

## SECTION 4

### Commands According to Application

This section describes the commands that are used according to the application.

4-1	Auto-tuning Start: AS	.....
4-2	Auto-tuning Stop: AP	.....
4-3	Setting Unit Write: Wt	.....
4-4	Setting Unit Read: Rt	.....
4-5	Input Shift Write: WI	.....
4-6	Input Shift Read: RI	.....
4-7	Manual Reset Value Write: WK	.....
4-8	Manual Reset Value Read: RK	.....
4-9	Ramp Value Write: WR	.....
4-10	Ramp Value Read: RR	.....
4-11	Present Set Point Read: Rs	.....
4-12	Manual Output Value Write: WO	.....
4-13	Output Variable Limit Value Write: WL	.....
4-14	Output Variable Limit Value Read: RL	.....
4-15	Output Variable Change Rate Limit Value Write: WG	.....
4-16	Output Variable Change Rate Limit Value Read: RG	.....
4-17	Memory Write: WE	.....
4-18	Initialize Setting Data: MC	.....
4-19	Communication Test: TS	.....

## 4-1 Auto-tuning Start: AS

### Function



This command is used to auto-tune a control point.

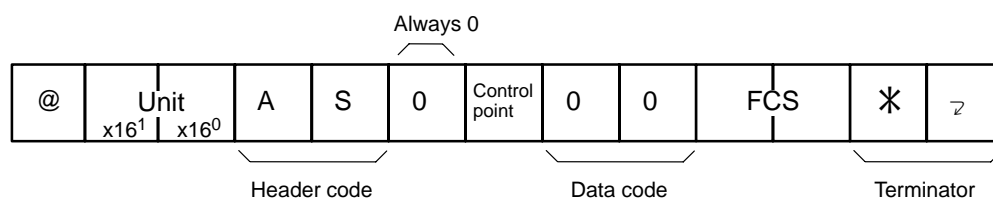
Auto-tuning Start (AS) is not accepted by a control point if the control point is already being auto-tuned or the operation of the control point has been interrupted.



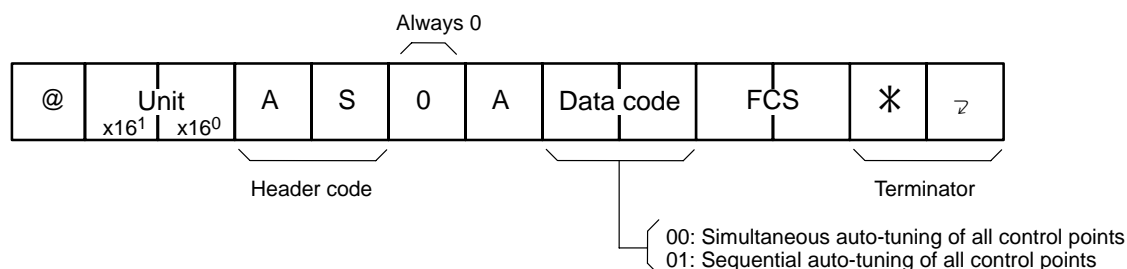
The HB or HS alarm of a control point will not work if the control point is being auto-tuned.

### Commands

#### With Control Point Designated



#### Auto-tuning of All Control Points



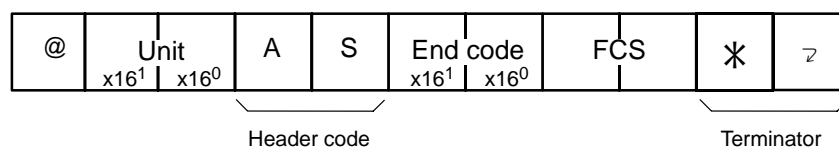
If the control point data of the command block is set to A and the data code of the command block is set to 00, all the control points will be auto-tuned simultaneously. If the control point data of the command block is set to A and the data code of the command block is set to 01, all the control points will be auto-tuned in sequence.



Sequential Auto-tuning of All Control Points:

If the data code of the command block is set to 01, all the control points will be auto-tuned in numerical order.

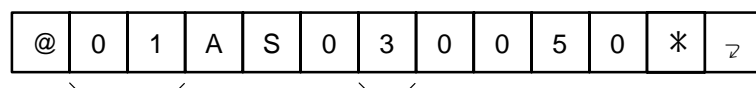
### Response



### Communications Example

In this example, control point 3, the unit number of which has been set to 1, is auto-tuned with Auto-tuning Start (AS).

