated</td></tr><tr><td>07</td><td>Timer/counter preset value change error</td><td>Preset value change is attempted to timer or counter with preset value designated by data register</td></tr><tr><td>08</td><td>Calendar/clock data error</td><td>Invalid value written to calendar/clock</td></tr><tr><td>09</td><td>Data clear error</td><td>Designated data cannot be cleared</td></tr><tr><td>10</td><td>Data error</td><td>Invalid data other than 0 (30h) - 9 (39h) or A (41h) - F (46h)</td></tr><tr><td>11</td><td>Setting error</td><td>Incorrect setting for user communication</td></tr><tr><td>12</td><td>CPU module type code error</td><td>CPU module type code in the request message does not match the connected PLC.</td></tr></table></td></tr>
</table>

(1) The command code indicates whether the request command is completed normally or not and also whether another reply message will be sent successively.

When reading a user program from the PLC, reply message 1 is returned in response to request message 1 and reply message 2 is returned in response to request message 2. Reply message 1 contains command 1 (OK: continued) to inform the computer that another reply message follows. All other reply messages contain command 0 (OK: discontinued) to indicate that no reply message follows when communication is completed normally.

(2) When an OK reply is returned in response to request command R (read data), the read data is included in this place. When an NG reply is returned, the cause of error exists in the PLC. See page 47.

NAK Reply Message

When an error is found during communication, a NAK reply message is sent from the PLC to the computer.

NAK Reply Message

NAK

15h	Device	(1)	(2)	BCC	Termi-nator

(1)	Command	0 (no meaning): dummy data for consistent communication format
(2)	Communication error code (2 bytes)	Depending on the communication error, an error code is set in this place.

Error Code	Error Type	Error Contents
00	BCC error	Appended BCC code does not match BCC calculated value of received data.
01	Frame error	Quantity of received bits differs from the preset value (stop bit is 0 for example).
02	Data send/receive error	Parity error or overrun error occurred.
03	Command error	Unsupported request message is received.
04	Procedure/data quantity error	Received request message does not match the expected data (including quantity of data).

(1) The command code in the NAK reply message is always 0.

(2) The next two bytes indicate the communication error code.

Write User Program in ASCII Format

The user program can be written from a computer to the PLC. When transferring a user program through modem, this command is recommended to transfer the user program in ASCII format because modems understand ASCII codes.

When writing a user program from a computer, two request messages must be sent to the PLC.
Send request message 1 first. After confirming that the returned reply message is an OK reply, send request message 2.

Request Messages (Write User Program in ASCII Format)

Request Message 1

05h	**	**	31h	57h	50h	3*h	**	**	**	**	**	**	**	**	**	0Dh
(1)	(2)		(3)	(4)	(5)	(6)				(7)					(8)	(9)

(1)	**Communication control character**	1 byte	ENQ (05h)	Enquiry
(2)	**Communication device number**	2 bytes	00 - 1F FF	Device number 0 through 31 Device number 255 (all devices)
(3)	**Continuation**	1 byte	1 (31h)	Continued
(4)	**Command**	1 byte	W (57h)	Write data
(5)	**Data type**	1 byte	P (50h)	User program in ASCII format
(6)	**CPU module type code**	1 byte	0 (30h) 1 (31h) 2 (32h) 3 (33h) 4 (34h) 6 (36h)	10-I/O 16-I/O 20-I/O transistor output 24-I/O 40-I/O 20-I/O relay output
(7)	**Program capacity**	8 bytes	0000 0000 : FFFF FFFF	User program includes data of rung comments and tag comments plus function area settings. The function area occupies 94 bytes.
(8)	**BCC**	2 bytes	00 - 7F	Block check character
(9)	**Terminator**	1 byte	CR (0Dh)	Message end code

Request Message 2

05h	**	**	30h	**	**	**	**	**	**	**	**	**	**	0Dh
(1)	(2)		(3)				(4)					(5)		(6)

(1)	**Communication control character**	1 byte	ENQ (05h)	Enquiry
(2)	**Communication device number**	2 bytes	00 - 1F FF	Device number 0 through 31 Device number 255 (all devices)
(3)	**Continuation**	1 byte	0 (30h)	Discontinued
(4)	**User program**	Variable length 64,336 bytes max.	0 (30h) - 9 (39h) A (41h) - F (46h)	User program (ASCII code file)
(5)	**BCC**	2 bytes	00 - 7F	Block check character
(6)	**Terminator**	1 byte	CR (0Dh)	Message end code

Note: The user program must be stored in a file of the ASCII code format. Ladder program files (.LDR) cannot be sent to the PLC using this request message.

Reply Messages (Write User Program in ASCII Format)

OK Reply (Reply to Request Messages 1 and 2)

06h	**	**	30h	**	**	0Dh
(1)	(2)		(3)	(4)		(5)

(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	0 (30h)	OK: Discontinued
(4)	**BCC**	2 bytes	00 - 7F	Block check character
(5)	**Terminator**	1 byte	CR (0Dh)	Message end code

NG Reply (Reply to Request Message 1)

06h	**	**	32h	30h	3*h	**	**	0Dh
(1)	(2)		(3)	(4)		(5)		(6)

(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	2 (32h)	NG
(4)	**NG code**	2 bytes	01 (30h 31h) 02 (30h 32h) 03 (30h 33h) 04 (30h 34h) 12 (31h 32h)	Program capacity error Protect error RUN error CRC error CPU module type code error
(5)	**BCC**	2 bytes	00 - 7F	Block check character
(6)	**Terminator**	1 byte	CR (0Dh)	Message end code

Note: NG reply never occurs in response to reply message 2.

Write User Program in Binary Format

The user program can be written from a computer to the PLC. This command can send a user program faster than the Write User Program in ASCII format command.

When writing a user program from a computer, two request messages must be sent to the PLC.
Send request message 1 first. After confirming that the returned reply message is an OK reply, send request message 2.

Request Messages (Write User Program in Binary Format)

Request Message 1

05h	**	**	31h	57h	70h	3*h	**	**	**	**	**	**	**	**	**	**	0Dh
(1)	(2)		(3)	(4)	(5)	(6)				(7)					(8)		(9)

(1)	**Communication control character**	1 byte	ENQ (05h)	Enquiry
(2)	**Communication device number**	2 bytes	00 - 1F FF	Device number 0 through 31 Device number 255 (all devices)
(3)	**Continuation**	1 byte	1 (31h)	Continued
(4)	**Command**	1 byte	W (57h)	Write data
(5)	**Data type**	1 byte	p (70h)	User program in binary format
(6)	**CPU module type code**	1 byte	0 (30h) 1 (31h) 2 (32h) 3 (33h) 4 (34h) 6 (36h)	10-I/O 16-I/O 20-I/O transistor output 24-I/O 40-I/O 20-I/O relay output
(7)	**Program capacity**	8 bytes	0000 0000 : FFFF FFFF	User program includes data of rung comments and tag comments plus function area settings. The function area occupies 94 bytes.
(8)	**BCC**	2 bytes	00 - 7F	Block check character
(9)	**Terminator**	1 byte	CR (0Dh)	Message end code

Request Message 2

05h	**	**	30h	**	**	**	**	**	**	**	**	**	**	0Dh
(1)	(2)		(3)				(4)					(5)		(6)

(1)	**Communication control character**	1 byte	ENQ (05h)	Enquiry
(2)	**Communication device number**	2 bytes	00 - 1F FF	Device number 0 through 31 Device number 255 (all devices)
(3)	**Continuation**	1 byte	0 (30h)	Discontinued
(4)	**User program**	Variable length 32,168 bytes max.	(00h) - (FFh)	User program (binary code file)
(5)	**BCC**	2 bytes	00 - FF	Block check character
(6)	**Terminator**	1 byte	CR (0Dh)	Message end code

Note: The user program must be stored in a file of the binary code format. Ladder program files (.LDR) cannot be sent to the PLC using this request message.

Reply Messages (Write User Program in Binary Format)

OK Reply (Reply to Request Messages 1 and 2)

06h	**	**	30h	**	**	0Dh
(1)	(2)		(3)	(4)		(5)

(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	0 (30h)	OK: Discontinued
(4)	**BCC**	2 bytes	00 - 7F	Block check character
(5)	**Terminator**	1 byte	CR (0Dh)	Message end code

NG Reply (Reply to Request Message 1)

06h	**	**	32h	30h	3*h	**	**	0Dh
(1)	(2)		(3)	(4)		(5)		(6)

(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	2 (32h)	NG
(4)	**NG code**	2 bytes	01 (30h 31h) 02 (30h 32h) 03 (30h 33h) 04 (30h 34h) 12 (31h 32h)	Program capacity error Protect error RUN error CRC error CPU module type code error
(5)	**BCC**	2 bytes	00 - 7F	Block check character
(6)	**Terminator**	1 byte	CR (0Dh)	Message end code

Note: NG reply never occurs in response to reply message 2.

Read User Program in ASCII Format

The user program can be read from the PLC to a computer.

When reading a user program to a computer, two request messages must be sent from the computer to the PLC. Send request message 1 first. After confirming that the returned reply message is an OK reply, send request message 2.

Specify a value larger than the user program capacity selected in the PLC in place of the program capacity in request message 1. Reserve a buffer in the computer to store the data of the specified program capacity temporarily.

Request Messages (Read User Program in ASCII Format)

Request Message 1

05h	**	**	31h	52h	50h	3*h	**	**	**	**	**	**	**	**	**	0Dh
(1)	(2)		(3)	(4)	(5)	(6)				(7)					(8)	(9)

(1)	**Communication control character**	1 byte	ENQ (05h)	Enquiry
(2)	**Communication device number**	2 bytes	00 - 1F FF	Device number 0 through 31 Device number 255 (all devices)
(3)	**Continuation**	1 byte	1 (31h)	Continued
(4)	**Command**	1 byte	R (52h)	Read data
(5)	**Data type**	1 byte	P (50h)	User program in ASCII format
(6)	**CPU module type code**	1 byte	0 (30h) 1 (31h) 2 (32h) 3 (33h) 4 (34h) 6 (36h)	10-I/O 16-I/O 20-I/O transistor output 24-I/O 40-I/O 20-I/O relay output
(7)	**Program capacity**	8 bytes	0000 0000 : FFFF FFFF	User program includes data of rung comments and tag comments plus function area settings. The function area occupies 94 bytes.
(8)	**BCC**	2 bytes	00 - 7F	Block check character
(9)	**Terminator**	1 byte	CR (0Dh)	Message end code

Request Message 2

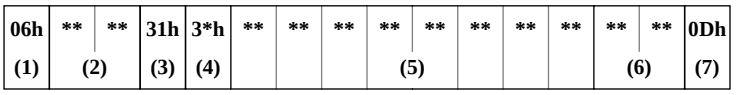
05h	**	**	30h	52h	**	**	0Dh
(1)	(2)		(3)	(4)	(5)		(6)

(1)	**Communication control character**	1 byte	ENQ (05h)	Enquiry
(2)	**Communication device number**	2 bytes	00 - 1F FF	Device number 0 through 31 Device number 255 (all devices)
(3)	**Continuation**	1 byte	0 (30h)	Discontinued
(4)	**Command**	1 byte	R (52h)	Read data
(5)	**BCC**	2 bytes	00 - 7F	Block check character
(6)	**Terminator**	1 byte	CR (0Dh)	Message end code

Reply Messages (Read User Program in ASCII Format)

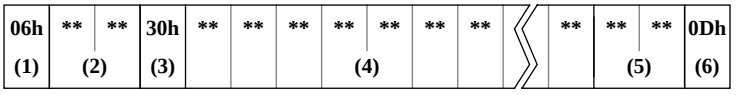
OK Reply

- **Reply Message 1**



(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	1 (31h)	OK: Continued
(4)	**CPU module type code**	1 byte	0 (30h) 1 (31h) 2 (32h) 3 (33h) 4 (34h) 6 (36h)	10-I/O 16-I/O 20-I/O transistor output 24-I/O 40-I/O 20-I/O relay output
(5)	**Program capacity**	8 bytes	0000 0000 : FFFF FFFF	User program includes data of rung comments and tag comments plus function area settings. The function area occupies 94 bytes.
(6)	**BCC**	2 bytes	00 - 7F	Block check character
(7)	**Terminator**	1 byte	CR (0Dh)	Message end code

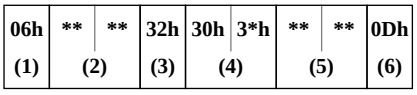
- **Reply Message 2**



(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	0 (30h)	OK: Discontinued
(4)	**User program**	Variable length 64,336 bytes max.	0 (30h) - 9 (39h) A (41h) - F (46h)	User program (ASCII code file)
(5)	**BCC**	2 bytes	00 - 7F	Block check character
(6)	**Terminator**	1 byte	CR (0Dh)	Message end code

Note: The received user program is stored on the disk in the ASCII code format.

NG Reply (Reply to Request Message 1)



(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	2 (32h)	NG
(4)	**NG code**	2 bytes	01 (30h 31h) 02 (30h 32h) 04 (30h 34h)	Program capacity error Protect error CRC error
(5)	**BCC**	2 bytes	00 - 7F	Block check character
(6)	**Terminator**	1 byte	CR (0Dh)	Message end code

Note: NG reply never occurs in response to reply message 2.

Read User Program in Binary Format

The user program can be read from the PLC to a computer.

When reading a user program to a computer, two request messages must be sent from the computer to the PLC. Send request message 1 first. After confirming that the returned reply message is an OK reply, send request message 2.

Specify a value larger than the user program capacity selected in the PLC in place of the program capacity in request message 1. Reserve a buffer in the computer to store the data of the specified program capacity temporarily.

Request Messages (Read User Program in Binary Format)

Request Message 1

05h	** **	31h	52h	70h	3*h	**	**	**	** **	**	**	**	** **	0Dh
(1)	(2)	(3)	(4)	(5)	(6)				(7)				(8)	(9)

(1)	**Communication control character**	1 byte	ENQ (05h)	Enquiry
(2)	**Communication device number**	2 bytes	00 - 1F FF	Device number 0 through 31 Device number 255 (all devices)
(3)	**Continuation**	1 byte	1 (31h)	Continued
(4)	**Command**	1 byte	R (52h)	Read data
(5)	**Data type**	1 byte	p (70h)	User program in binary format
(6)	**CPU module type code**	1 byte	0 (30h) 1 (31h) 2 (32h) 3 (33h) 4 (34h) 6 (36h)	10-I/O 16-I/O 20-I/O transistor output 24-I/O 40-I/O 20-I/O relay output
(7)	**Program capacity**	8 bytes	0000 0000 : FFFF FFFF	User program includes data of rung comments and tag comments plus function area settings. The function area occupies 94 bytes.
(8)	**BCC**	2 bytes	00 - 7F	Block check character
(9)	**Terminator**	1 byte	CR (0Dh)	Message end code

Request Message 2

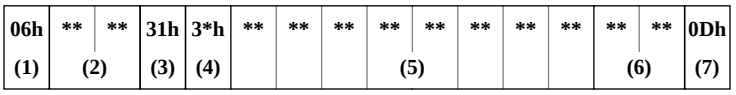
05h	** **	30h	52h	** **	0Dh
(1)	(2)	(3)	(4)	(5)	(6)

(1)	**Communication control character**	1 byte	ENQ (05h)	Enquiry
(2)	**Communication device number**	2 bytes	00 - 1F FF	Device number 0 through 31 Device number 255 (all devices)
(3)	**Continuation**	1 byte	0 (30h)	Discontinued
(4)	**Command**	1 byte	R (52h)	Read data
(5)	**BCC**	2 bytes	00 - 7F	Block check character
(6)	**Terminator**	1 byte	CR (0Dh)	Message end code

Reply Messages (Read User Program in Binary Format)

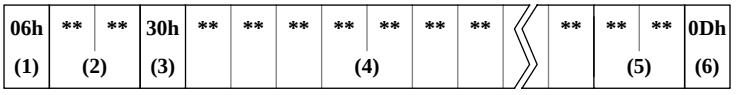
OK Reply

- **Reply Message 1**



(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	1 (31h)	OK: Continued
(4)	**CPU module type code**	1 byte	0 (30h) 1 (31h) 2 (32h) 3 (33h) 4 (34h) 6 (36h)	10-I/O 16-I/O 20-I/O transistor output 24-I/O 40-I/O 20-I/O relay output
(5)	**Program capacity**	8 bytes	0000 0000 : FFFF FFFF	User program includes data of rung comments and tag comments plus function area settings. The function area occupies 94 bytes.
(6)	**BCC**	2 bytes	00 - 7F	Block check character
(7)	**Terminator**	1 byte	CR (0Dh)	Message end code

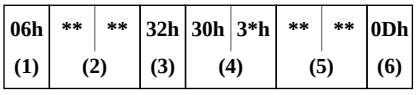
- **Reply Message 2**



(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	0 (30h)	OK: Discontinued
(4)	**User program**	Variable length 32,168 bytes max.	(00h) - (FFh)	User program (binary code file)
(5)	**BCC**	2 bytes	00 - FF	Block check character
(6)	**Terminator**	1 byte	CR (0Dh)	Message end code

Note: The received user program is stored on the disk in the binary code format.

NG Reply (Reply to Request Message 1)



(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	2 (32h)	NG
(4)	**NG code**	2 bytes	01 (30h 31h) 02 (30h 32h) 04 (30h 34h)	Program capacity error Protect error CRC error
(5)	**BCC**	2 bytes	00 - 7F	Block check character
(6)	**Terminator**	1 byte	CR (0Dh)	Message end code

Note: NG reply never occurs in response to reply message 2.

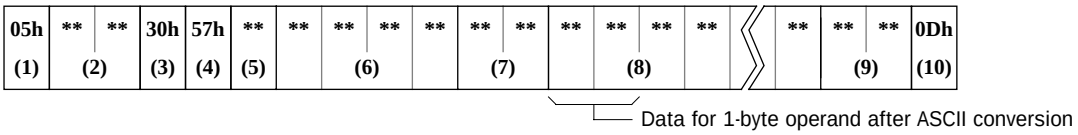
Write N Bytes

Data can be written into N-bytes of operands starting with the specified operand number in the PLC.

This command can be used to turn on or off bit operands such as inputs, outputs, internal relays, and shift register bits in units of 8 bits.

This command can also be used to change timer and counter preset values, enter data into data registers, and set calendar/clock data.

Request Message (Write N Bytes)



(1)	**Communication control character**	1 byte	ENQ (05h)	Enquiry
(2)	**Communication device number**	2 bytes	00 - 1F FF	Device number 0 through 31 Device number 255 (all devices)
(3)	**Continuation**	1 byte	0 (30h)	Discontinued
(4)	**Command**	1 byte	W (57h)	Write data
(5)	**Data type**	1 byte	See table below.	N-byte designation
(6)	**Operand number**	4 bytes	See table below.	First operand number to write to
(7)	**Data length (n)**	2 bytes	00 - C8	Byte count of data to write 200 (C8h) bytes maximum
(8)	**Data**	2n bytes 1 ≤ n ≤ 200	0 (30h) - 9 (39h) A (41h) - F (46h)	Data to write
(9)	**BCC**	2 bytes	00 - 7F	Block check character
(10)	**Terminator**	1 byte	CR (0Dh)	Message end code

(5) Data type code		**(6) Operand number** (Note)	**Remarks**
X (58h)	Input	0000 - 0307	The least significant digit of the operand number is an octal number (0-7). Upper digits are decimal numbers.
Y (59h)	Output	0000 - 0307	
M (4Dh)	Internal relay	0000 - 1277, 8000 - 8077	
R (52h)	Shift register	0000 - 0127	All four digits of the operand number are decimal numbers.
T (54h)	Timer (preset value)	0000 - 0099	
t (74h)	Timer (current value)	0000 - 0099	
C (43h)	Counter (preset value)	0000 - 0099	
c (63h)	Counter (current value)	0000 - 0099	
D (44h)	Data register	0000 - 1299, 2000 - 7999, 8000 - 8199	
W (57h)	Calendar/clock	0000 - 0006	

Note: The valid operand range depends on the CPU module type. For details, see page 48.

Operand numbers for calendar and clock are allocated as listed on the right:

When the range specified by the data type and data length is invalid, the PLC returns an NG reply.

When a data register is designated as a preset value for a timer or counter, data cannot be written into the preset value. To change the preset value, write data into the data register designated as a preset value.