#### Command



**Response**

@	0	1	A	S	0	0	5	3	*	↻
---	---	---	---	---	---	---	---	---	---	---

Normal end

## 4-2 Auto-tuning Stop: AP

**Function**

This command is used to stop the auto-tuning of all the control points.

Auto-tuning Stop (AP) cannot be used to stop the auto-tuning of a particular control point individually.

**Command**

<div>Always 0</div>											
@	Unit x16 <sup>1</sup> x16 <sup>0</sup>		A	P	0	0	0	0	FCS	*	↻
Header code					Data code				Terminator		

**Response**

@	Unit x16 <sup>1</sup> x16 <sup>0</sup>		A	P	End code x16 <sup>1</sup> x16 <sup>0</sup>		FCS	*	↻
Header code								Terminator	

**Communications Example**

In this example, the auto-tuning of the control points, the unit number of which has been set to 1, is stopped.

**Command**

@	0	1	A	P	0	0	0	0	5	0	*	↻
---	---	---	---	---	---	---	---	---	---	---	---	---

**Response**

@	0	1	A	P	0	0	5	0	*	↻
---	---	---	---	---	---	---	---	---	---	---

Normal end

## 4-3 Setting Unit Write: Wt

**Function**

This command is used to set the temperature setting unit to 1 or 0.1.



1. The default temperature setting unit varies with the type of input type to be used with the E5ZE as described below.

Thermocouple: 1 (default value)

Platinum resistance thermometer: 0.1 (default value)

2. The digits of a setting data set with the E5ZE vary with the temperature setting unit if the E5ZE is operated with any of the following commands.

- Set Point Write (WS) and Set Point Read (RS)
- Process Value Temperature Read (RX)
- Alarm Temperature Write (W%) and Alarm Temperature Read (R%)
- Present Set Point Read (Rs)

## 3. Setting Data Set before Changing Temperature Setting Unit:

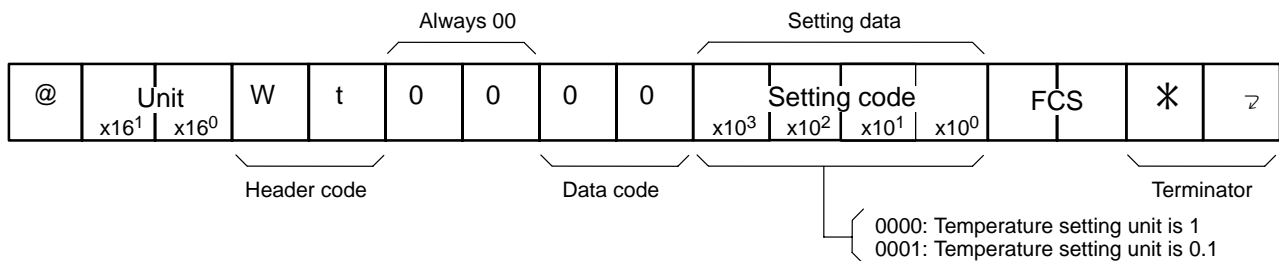
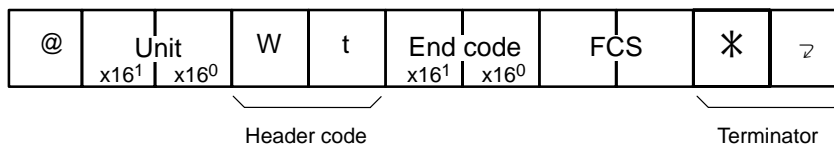
- The temperature setting unit of a setting data set for a control point will remain unchanged after the temperature setting unit of the control point is changed.
- When the E5ZE is operated with Setting Unit Read (Rt), the following parameters will be read.

If the temperature setting unit has been changed to 1 from 0.1:  
Parameters will be rounded off (e.g., 1234.5 will be read as 1235).

If the temperature setting unit has been changed to 0.1 from 1:  
Parameters with .0 added (e.g., 1234 will be read as 1234.0).