Calendar/clock operand number	**Data**
0000	Year
0001	Month
0002	Day
0003	Day of week
0004	Hour
0005	Minute
0006	Second

Reply Messages (Write N Bytes)

OK Reply

06h	**	**	30h	**	**	0Dh
(1)	(2)		(3)	(4)		(5)

(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	0 (30h)	OK: Discontinued
(4)	**BCC**	2 bytes	00 - 7F	Block check character
(5)	**Terminator**	1 byte	CR (0Dh)	Message end code

NG Reply

06h	**	**	32h	30h	3*h	**	**	0Dh
(1)	(2)		(3)	(4)		(5)		(6)

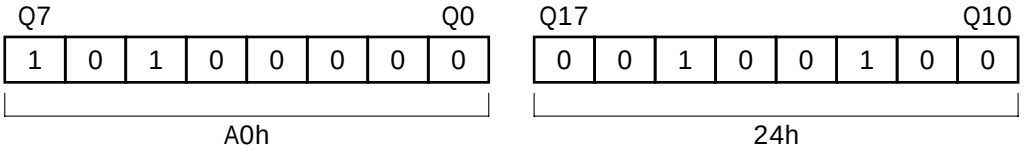
(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	2 (32h)	NG
(4)	**NG code**	2 bytes	06 (30h 36h) 07 (30h 37h) 08 (30h 38h)	Data range error Timer/counter preset value change error Calendar/clock data error
(5)	**BCC**	2 bytes	00 - 7F	Block check character
(6)	**Terminator**	1 byte	CR (0Dh)	Message end code

Data Format in the Request Message (Write N Bytes)

X (Input), Y (Output), M (Internal Relay), and R (Shift Register)

To write ON/OFF statuses of bit operands such as inputs, outputs, internal relays, or shift registers, divide the operand numbers into 8-bit (1-byte) groups, and convert the 8-bit value into a hexadecimal value. Then, convert the hexadecimal value into ASCII codes. Include the ASCII codes in place of “Data” in the request message.

Example: To write data to outputs Q0 through Q17 to set Q5, Q7, Q12, and Q15 and reset other outputs.



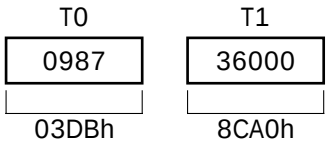
In this example, convert the hexadecimal value A024 into ASCII codes, and include the results (41h 30h 32h 34h) in the request message. Consequently, the data to send has a length of 4 bytes in the request message.

The data length to write in this example is 16 bits, or 2 (02h) bytes, of output points. So, include ASCII codes 30h 32h in place of “Data length” in the request message.

T (Timer Preset Value) and C (Counter Preset Value)

To write data into word operands such as timers and counters, convert the hexadecimal values into ASCII codes. Include the ASCII codes in place of “Data” in the request message.

Example: To write decimal 987 and 36000 to preset values for timers T0 and T1, respectively.



In this example, convert the decimal values into hexadecimal values and send data 03DB8CA0 (30h 33h 44h 42h 38h 43h 41h 30h).

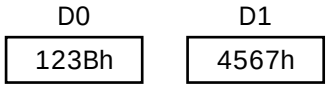
The data length of this example is 2 words, or 4 (04h) bytes. So, include ASCII codes 30h 34h in place of “Data length” in the request message.

Since the MicroSmart uses separate memory areas for timers and counters, timer and counter preset values are written into the specified operand number in different memory areas.

D (Data Register)

To write data into word operands of data registers, convert the hexadecimal values into ASCII codes. Include the ASCII codes in place of “Data” in the request message.

Example: To write 123Bh and 4567h to data registers D0 and D1, respectively.



In this example, send data 123B4567 (31h 32h 33h 42h 34h 35h 36h 37h).

The data length of this example is 2 words, or 4 (04h) bytes. So, include ASCII codes 30h 34h in place of “Data length” in the request message.

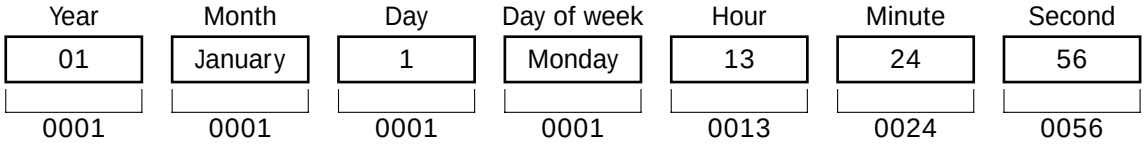
W (Calendar / Clock)

To send calendar/clock operands such as year, month, day, day of week, hour, minute, and second, write each one-word (2 bytes) data directly.

Day of week data format (0 through 6) is assigned as follows:

0	1	2	3	4	5	6
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday

Example: To send calendar/clock data Monday, January 1, 2001, 13 hour, 24 minutes, 56 seconds.



In this example, send data 00010001000100010001300240056 (30h 30h 30h 31h 30h 30h 30h 31h 30h 30h 30h 31h 30h 30h 30h 31h 30h 30h 31h 30h 30h 31h 33h 30h 30h 32h 34h 30h 30h 35h 36h).

The data length of this example is 7 words, or 14 (0Eh) bytes. So, include ASCII codes 30h 3Eh in place of “Data length” in the request message.

Read N Bytes

Data can be read from N-bytes of operands starting with the specified operand number in the PLC.

This command can be used to monitor the ON/OFF statuses of bit operands such as inputs, outputs, internal relays, and shift register bits in units of 8 bits.

This command can also be used to monitor preset and current values of timers and counters, data of data registers, and read calendar/clock data.

Request Message (Read N Bytes)

05h	**	**	30h	52h	**	**	**	**	**	**	**	**	**	0Dh
(1)	(2)		(3)	(4)	(5)		(6)			(7)		(8)		(9)

(1)	**Communication control character**	1 byte	ENQ (05h)	Enquiry
(2)	**Communication device number**	2 bytes	00 - 1F FF	Device number 0 through 31 Device number 255 (all devices)
(3)	**Continuation**	1 byte	0 (30h)	Discontinued
(4)	**Command**	1 byte	R (52h)	Read data
(5)	**Data type**	1 byte	See table below.	N-byte designation
(6)	**Operand number**	4 bytes	See table below.	First operand number to read
(7)	**Data length (n)**	2 bytes	00 - C8	Byte count of data to read 200 (C8h) bytes maximum
(8)	**BCC**	2 bytes	00 - 7F	Block check character
(9)	**Terminator**	1 byte	CR (0Dh)	Message end code

(5) Data type code		**(6) Operand number** (Note)	**Remarks**
X (58h)	Input	0000 - 0307	The least significant digit of the operand number is an octal number (0-7). Upper digits are decimal numbers.
Y (59h)	Output	0000 - 0307	
M (4Dh)	Internal relay	0000 - 1277, 8000 - 8157	
R (52h)	Shift register	0000 - 0127	All four digits of the operand number are decimal numbers.
T (54h)	Timer (preset value)	0000 - 0099	
t (74h)	Timer (current value)	0000 - 0099	
C (43h)	Counter (preset value)	0000 - 0099	
c (63h)	Counter (current value)	0000 - 0099	
D (44h)	Data register	0000 - 1299, 2000 - 7999, 8000 - 8199	
W (57h)	Calendar/clock	0000 - 0006	

Note: The valid operand range depends on the CPU module type. For details, see page 48.

Operand numbers for calendar and clock are allocated as listed on the right:

Calendar/clock operand number	Data
0000	Year
0001	Month
0002	Day
0003	Day of week
0004	Hour
0005	Minute
0006	Second

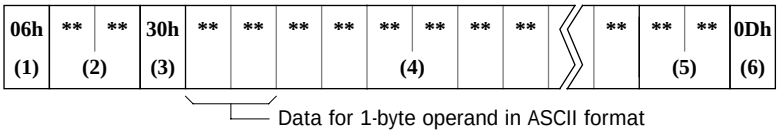
The internal relay memory area is divided into the ordinary internal relays and special internal relays. N-byte data cannot be read from the internal relay area continuing from the ordinary internal relays through special internal relays.

When the range specified by the data type and data length is invalid, the PLC returns an NG reply.

When a preset value is read from a timer or counter for which a data register is designated as a preset value, the preset value is returned as a reply, rather than the data register number.

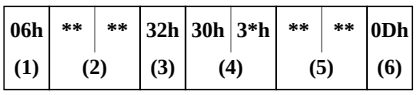
Reply Messages (Read N Bytes)

OK Reply



(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	0 (30h)	OK: Discontinued
(4)	**Data**	2n bytes 1 ≤ n ≤ 200	0 (30h) - 9 (39h) A (41h) - F (46h)	Read data
(5)	**BCC**	2 bytes	00 - 7F	Block check character
(6)	**Terminator**	1 byte	CR (0Dh)	Message end code

NG Reply



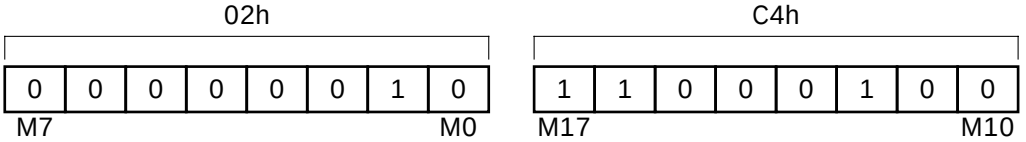
(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	2 (32h)	NG
(4)	**NG code**	2 bytes	06 (30h 36h) 08 (30h 38h)	Data range error Calendar/clock data error
(5)	**BCC**	2 bytes	00 - 7F	Block check character
(6)	**Terminator**	1 byte	CR (0Dh)	Message end code

Data Format in the Reply Message (Read N Bytes)

X (Input), Y (Output), M (Internal Relay), and R (Shift Register)

When reading ON/OFF statuses of bit operands such as inputs, outputs, internal relays, or shift registers, the received data shows the hexadecimal value of 8-bit groups.

Example: The read data is 02C4 (30h 32h 43h 34h) when reading 2 bytes starting with internal relay M0.

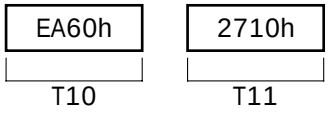


Divide the read data into one-byte (8-bit) groups. The bits where a 1 is stored are ON. In this example, internal relays M1, M12, M16, and M17 are on.

T (Timer Preset Value), t (Timer Current Value), C (Counter Preset Value), and c (Counter Current Value)

The Read N Bytes command can be used to read preset or current values of consecutive timers or counters. When reading timer/counter preset or current values, the received data show the hexadecimal values in four characters each.

Example: The read data is EA602710 (45h 41h 36h 30h 32h 37h 31h 30h) when reading 4 bytes of timer current values starting with timer T10.



Divide the received data into 4-character groups and convert the data into 4-digit hexadecimal values. In this example, the read data is shown below:

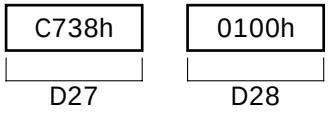
T10 = EA60h (60000 decimal)
T11 = 2710h (10000 decimal)

To read preset, current values, and timer status of timers, use the Read Timer Information command (see page 36).
To read preset, current values, and counter status of counter, use the Read Counter Information command (see page 38).

D (Data Register)

When reading data registers, the received data show the hexadecimal values in four characters each.

Example: The read data is C7380100 (43h 37h 33h 38h 30h 31h 30h 30h) when reading 4 bytes starting with data register D27.



Divide the received data into 4-character groups and convert the data into 4-digit hexadecimal values. In this example, the read data is shown below:

D27 = C738h (51000 decimal)
D28 = 100h (256 decimal)

W (Calendar / Clock)

Calendar/clock data are received in units of 2 bytes starting with the specified operand number 0000 (year) through 0006 (second). For operand numbers for the calendar and clock, see page 18.

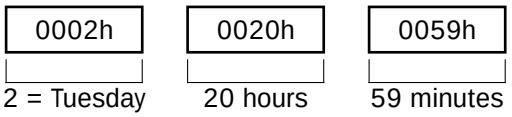
Day of week data format (0 through 6) is assigned as follows:

0	1	2	3	4	5	6
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday

Example: The read data is 000200200059 (30h 30h 30h 32h 30h 30h 32h 30h 30h 30h 35h 39h) when reading 6 bytes (3 words) starting with operand number 0003 (day of week) for reading calendar/clock values.

Divide the received data into 4-character groups and convert the data into 4-digit hexadecimal values.

Data of three operands starting with 0003 (day of week) is read as shown on the right.



Write 1 Bit

Data can be written into 1 bit of the specified operand in the PLC, enabling to set (ON) or reset (OFF) the operand.

The PLC operation can be started or stopped by setting or resetting start control special internal relay M8000 using this request message.

Request Message (Write 1 Bit)

05h	**	**	30h	57h	**	**	**	**	**	3*h	**	**	0Dh
(1)	(2)		(3)	(4)	(5)	(6)				(7)	(8)		(9)

(1)	**Communication control character**	1 byte	ENQ (05h)	Enquiry
(2)	**Communication device number**	2 bytes	00 - 1F FF	Device number 0 through 31 Device number 255 (all devices)
(3)	**Continuation**	1 byte	0 (30h)	Discontinued
(4)	**Command**	1 byte	W (57h)	Write data
(5)	**Data type**	1 byte	See table below.	1-bit designation
(6)	**Operand number**	4 bytes	See table below.	Operand number to write to
(7)	**ON / OFF status**	1 byte	0 (30h) 1 (31h)	OFF ON
(8)	**BCC**	2 bytes	00 - 7F	Block check character
(9)	**Terminator**	1 byte	CR (0Dh)	Message end code

(5) Data type code		**(6) Operand number** (Note)	**Remarks**
x (78h)	Input	0000 - 0307	The least significant digit of the operand number is an octal number (0-7). Upper digits are decimal numbers.
y (79h)	Output	0000 - 0307	
m (6Dh)	Internal relay	0000 - 1277, 8000 - 8077	
r (72h)	Shift register	0000 - 0127	All four digits of the operand number are decimal numbers.

Note: The valid operand range depends on the CPU module type. For details, see page 48.

Reply Messages (Write 1 Bit)

OK Reply

06h	**	**	30h	**	**	0Dh
(1)	(2)		(3)	(4)		(5)

(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	0 (30h)	OK: Discontinued
(4)	**BCC**	2 bytes	00 - 7F	Block check character
(5)	**Terminator**	1 byte	CR (0Dh)	Message end code

NG Reply

06h	**	**	32h	30h	36h	**	**	0Dh
(1)	(2)		(3)	(4)		(5)		(6)

(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	2 (32h)	NG
(4)	**NG code**	2 bytes	06 (30h 36h)	Data range error
(5)	**BCC**	2 bytes	00 - 7F	Block check character
(6)	**Terminator**	1 byte	CR (0Dh)	Message end code

Read 1 Bit

Data can be read from 1 bit of the specified operand in the PLC to see if the operand is on or off.

The read 1 bit command can be used to monitor the ON/OFF status of a bit operand such as input, output, internal relay, or shift register bit.

Request Message (Read 1 Bit)

05h	**	**	30h	52h	**	**	**	**	**	**	**	0Dh
(1)	(2)		(3)	(4)	(5)	(6)				(7)		(8)

(1)	**Communication control character**	1 byte	ENQ (05h)	Enquiry
(2)	**Communication device number**	2 bytes	00 - 1F FF	Device number 0 through 31 Device number 255 (all devices)
(3)	**Continuation**	1 byte	0 (30h)	Discontinued
(4)	**Command**	1 byte	R (52h)	Read data
(5)	**Data type**	1 byte	See table below.	1-bit designation
(6)	**Operand number**	4 bytes	See table below.	Operand number to read from
(7)	**BCC**	2 bytes	00 - 7F	Block check character
(8)	**Terminator**	1 byte	CR (0Dh)	Message end code

(5) Data type code		**(6) Operand number** (Note)	**Remarks**
x (78h)	Input	0000 - 0307	The least significant digit of the operand number is an octal number (0-7). Upper digits are decimal numbers.
y (79h)	Output	0000 - 0307	
m (6Dh)	Internal relay	0000 - 1277, 8000 - 8157	
r (72h)	Shift register	0000 - 0127	All four digits of the operand number are decimal numbers.

Note: The valid operand range depends on the CPU module type. For details, see page 48.

Reply Messages (Read 1 Bit)

OK Reply

06h	**	**	30h	3*h	**	**	0Dh
(1)	(2)		(3)	(4)	(5)		(6)

(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	0 (30h)	OK: Discontinued
(4)	**ON / OFF status**	1 byte	0 (30h) 1 (31h)	OFF ON
(5)	**BCC**	2 bytes	00 - 7F	Block check character
(6)	**Terminator**	1 byte	CR (0Dh)	Message end code

NG Reply

06h	**	**	32h	30h	36h	**	**	0Dh
(1)	(2)		(3)	(4)		(5)		(6)

(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	2 (32h)	NG
(4)	**NG code**	2 bytes	06 (30h 36h)	Data range error
(5)	**BCC**	2 bytes	00 - 7F	Block check character
(6)	**Terminator**	1 byte	CR (0Dh)	Message end code

Read Error Code

Error codes can be read from the PLC.

Request Message (Read Error Code)

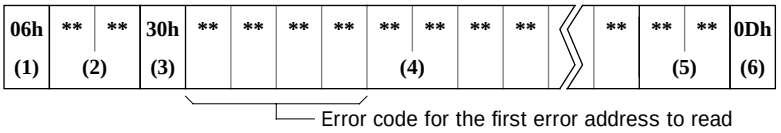
05h	**	**	30h	52h	45h	30h	30h	30h	3*h	30h	**	**	**	0Dh
(1)	(2)		(3)	(4)	(5)	(6)				(7)		(8)		(9)

(1)	**Communication control character**	1 byte	ENQ (05h)	Enquiry
(2)	**Communication device number**	2 bytes	00 - 1F FF	Device number 0 through 31 Device number 255 (all devices)
(3)	**Continuation**	1 byte	0 (30h)	Discontinued
(4)	**Command**	1 byte	R (52h)	Read data
(5)	**Data type**	1 byte	E (45h)	Error code
(6)	**Error address**	4 bytes	See table below.	First error address to read
(7)	**Data length (n)**	2 bytes	02 - 0C	2 bytes per error address 12 (0Ch) bytes maximum
(8)	**BCC**	2 bytes	00 - 7F	Block check character
(9)	**Terminator**	1 byte	CR (0Dh)	Message end code

(6) Error address	Error details
0000	General error code
0001	User program syntax error: Type code
0002	User program syntax error: Address code
0003	Advanced instruction syntax error
0004	User program execution error
0005	Link communication error

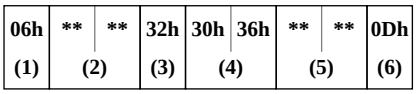
Reply Messages (Read Error Code)

OK Reply



(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	0 (30h)	OK: Discontinued
(4)	**Data**	4n bytes (1 ≤ n ≤ 6)	0 (30h) - 9 (39h) A (41h) - F (46h)	Error code (4 bytes per error address)
(5)	**BCC**	2 bytes	00 - 7F	Block check character
(6)	**Terminator**	1 byte	CR (0Dh)	Message end code

NG Reply



(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	2 (32h)	NG
(4)	**NG code**	2 bytes	06 (30h 36h)	Data range error (error address)
(5)	**BCC**	2 bytes	00 - 7F	Block check character
(6)	**Terminator**	1 byte	CR (0Dh)	Message end code

Data Format in the Reply Message (Read Error Code)

When reading error codes, the received data show the hexadecimal values in four characters each.

Example: The read data is 0080 0000 0000 0000 0000 0000 when reading 12 (0Ch) bytes starting with error address 0000.

Divide the received data into 4-character groups and convert the data into 4-digit hexadecimal values.

Error address:	0000	0001	0002	0003	0004	0005
	0080h	0000h	0000h	0000h	0000h	0000h

In this example, the read data is shown below:

0000	General error code	80h
0001	User program syntax error: Type code	0h
0002	User program syntax error: Address code	0h
0003	Advanced instruction syntax error code	0h
0004	User program execution error code	0h
0005	Data link communication error code	0h

The above data means that user program syntax error (error code 80h) is found.

Since user program syntax errors and advanced instruction syntax errors never occur, the reply message contains 0 at error addresses 0001 through 0003.

For details of error codes, see the next page.

Error Codes

General Error Code

Error Code	Bit Position	Error Status
1h	bit 0	Power failure
2h	bit 1	Watch dog timer error
4h	bit 2	Data link connection error
8h	bit 3	User program EEPROM sum check error
10h	bit 4	Timer/counter preset value sum check error
20h	bit 5	User program RAM sum check error
40h	bit 6	Keep data error
80h	bit 7	User program syntax error
100h	bit 8	User program writing error
200h	bit 9	CPU module error
400h	bit 10	Clock IC error
800h	bit 11	Unused
1000h	bit 12	Unused
2000h	bit 13	I/O bus initialize error
4000h	bit 14	Unused
8000h	bit 15	Unused

User Program Execution Error Code — Special internal relay M8004 goes on

This error indicates that invalid data is found during execution of a user program. When this error occurs, special internal relay M8004 (user program execution error) is also turned on. The detailed information of this error can be viewed at this error address. When this error occurs, program operation and all output statuses are maintained.