**Setting Data Range**

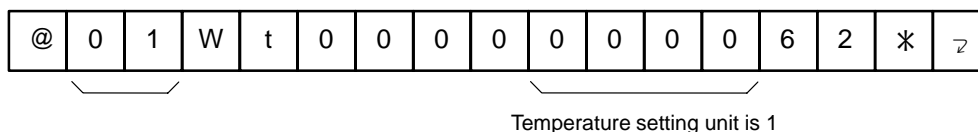
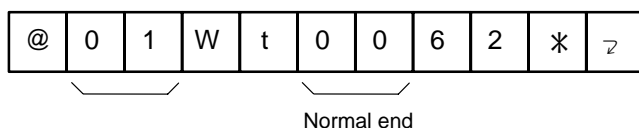
Input type	Thermocouple		Platinum resistance thermometer	
°C or °F	°C	°F	°C	°F
Default	0000 (Temperature setting unit: 1)		0001 (Temperature setting unit: 0.1)	
Setting code	0000 to 0001			

**Command****Response****Communications Example**

In this example, the E5ZE is operated with Setting Unit Write (Wt) under the following conditions.

Unit no.: 1

Temperature Setting Unit: 1

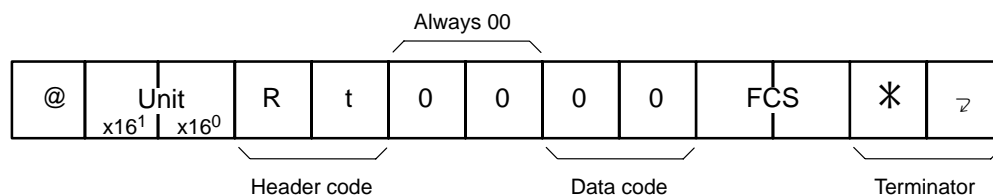
**Command****Response**

## 4-4 Setting Unit Read: Rt

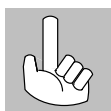
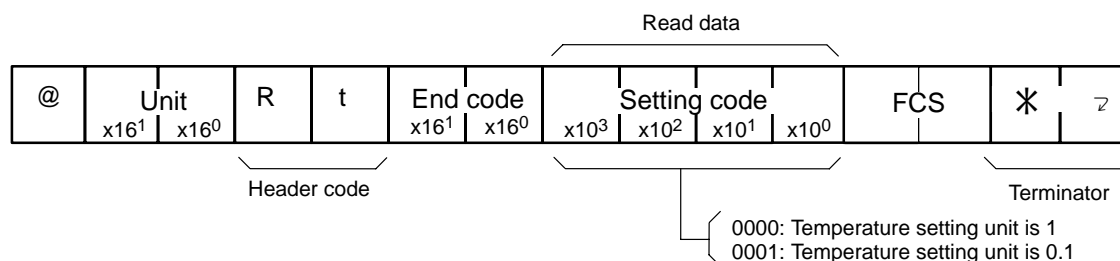
### Function

This command is used to read the setting unit that has been set with the E5ZE.

### Command



### Response



1. The response block for Setting Unit Read (Rt) does not include read data if the end code of the response block is other than 00.
2. Refer to 1-4 End Codes.

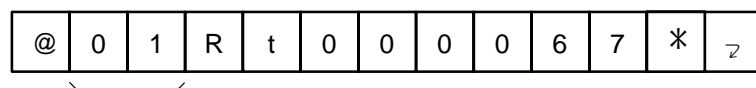
### Communications Example

In this example, the E5ZE is operated with Setting Unit Read (Rt) under the following conditions.

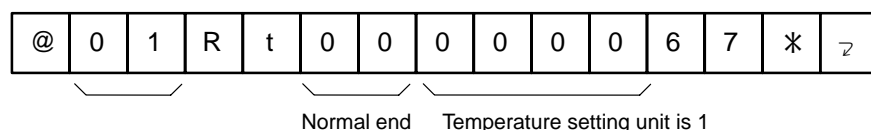
Unit no.: 1

Temperature Setting Unit: 1

### Command



### Response



## 4-5 Input Shift Write: WI

### Function

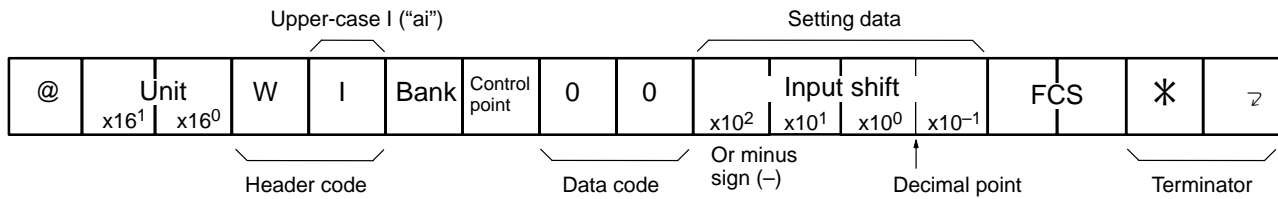
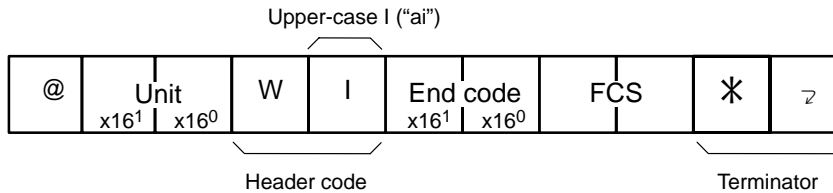
This command is used to write input shift values to shift the processes value.

Input Shift Write (WI) cannot be used at a control point being auto-tuned.



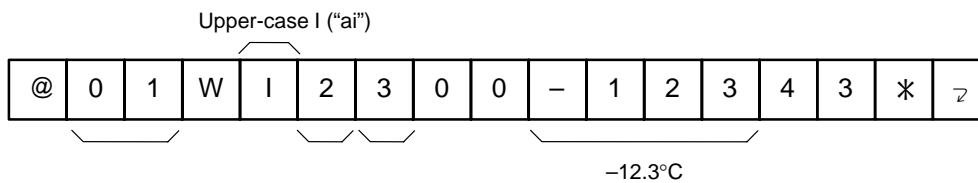
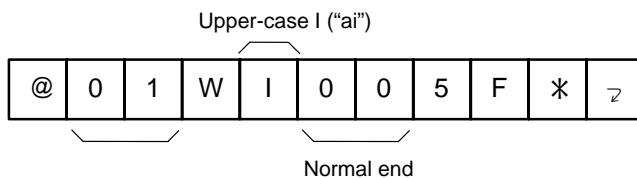
### Setting Data Range

Setting unit	0.1	
°C or °F	°C	°F
Default	0000	
Setting data	-999 to 0999	

**Command****Response****Communications Example**

In this example, the E5ZE is operated with Input Shift Write (WI) under the following conditions.

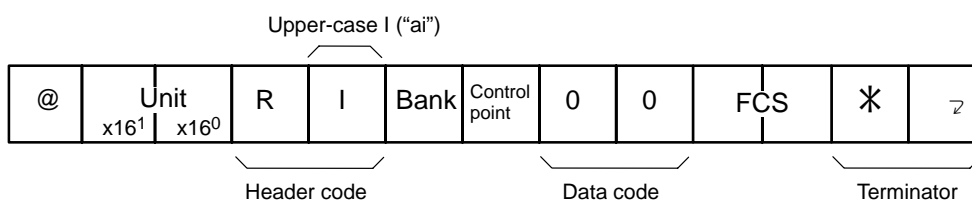
Unit no: 1  
Memory Bank no.: 2  
Control Point: 3  
Input Shift Value: -12.3°C

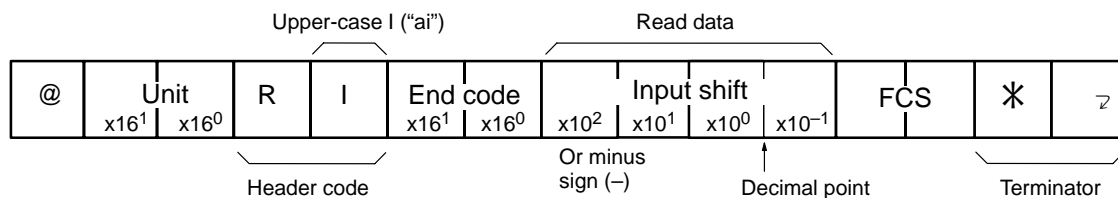
**Command****Response**

If the sensor input is 100°C, the processes value will be 87.7°C (i.e., 100 – 12.3 = 87.7). The temperature read with Processes Value Read (RX) will be thus 87.7°C.

**4-6 Input Shift Read: RI****Function**

This command is used to read the input shift values that have been set at a control point.