User Program Execution Error Code (D8006)	Error Details
1	Source/destination operand is out of range
2	MUL result is out of data type range.
3	DIV result is out of data type range, or division by 0.
4	BCDLS has S1 or S1+1 exceeding 9999.
5	HTOB(W) has S1 exceeding 9999.
6	BTOH has any digit of S1 exceeding 9.
7	HTOA/ATOH/BTOA/ATOB has quantity of digits to convert out of range.
8	ATOH/ATOB has non-ASCII data for S1 through S1+4.
9	WKTIM has S1, S2, and S3 exceeding the valid range. S1: 0 through 127 S2/S3: Hour data 0 through 23, minute data 0 through 59 S2/S3 can be 10000.
10	WKTBL has S1 through Sn out of range. Month: 01 through 12 Day: 01 through 31
11	DGRD data exceeds 65535 with BCD5 digits selected.
12	CVXTY/CVYTX is executed without matching XYFS.
13	CVXTY/CVYTX has S2 exceeding the value specified in XYFS.
14	Label in LJMP/LCAL is not found.

User Program Execution Error Code (D8006)	Error Details
15	TXD/RXD is executed while the RS232C port 1 or 2 is *not* set to user communication mode.
16	PID instruction execution error.
17	Preset value is written to a timer or counter whose preset value is designated with a data register.
18	Attempt was made to execute an instruction that cannot be used in an interrupt program: SOTU, SOTD, TML, TIM, TMH, TMS, CNT, CDP, CUD, SFR, SFRN, WKTIM, WKTBL, DISP, DGRD, TXD1, TXD2, RXD1, RXD2, DI, EI, XYFS, CVXTY, CVYTX, PULS1, PULS2, PWM1, PWM2, RAMP, ZRN1, ZRN2, PID, DTML, DTIM, DTMH, DTMS, and TTIM.
19	Attempt was made to execute an instruction that is not available for the PLC.
20	PULS1, PULS2, PWM1, PWM2, RAMP, ZRN1, or ZRN2 has an invalid value in control registers.
21	DECO has S1 exceeding 255.
22	BCNT has S2 exceeding 256.
23	ICMP>= has S1 < S3.
24	Interrupt program execution time exceeds 670 µsec when using a timer interrupt
25	BCDLS has S2 exceeding 7.
26	DI or EI is executed when interrupt input or timer interrupt is not programmed in the Function Area Settings.
27	Work area is broken when using DTML, DTIM, DTMH, DTMS, or TTIM.

Data Link Communication Error Code — Special internal relay M8005 goes on

This error indicates a communication error in the data link system. When this error occurs, special internal relay M8005 (data link communication error) is also turned on. The detailed information of this error can be viewed at this error address. When this error occurs, program operation and all output statuses are maintained.

Error Code	Bit Position	Error Details
1h	bit 0	Overrun error (data is received when the receive data registers are full)
2h	bit 1	Framing error (failure to detect start or stop bit)
4h	bit 2	Parity error (an error was found by the parity check)
8h	bit 3	Receive timeout (line disconnection)
10h	bit 4	BCC (block check character) error (disparity with data received up to BCC)
20h	bit 5	Retry cycle over (error occurred in all 3 trials of communication)
40h	bit 6	I/O definition quantity error (discrepancy of transmit/receive station number or data quantity)

When more than one error is detected in the data link system, the total of error codes is indicated. For example, when framing error (error code 2h) and BCC error (error code 10h) are found, error code 12h (18) is displayed.

Clear Operand Data

All data of selected operand area or all operands can be cleared from the PLC.

Request Message (Clear Operand Data)

05h	**	**	30h	43h	**	**	**	0Dh
(1)	(2)		(3)	(4)	(5)	(6)		(7)

(1)	**Communication control character**	1 byte	ENQ (05h)	Enquiry
(2)	**Communication device number**	2 bytes	00 - 1F FF	Device number 0 through 31 Device number 255 (all devices)
(3)	**Continuation**	1 byte	0 (30h)	Discontinued
(4)	**Command**	1 byte	C (43h)	Clear data
(5)	**Data type**	1 byte	See table below.	
(6)	**BCC**	2 bytes	00 - 7F	Block check character
(7)	**Terminator**	1 byte	CR (0Dh)	Message end code

(5) Data type	Data to clear	(5) Data type	Data to clear
X (58h)	Input	**C (43h)**	Counter (preset value)
Y (59h)	Output	**c (63h)**	Counter (current value)
M (4Dh)	Internal relay	**D (44h)**	Data register
R (52h)	Shift register	**E (45h)**	Error code
T (54h)	Timer (preset value)	**Z (5Ah)**	System reset (all operands)
t (74h)	Timer (current value)	**I (49h)**	Link formatting sequence

When the timer preset value (T) or counter preset value (C) is cleared, the changed preset values in the CPU module RAM are cleared and the original preset values are restored.

When the system reset is executed with Z (5Ah) specified for “Data type” in the request message, data is cleared from all operand areas of inputs (X), outputs (Y), internal relays (M), shift registers (R), timer current values (t), counter current values (c) and, data registers (D).

When the link formatting sequence (I) is executed, the data link terminal connection data is updated. This function is the same as turning on special internal relay M8007 (data link communication initialize flag).

Reply Messages (Clear Operand Data)

OK Reply

06h	**	**	30h	**	**	0Dh
(1)	(2)		(3)	(4)		(5)

(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	0 (30h)	OK: Discontinued
(4)	**BCC**	2 bytes	00 - 7F	Block check character
(5)	**Terminator**	1 byte	CR (0Dh)	Message end code

NG Reply

06h	**	**	32h	30h	39h	**	**	0Dh
(1)	(2)		(3)	(4)		(5)		(6)

(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	2 (32h)	NG
(4)	**NG code**	2 bytes	09 (30h 39h)	Data clear error
(5)	**BCC**	2 bytes	00 - 7F	Block check character
(6)	**Terminator**	1 byte	CR (0Dh)	Message end code

Enable / Disable User Program Protection

The user program in the CPU module can be protected from reading, writing, or both using the Function Area Settings in WindLDR. To enable user program protection, access the Protect User Program option in the Function Area Settings, select Write Protected, Read Protected, or Read/Write Protected, enter a password, and download the user program from the PC to the CPU module. Then, the user program in the CPU module is protected from reading, writing, or both depending on the selection in the Function Area Settings.

The user program protection can also be temporarily canceled using a communication command. To disable the user protection, send this command including the correct protect code (password entered in the Function Area Settings) and protect option 0 (disable protection) to the CPU module. The user program protection is disabled until the CPU module is shut down or the user program protection is enabled again by sending this communication command including protect option 1 (enable protection).

Request Message (Enable / Disable User Program Protection)

05h	**	**	30h	57h	56h	**	**	**	**	**	**	**	**	3*h	**	**	0Dh
(1)	(2)		(3)	(4)	(5)				(6)					(7)	(8)		(9)

(1)	**Communication control character**	1 byte	ENQ (05h)	Enquiry
(2)	**Communication device number**	2 bytes	00 - 1F FF	Device number 0 through 31 Device number 255 (all devices)
(3)	**Continuation**	1 byte	0 (30h)	Discontinued
(4)	**Command**	1 byte	W (57h)	Write data
(5)	**Data type**	1 byte	V (56h)	User program protection
(6)	**Protect code**	8 bytes	0000 0000 to FFFF FFFF	Password designated in the Function Area Settings.
(7)	**Protect option**	1 bytes	0 (30h) 1 (31h)	Disable protection Enable protection
(8)	**BCC**	2 bytes	00 - 7F	Block check character
(9)	**Terminator**	1 byte	CR (0Dh)	Message end code

(6) Protect code

The protect code consists of 8 ASCII characters (20h through 7Fh). Enter 8 characters without conversion. When the password is less than 8 characters long, fill the empty places with 00h so that the protect code consists of 8 bytes.

(7) Protect option

Protect option 0 (disable protection): When the protect code in the request message matches that set in the CPU module, the user program protection is disabled temporarily.

Protect option 1 (enable protection): When the protect code in the request message matches that set in the CPU module, the user program protection is restored. The protect mode of read, write, or read/write protect depends on the selection in the Function Area Settings of the user program.

Unlike the MICRO^3 and MICRO^{3}C, this request command is primarily used for the MicroSmart to disable the user program protection temporarily when the user program is protected by the Function Area Settings. In addition, this request command can also be used to restore the user program protection which has been disabled temporarily by this request command. Note that this request command cannot be used for the MicroSmart to protect a user program which is not protected by the Function Area Settings.

Reply Messages (Enable / Disable User Program Protection)

OK Reply

06h	**	**	30h	**	**	0Dh
(1)	(2)		(3)	(4)		(5)

(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	0 (30h)	OK: Discontinued
(4)	**BCC**	2 bytes	00 - 7F	Block check character
(5)	**Terminator**	1 byte	CR (0Dh)	Message end code

NG Reply

06h	**	**	32h	30h	35h	**	**	0Dh
(1)	(2)		(3)	(4)		(5)		(6)

(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	2 (32h)	NG
(4)	**NG code**	2 bytes	05 (30h 35h)	Protect code error
(5)	**BCC**	2 bytes	00 - 7F	Block check character
(6)	**Terminator**	1 byte	CR (0Dh)	Message end code

(4) NG code

Protect code error: The protect code in the request message does not match the password set in the CPU module. Attempt was made to enable protection on a protected user program.

Read PLC Operating Status

This command reads the operating status of the CPU module to the computer. When this command is executed, the received data also indicates whether the timer/counter preset values have been changed, whether the user program in the CPU module is protected, and the type of the CPU module.