**Command**

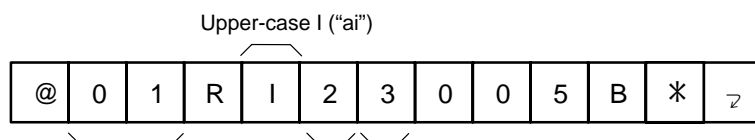
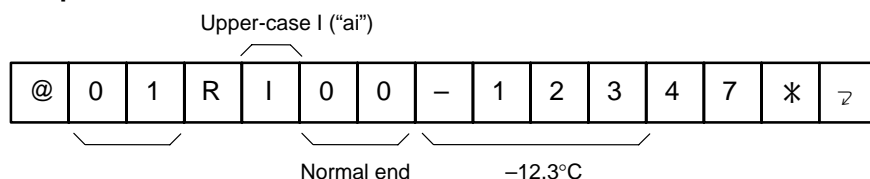
**Response**

1. The response block for Input Shift Read (RI) does not include read data if the end code of the response block is other than 00.
2. Refer to 1-4 End Codes.

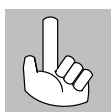
**Communications Example**

In this example, the E5ZE is operated with Input Shift Read (RI) under the following conditions.

Unit no.: 1  
 Memory Bank no.: 2  
 Control Point: 3  
 Input Shift Value: -12.3°C

**Command****Response****4-7 Manual Reset Value Write: WK****Function**

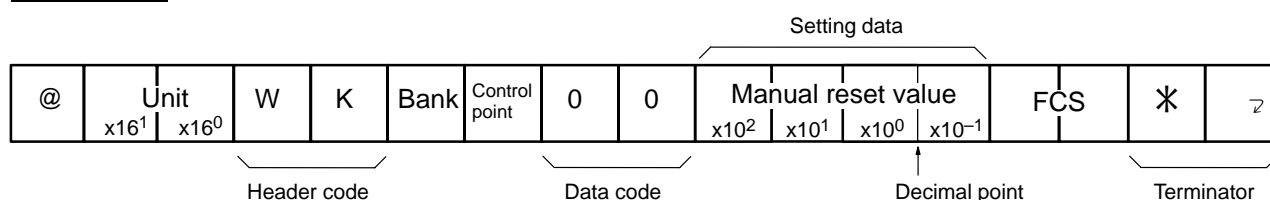
This command is used to write the percentages of manual reset value to a control point when there are offset at the control point in P or PD control operation.



1. The offset at the control point can be corrected by adjusting the manual reset value written to the control point.
2. Manual Reset Value Write (WK) cannot be used at a control point being auto-tuned.

**Setting Data Range**

Setting unit	0.1
Manual reset value unit	%
Default	0500
Setting data	0000 to 1000

**Command**

## Response

@	Unit x16 <sup>1</sup> x16 <sup>0</sup>	W	K	End code x16 <sup>1</sup> x16 <sup>0</sup>	FCS	*	z
Header code						Terminator	

## Communications Example

In this example, the E5ZE is operated with Manual Reset Value Write (WK) under the following conditions.

Unit no.:	1
Memory Bank no.:	2
Control Point:	3
Manual Reset Value:	70.0%

## Command

@	0	1	W	K	2	3	0	0	0	7	0	0	5	B	*	z
							70.0%									

## Response

@	0	1	W	K	0	0	5	D	*	2
└──┘			└──┘							
			Normal end							

#### 4-8 Manual Reset Value Read: RK

## Function

This command is used to read the percentages of manual reset value that have been set at a control point.

## Command

@	Unit x16 <sup>1</sup>	x16 <sup>0</sup>	R	K	Bank	Control point	0	0	FCS	*	Z
Header code						Data code			Terminator		

## Response

The diagram illustrates the 12-byte data format for the 16-bit manual reset value. The data is organized into a sequence of fields:

- Header code:** Consists of the '@' symbol, the Unit (split into  $x16^1$  and  $x16^0$ ), and the 'R' and 'K' characters.
- End code:** Consists of the 'End code' (split into  $x16^1$  and  $x16^0$ ).
- Manual reset value:** Consists of four bytes:  $x10^2$ ,  $x10^1$ ,  $x10^0$ , and  $x10^{-1}$ . The  $x10^0$  byte contains a decimal point.
- FCS:** Consists of the 'FCS' (Frame Check Sequence) field.
- Terminator:** Consists of the '\*' and 'Z' characters.

Labels above the diagram indicate the data flow: 'Read data' spans from the 'End code' to the 'Manual reset value', and 'Header code' spans from the '@' to the 'R' and 'K' characters. A label 'Decimal point' points to the  $x10^0$  byte, and a label 'Terminator' points to the '\*' and 'Z' characters.