Request Message (Read PLC Operating Status)

05h	**	**	30h	52h	53h	**	**	0Dh
(1)	(2)		(3)	(4)	(5)	(6)		(7)

(1)	**Communication control character**	1 byte	ENQ (05h)	Enquiry
(2)	**Communication device number**	2 bytes	00 - 1F FF	Device number 0 through 31 Device number 255 (all devices)
(3)	**Continuation**	1 byte	0 (30h)	Discontinued
(4)	**Command**	1 byte	R (52h)	Read data
(5)	**Data type**	1 byte	S (53h)	PLC operating status
(6)	**BCC**	2 bytes	00 - 7F	Block check character
(7)	**Terminator**	1 byte	CR (0Dh)	Message end code

Reply Message (Read PLC Operating Status)

OK Reply

06h	**	**	30h	3*h	3*h	3*h	3*h	**	**	**	**	**	**	**	**	**	**	**	**	**	0Dh
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)				(9)								(10)	(11)

(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	0 (30h)	OK: Discontinued
(4)	**PLC operating status**	1 byte	0 (30h) 1 (31h)	Run Stop
(5)	**Timer / counter preset value change**	1 byte	0 (30h) 1 (31h)	Not changed Changed
(6)	**User program protection**	1 byte	0 (30h) 1 (31h) 2 (32h) 3 (33h)	Not protected Write protect Read protect Read and write protect
(7)	**CPU module type code**	1 byte	0 (30h) 1 (31h) 2 (32h) 3 (33h) 4 (34h) 6 (36h)	10-I/O 16-I/O 20-I/O transistor output 24-I/O 40-I/O 20-I/O relay output
(8)	**CRC code**	4 bytes	0000 - FFFF	CRC code 0000 through FFFF
(9)	**Sum check code**	32 bytes		2 bytes × 16 blocks
(10)	**BCC**	2 bytes	00 - 7F	Block check character
(11)	**Terminator**	1 byte	CR (0Dh)	Message end code

NG Reply

NG reply never occurs in response to the request message of reading the PLC operating status.

Read Scan Time

The scan time of the user program in operation can be read from the CPU module. When this command is executed, the received data indicates the current and maximum values of the user program scan time.

Request Message (Read Scan Time)

05h	**	**	30h	52h	4Bh	**	**	0Dh
(1)	(2)		(3)	(4)	(5)	(6)		(7)

(1)	**Communication control character**	1 byte	ENQ (05h)	Enquiry
(2)	**Communication device number**	2 bytes	00 - 1F FF	Device number 0 through 31 Device number 255 (all devices)
(3)	**Continuation**	1 byte	0 (30h)	Discontinued
(4)	**Command**	1 byte	R (52h)	Read data
(5)	**Data type**	1 byte	K (4Bh)	Scan time
(6)	**BCC**	2 bytes	00 - 7F	Block check character
(7)	**Terminator**	1 byte	CR (0Dh)	Message end code

Reply Message (Read Scan Time)

OK Reply

06h	**	**	30h	**	**	**	**	**	**	**	**	**	**	0Dh
(1)	(2)		(3)		(4)				(5)				(6)	(7)

(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	0 (30h)	OK: Discontinued
(4)	**Scan time (current value)**	4 bytes	0000 - FFFF	Current value of the scan time
(5)	**Scan time (maximum value)**	4 bytes	0000 - FFFF	Maximum value of the scan time
(6)	**BCC**	2 bytes	00 - 7F	Block check character
(7)	**Terminator**	1 byte	CR (0Dh)	Message end code

(4) and (5) Data Format in the Reply Message (Read Scan Time)

The current and maximum values of the scan time are presented in the hexadecimal notation and read in units of msec.

Example: The read data is 002A when reading the scan time.

In this example, the scan time reads $2 \times 16 + 10 = 42$ msec in the decimal notation.

NG Reply

NG reply never occurs in response to the request message of reading the scan time.

Read PLC System Program Version

The system program version of the CPU module can be read to the computer.

Request Message (Read PLC System Program Version)

05h	**	**	30h	52h	4Eh	**	**	0Dh
(1)	(2)		(3)	(4)	(5)	(6)		(7)

(1)	**Communication control character**	1 byte	ENQ (05h)	Enquiry
(2)	**Communication device number**	2 bytes	00 - 1F FF	Device number 0 through 31 Device number 255 (all devices)
(3)	**Continuation**	1 byte	0 (30h)	Discontinued
(4)	**Command**	1 byte	R (52h)	Read data
(5)	**Data type**	1 byte	N (4Eh)	PLC system program version
(6)	**BCC**	2 bytes	00 - 7F	Block check character
(7)	**Terminator**	1 byte	CR (0Dh)	Message end code

Reply Message (Read PLC System Program Version)

OK Reply

06h	**	**	30h	**	**	**	**	**	**	0Dh
(1)	(2)		(3)		(4)			(5)		(6)

(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	0 (30h)	OK: Discontinued
(4)	**PLC system program version**	4 bytes	0000 - FFFF	System program version of the PLC
(5)	**BCC**	2 bytes	00 - 7F	Block check character
(6)	**Terminator**	1 byte	CR (0Dh)	Message end code

NG Reply

NG reply never occurs in response to the request message of reading the PLC system program version.

Data Format in the Reply Message (Read PLC System Program Version)

The PLC system program version is the decimal equivalent of the hexadecimal reply data.

Example: The read data is 000A when reading the PLC system program version.

The PLC program version is 10 in the decimal notation.

Read Timer Information

Since the MicroSmart has a timer preset range of 0 through 65535, the MSB of the timer current value data read using the Read N Byte command for the MICRO^3 cannot be used for timeout status flag. Consequently the timeout status information must be prepared by the system program separately. The MicroSmart has a new data type to implement a command to read timer current value, preset value, timeout status, and preset value change status.

When a preset value is read from a timer for which a data register is designated as a preset value, the data register number is returned as a reply, rather than the preset value.

This command can read data from 48 timers at the maximum.

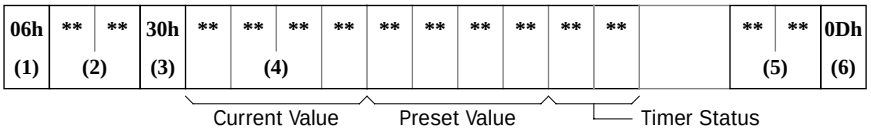
Request Message (Read Timer Information)

05h	**	**	30h	52h	5Fh	**	**	**	**	**	**	**	**	0Dh
(1)	(2)		(3)	(4)	(5)	(6)				(7)		(8)		(9)

(1)	**Communication control character**	1 byte	ENQ (05h)	Enquiry
(2)	**Communication device number**	2 bytes	00 - 1F FF	Device number 0 through 31 Device number 255 (all devices)
(3)	**Continuation**	1 byte	0 (30h)	Discontinued
(4)	**Command**	1 byte	R (52h)	Read data
(5)	**Data type**	1 byte	_ (5Fh)	Timer information
(6)	**First timer number**	4 bytes	0000 - 0099	First timer number to start reading
(7)	**Quantity of timers (n)**	2 bytes	01 - 30	Read information from 1 to 48 (30h) timers
(8)	**BCC**	2 bytes	00 - 7F	Block check character
(9)	**Terminator**	1 byte	CR (0Dh)	Message end code

Reply Messages (Read Timer Information)

OK Reply

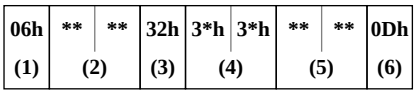


(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	0 (30h)	OK: Discontinued
(4)	**Data**	10n bytes (1 ≤ n ≤ 48)	0000 - FFFF 0000 - FFFF 00 - FF	Current value (4 bytes) Preset value (4 bytes) Timer status (2 bytes)
(5)	**BCC**	2 bytes	00 - 7F	Block check character
(6)	**Terminator**	1 byte	CR (0Dh)	Message end code

(4) Data — Timer Status

bit 7	Specified timer number programmed	0: Not programmed 1: Programmed
bit 6	Preset value designation	0: Constant 1: Data register
bit 5	Preset value change	0: Changed 1: Not changed
bits 4 and 3	Time base	00: 1 msec 10: 10 msec 01: 100 msec 11: 1 sec
bit 2	Unused	—
bit 1	Execution cycle	0: Subsequent timer cycle 1: First timer cycle
bit 0	Timeout status	0: Not timeout 1: Timeout

NG Reply



(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	2 (32h)	NG
(4)	**NG code**	2 bytes	06 (30h 36h) 10 (31h 30h)	Data range error Data error
(5)	**BCC**	2 bytes	00 - 7F	Block check character
(6)	**Terminator**	1 byte	CR (0Dh)	Message end code

Read Counter Information

Since the MicroSmart has a counter preset range of 0 through 65535, the MSB of the counter current value data read using the Read N Byte command for the MICRO^3 cannot be used for countout status flag. Consequently the countout status information must be prepared by the system program separately. The MicroSmart has a new data type to implement a command to read counter current value, preset value, countout status, and preset value change status.

When a preset value is read from a counter for which a data register is designated as a preset value, the data register number is returned as a reply, rather than the preset value.

This command can read data from 48 counters at the maximum.

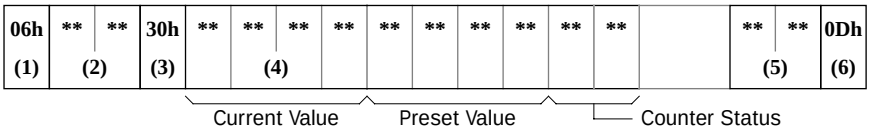
Request Message (Read Counter Information)

05h	**	**	30h	52h	60h	**	**	**	**	**	**	**	**	0Dh
(1)	(2)		(3)	(4)	(5)		(6)			(7)		(8)		(9)

(1)	**Communication control character**	1 byte	ENQ (05h)	Enquiry
(2)	**Communication device number**	2 bytes	00 - 1F FF	Device number 0 through 31 Device number 255 (all devices)
(3)	**Continuation**	1 byte	0 (30h)	Discontinued
(4)	**Command**	1 byte	R (52h)	Read data
(5)	**Data type**	1 byte	` (60h)	Counter information
(6)	**First counter number**	4 bytes	0000 - 0099	First counter number to start reading
(7)	**Quantity of counters (n)**	2 bytes	01 - 30	Read information from 1 to 48 (30h) counters
(8)	**BCC**	2 bytes	00 - 7F	Block check character
(9)	**Terminator**	1 byte	CR (0Dh)	Message end code

Reply Messages (Read Counter Information)

OK Reply

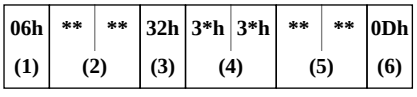


(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	0 (30h)	OK: Discontinued
(4)	**Data**	10n bytes (1 ≤ n ≤ 48)	0000 - FFFF 0000 - FFFF 00 - FF	Current value (4 bytes) Preset value (4 bytes) Counter status (2 bytes)
(5)	**BCC**	2 bytes	00 - 7F	Block check character
(6)	**Terminator**	1 byte	CR (0Dh)	Message end code

(4) Data — Counter Status

bit 7	Specified counter number programmed	0: Not programmed 1: Programmed
bit 6	Preset value designation	0: Constant 1: Data register
bit 5	Preset value change	0: Changed 1: Not changed
bits 4 and 3	Counter type	00: Adding 10: Up/down selection reversible 01: Dual pulse reversible
bit 2	—	—
bit 1	—	—
bit 0	Countout status	0: Not countout 1: Countout

NG Reply



(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	2 (32h)	NG
(4)	**NG code**	2 bytes	06 (30h 36h) 10 (31h 30h)	Data range error Data error
(5)	**BCC**	2 bytes	00 - 7F	Block check character
(6)	**Terminator**	1 byte	CR (0Dh)	Message end code

Read Timer Preset Value Change Status

This command is used to check at once if preset values of all timers are changed or not.

The all-in-one 10-I/O type CPU module has 32 timers, and all other CPU modules have 100 timers.

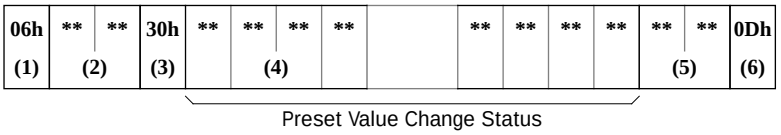
Request Message (Read Timer Preset Value Change Status)

05h	**	**	30h	52h	61h	**	**	0Dh
(1)	(2)		(3)	(4)	(5)	(6)		(7)

(1)	**Communication control character**	1 byte	ENQ (05h)	Enquiry
(2)	**Communication device number**	2 bytes	00 - 1F FF	Device number 0 through 31 Device number 255 (all devices)
(3)	**Continuation**	1 byte	0 (30h)	Discontinued
(4)	**Command**	1 byte	R (52h)	Read data
(5)	**Data type**	1 byte	a (61h)	Timer preset value change status
(6)	**BCC**	2 bytes	00 - 7F	Block check character
(7)	**Terminator**	1 byte	CR (0Dh)	Message end code

Reply Messages (Read Timer Preset Value Change Status)

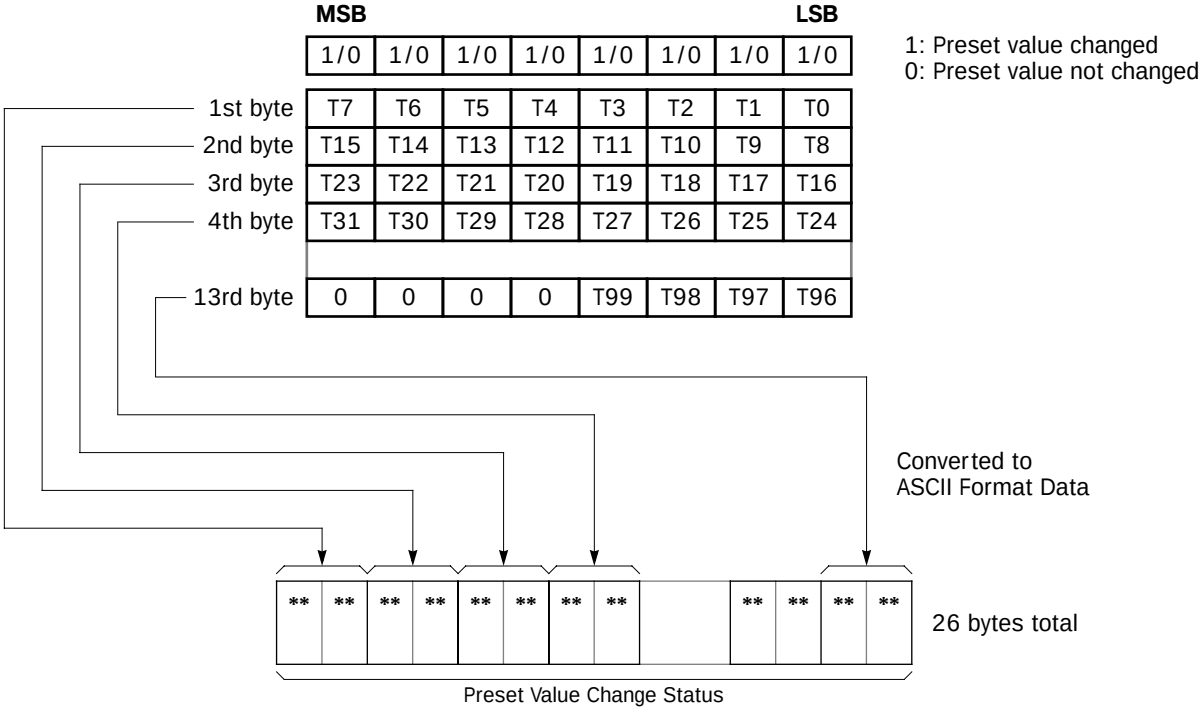
OK Reply



(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	0 (30h)	OK: Discontinued
(4)	**Data**	26 bytes	0 (30h) - 9 (39h) A (41h) - F (46h)	Preset value change status of all 100 timers
(5)	**BCC**	2 bytes	00 - 7F	Block check character
(6)	**Terminator**	1 byte	CR (0Dh)	Message end code

(4) Data — Preset Value Change Status

In the 26 bytes of data, the statuses of 100 timers are allocated as shown below:



NG Reply

NG reply never occurs in response to the request message of reading the timer preset value change status.

Read Counter Preset Value Change Status

This command is used to check at once if preset values of all counters are changed or not.

The all-in-one 10-I/O type CPU module has 32 counters, and all other CPU modules have 100 counters.

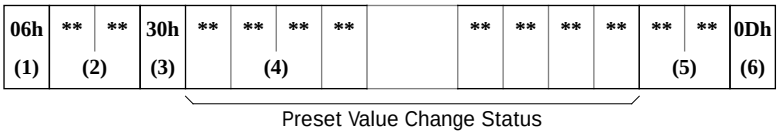
Request Message (Read Counter Preset Value Change Status)

05h	**	**	30h	52h	62h	**	**	0Dh
(1)	(2)		(3)	(4)	(5)	(6)		(7)

(1)	**Communication control character**	1 byte	ENQ (05h)	Enquiry
(2)	**Communication device number**	2 bytes	00 - 1F FF	Device number 0 through 31 Device number 255 (all devices)
(3)	**Continuation**	1 byte	0 (30h)	Discontinued
(4)	**Command**	1 byte	R (52h)	Read data
(5)	**Data type**	1 byte	b (62h)	Counter preset value change status
(6)	**BCC**	2 bytes	00 - 7F	Block check character
(7)	**Terminator**	1 byte	CR (0Dh)	Message end code

Reply Messages (Read Counter Preset Value Change Status)

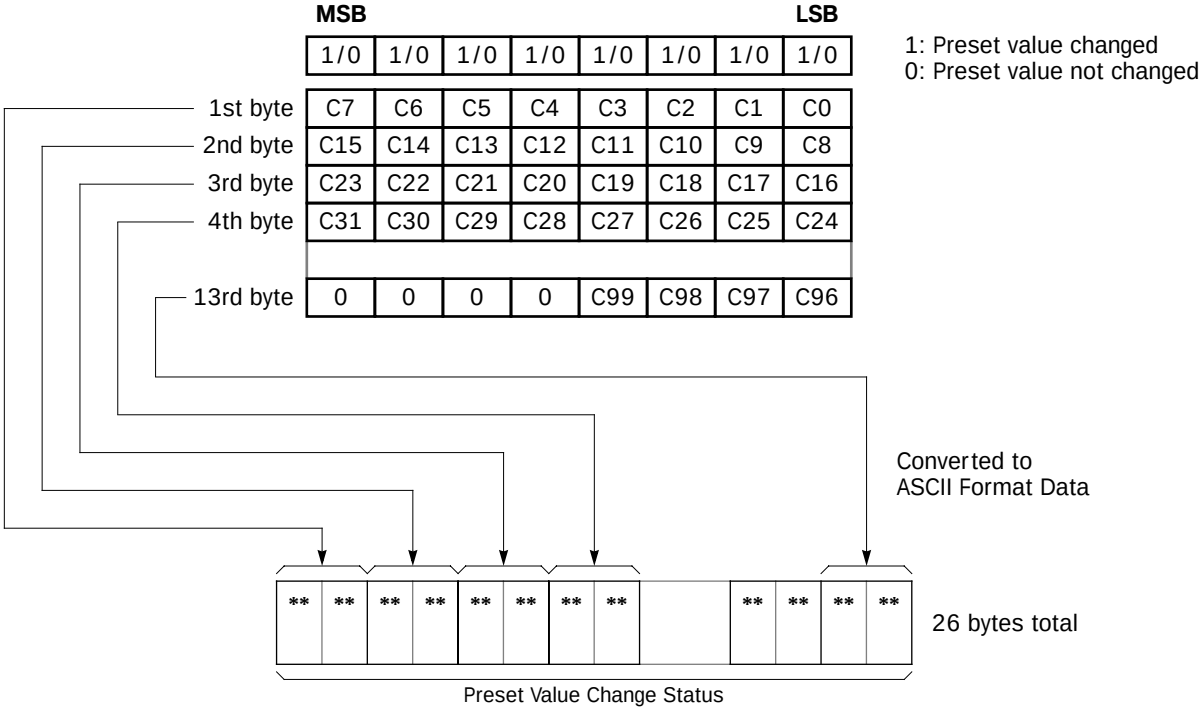
OK Reply



(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	0 (30h)	OK: Discontinued
(4)	**Data**	26 bytes	0 (30h) - 9 (39h) A (41h) - F (46h)	Preset value change status of all 100 counters
(5)	**BCC**	2 bytes	00 - 7F	Block check character
(6)	**Terminator**	1 byte	CR (0Dh)	Message end code

(4) Data — Preset Value Change Status

In the 26 bytes of data, the statuses of 100 counters are allocated as shown below:



NG Reply

NG reply never occurs in response to the request message of reading the counter preset value change status.

Read Timeout Status

Data can be read from 1 bit of the specified timer operand in the PLC to see if the operand is on or off.

The read timeout status command can be used to monitor whether a specified timer is timed out or not.

Request Message (Read 1 Bit)

05h	**	**	30h	52h	64h	30h	30h	3*h	3*h	**	**	0Dh
(1)	(2)		(3)	(4)	(5)		(6)			(7)		(8)

(1)	**Communication control character**	1 byte	ENQ (05h)	Enquiry
(2)	**Communication device number**	2 bytes	00 - 1F FF	Device number 0 through 31 Device number 255 (all devices)
(3)	**Continuation**	1 byte	0 (30h)	Discontinued
(4)	**Command**	1 byte	R (52h)	Read data
(5)	**Data type**	1 byte	d (64h)	Timer timeout status
(6)	**Operand number**	4 bytes	0000 - 0099 (Note)	Timer number to read from
(7)	**BCC**	2 bytes	00 - 7F	Block check character
(8)	**Terminator**	1 byte	CR (0Dh)	Message end code

Note: The all-in-one 10-I/O type CPU module has 32 timers, and all other CPU modules have 100 timers.

Reply Messages (Read 1 Bit)

OK Reply

06h	**	**	30h	3*h	**	**	0Dh
(1)	(2)		(3)	(4)	(5)		(6)

(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	0 (30h)	OK: Discontinued
(4)	**ON/OFF status**	1 byte	0 (30h) 1 (31h)	OFF ON (timeout)
(5)	**BCC**	2 bytes	00 - 7F	Block check character
(6)	**Terminator**	1 byte	CR (0Dh)	Message end code

NG Reply

06h	**	**	32h	30h	36h	**	**	0Dh
(1)	(2)		(3)	(4)		(5)		(6)

(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	2 (32h)	NG
(4)	**NG code**	2 bytes	06 (30h 36h)	Data range error
(5)	**BCC**	2 bytes	00 - 7F	Block check character
(6)	**Terminator**	1 byte	CR (0Dh)	Message end code

Read Countout Status

Data can be read from 1 bit of the specified counter operand in the PLC to see if the operand is on or off.

The read countout status command can be used to monitor whether a specified counter is counted out or not.

Request Message (Read 1 Bit)

05h	**	**	30h	52h	65h	30h	30h	3*h	3*h	**	**	0Dh
(1)	(2)		(3)	(4)	(5)	(6)				(7)		(8)

(1)	**Communication control character**	1 byte	ENQ (05h)	Enquiry
(2)	**Communication device number**	2 bytes	00 - 1F FF	Device number 0 through 31 Device number 255 (all devices)
(3)	**Continuation**	1 byte	0 (30h)	Discontinued
(4)	**Command**	1 byte	R (52h)	Read data
(5)	**Data type**	1 byte	e (65h)	Counter countout status
(6)	**Operand number**	4 bytes	0000 - 0099 (Note)	Counter number to read from
(7)	**BCC**	2 bytes	00 - 7F	Block check character
(8)	**Terminator**	1 byte	CR (0Dh)	Message end code

Note: The all-in-one 10-I/O type CPU module has 32 counters, and all other CPU modules have 100 counters.

Reply Messages (Read 1 Bit)

OK Reply

06h	**	**	30h	3*h	**	**	0Dh
(1)	(2)		(3)	(4)	(5)		(6)

(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	0 (30h)	OK: Discontinued
(4)	**ON/OFF status**	1 byte	0 (30h) 1 (31h)	OFF ON (countout)
(5)	**BCC**	2 bytes	00 - 7F	Block check character
(6)	**Terminator**	1 byte	CR (0Dh)	Message end code

NG Reply

06h	**	**	32h	30h	36h	**	**	0Dh
(1)	(2)		(3)	(4)		(5)		(6)

(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	2 (32h)	NG
(4)	**NG code**	2 bytes	06 (30h 36h)	Data range error
(5)	**BCC**	2 bytes	00 - 7F	Block check character
(6)	**Terminator**	1 byte	CR (0Dh)	Message end code

Confirm Changed Timer / Counter Preset Values

This command writes changed preset values for timers and counters from the RAM to the EEPROM in the CPU module.

Request Message (Confirm Changed Timer / Counter Preset Values)

05h	**	**	30h	57h	51h	30h	30h	30h	30h	30h	32h	30h	30h	**	**	0Dh
(1)	(2)		(3)	(4)	(5)	(6)				(7)		(8)		(9)		(10)

(1)	**Communication control character**	1 byte	ENQ (05h)	Enquiry
(2)	**Communication device number**	2 bytes	00 - 1F FF	Device number 0 through 31 Device number 255 (all devices)
(3)	**Continuation**	1 byte	0 (30h)	Discontinued
(4)	**Command**	1 byte	W (57h)	Write data
(5)	**Data type**	1 byte	Q (51h)	Changed timer / counter preset values
(6)	**Operand number**	4 bytes	0000	0000 (fixed)
(7)	**Data length**	2 bytes	02	02 (fixed)
(8)	**Data**	2 bytes	00	00 (fixed)
(9)	**BCC**	2 bytes	00 - 7F	Block check character
(10)	**Terminator**	1 byte	CR (0Dh)	Message end code

Reply Message (Confirm Changed Timer / Counter Preset Values)

OK Reply

06h	**	**	30h	**	**	0Dh
(1)	(2)		(3)	(4)		(5)

(1)	**Communication control character**	1 byte	ACK (06h)	Acknowledge
(2)	**Communication device number**	2 bytes	00 - 1F	Device number 0 through 31
(3)	**Command**	1 byte	0 (30h)	OK: Discontinued
(4)	**BCC**	2 bytes	00 - 7F	Block check character
(5)	**Terminator**	1 byte	CR (0Dh)	Message end code

NG Reply

NG reply never occurs in response to the request message of confirming changed timer/counter preset values.

NG Code and Action

When an NG reply is returned. The first character of the reply message is ACK (06h) and the command code is 2 (32h) which means NG (error).

Probable Cause and Action

The reply message signals an error. Check the NG code and take a corrective action shown in the table below:

NG Code	Cause	Action
01 (Program size error)	Improper write/read program size. When writing a user program to a PLC, the user program capacity is larger than the program capacity of the connected PLC. When reading a user program from a PLC, the program capacity of the connected PLC is larger than the user program receive buffer in the computer.	Check the program capacity of the PLC using WindLDR. Send a user program smaller than or equal to the program capacity setting. Increase the user program receive buffer capacity and send a request message including the capacity data to the PLC.
02 (Protect error)	The user program in the PLC is read and/or write protected.	Disable the program protection.
03 (RUN error)	Writing user program is attempted while the PLC is running.	Stop the PLC and try writing user program to the PLC again.
04 (CRC error)	User program CRC code does not match. The user program to be written is broken.	Correct the user program and send the corrected user program to the PLC.
05 (Protect code error)	Protect code in the request message does not match that set in the PLC. Attempt was made to enable protection on a protected user program.	Send a correct protect code to the PLC. Do not attempt to enable protection on a protected user program.
06 (Data range error)	Designated data range is invalid.	Make sure of the correct data range.
07 (Timer/counter preset value change error)	Preset value change is attempted to timer or counter with preset value designated by data register.	Timer/counter preset values in the PLC can not be changed when a data register is designated as a preset value. Check the user program in the PLC to see that the timer/counter has a constant designated as a preset value. To change a timer or counter preset value designated by a data register, change the value of the data register.
08 (Calendar/clock data error)	Writing an invalid value to calendar/clock is attempted. The calendar/clock in the PLC is broken.	Make sure of correct values for the calendar/clock.
09 (Data clear error)	Designated data cannot be cleared.	Check if an error has occurred in the PLC. Correct the error and try again.
10 (Data error)	Invalid data other than 0 (30h) - 9 (39h) or A (41h) - F (46h) is included in the request message.	Check the request message and send a correct request message.
11 (Setting error)	Incorrect setting for user communication	Check the request message and send a correct request message.
12 (CPU module type code error)	When writing a user program to the PLC, the CPU module type code does not match between request message 1 and the PLC.	Correct the CPU module type code in request message 1, and write the user program to the PLC again.

Operand Allocation Numbers

Available I/O numbers depend on the type of the MicroSmart CPU module and the combination of I/O modules. I/O modules can be used with only the 24-I/O type CPU module among all-in-one type CPU modules. All slim type CPU modules can be used with I/O modules to expand the I/O points.

All-in-One Type CPU Modules

Operand	FC4A-C10R2		FC4A-C16R2		FC4A-C24R2	
	Allocation No.	Points	Allocation No.	Points	Allocation No.	Points
Input (I)	I0 - I5	6	I0 - I7 I10	9	I0 - I7 I10 - I15	14
Expansion Input (I)	—	—	—	—	I30 - I107	64 (78 total)
Output (Q)	Q0 - Q3	4	Q0 - Q6	7	Q0 - Q7 Q10 - Q11	10
Expansion Output (Q)	—	—	—	—	Q30 - Q107	64 (74 total)
Internal Relay (M)	M0 - M317	256	M0 - M1277	1024	M0 - M1277	1024
Special Internal Relay (M)	M8000 - M8157	128	M8000 - M8157	128	M8000 - M8157	128
Shift Register (R)	R0 - R63	64	R0 - R127	128	R0 - R127	128
Timer (T)	T0 - T31	32	T0 - T99	100	T0 - T99	100
Counter (C)	C0 - C31	32	C0 - C99	100	C0 - C99	100
Data Register (D)	D0 - D399	400	D0 - D1299	1300	D0 - D1299	1300
Special Data Register (D)	D8000 - D8099	100	D8000 - D8199	200	D8000 - D8199	200

Slim Type CPU Modules

Operand	FC4A-D20K3 FC4A-D20S3		FC4A-D20RK1 FC4A-D20RS1		FC4A-D40K3 FC4A-D40S3	
	Allocation No.	Points	Allocation No.	Points	Allocation No.	Points
Input (I)	I0 - I7 I10 - I13	12	I0 - I7 I10 - I13	12	I0 - I7 I10 - I17 I20 - I27	24
Expansion Input (I)	I30 - I187	128 (140 total)	I30 - I307	224 (236 total)	I30 - I307	224 (248 total)
Output (Q)	Q0 - Q7	8	Q0 - Q7	8	Q0 - Q7 Q10 - Q17	16
Expansion Output (Q)	Q30 - Q187	128 (136 total)	Q30 - Q307	224 (232 total)	Q30 - Q307	224 (240 total)
Internal Relay (M)	M0 - M1277	1024	M0 - M1277	1024	M0 - M1277	1024
Special Internal Relay (M)	M8000 - M8157	128	M8000 - M8157	128	M8000 - M8157	128
Shift Register (R)	R0 - R127	128	R0 - R127	128	R0 - R127	128
Timer (T)	T0 - T99	100	T0 - T99	100	T0 - T99	100
Counter (C)	C0 - C99	100	C0 - C99	100	C0 - C99	100
Data Register (D)	D0 - D1299	1300	D0 - D1299	1300	D0 - D1299	1300
Expansion Data Register (D)	—	—	D2000 - D7999	6000	D2000 - D7999	6000
Special Data Register (D)	D8000 - D8199	200	D8000 - D8199	200	D8000 - D8199	200

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