1. The response block for Manual Reset Value Read (RK) does not include read data if the end code of the response block is other than 00.
2. Refer to 1-4 *End Codes*.

## Communications Example

In this example, the E5ZE is operated with Manual Reset Value Read (RK) under the following conditions.

Unit no.:	1
Memory Bank no.:	2
Control Point:	3
Manual Reset Value:	70.0%



**Command**

@	0	1	R	K	2	3	0	0	5	9	*	↵
---	---	---	---	---	---	---	---	---	---	---	---	---

**Response**

@	0	1	R	K	0	0	0	7	0	0	5	F	*	↵
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Normal end      70.0%

## 4-9 Ramp Value Write: WR

**Function**

This command is used to write ramp values to a control point to change the set point of the control point constantly.

**Setting Data Range**

Time	Second		Minute		Hour	
Symbol	S		M		H	
Setting unit	0.1					
Temperature unit	°C/s	°F/s	°C/min	°F/min	°C/h	°F/h
Default	000					
Setting data	000 to 999					

**Command**

@	Unit x16 <sup>1</sup> x16 <sup>0</sup>		W	R	Bank	Control point	0	0	Ramp value x10 <sup>1</sup> x10 <sup>0</sup> x10 <sup>-1</sup>			Time	FCS	*	↵
---	---	--	---	---	------	------------------	---	---	---	--	--	------	-----	---	---

Header code      Data code      Decimal point      Terminator

Setting data

S: Second  
M: Minute  
H: Hour

**Response**

@	Unit x16 <sup>1</sup> x16 <sup>0</sup>		W	R	End code x16 <sup>1</sup> x16 <sup>0</sup>	FCS	*	↵
---	---	--	---	---	---	-----	---	---

Header code      Terminator

**Communications Example**

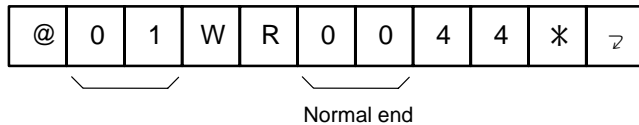
In this example, the E5ZE is operated with Ramp Value Write (WR) under the following conditions.

Unit no.: 1  
Memory Bank no.: 2  
Control Point: 3  
Ramp Value: 10.0 min

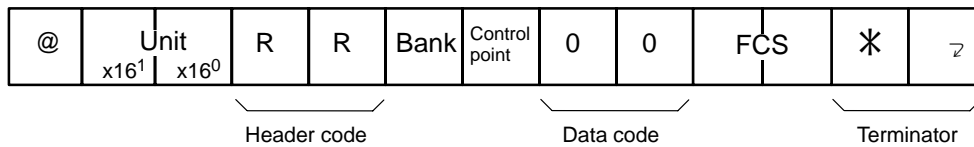
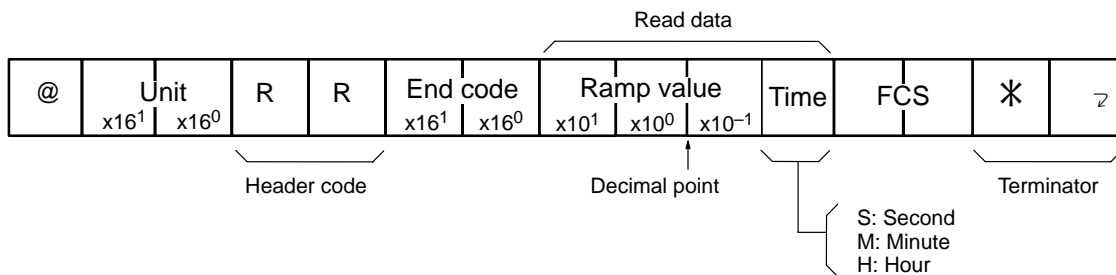
**Command**

@	0	1	W	R	2	3	0	0	1	0	0	M	3	9	*	↵
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

10.0 min

**Response****4-10 Ramp Value Read: RR****Function**

This command is used to read the ramp values that have been set at a control point.

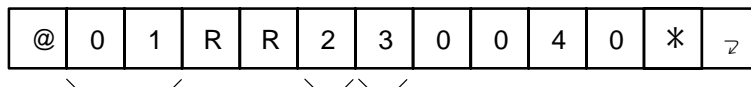
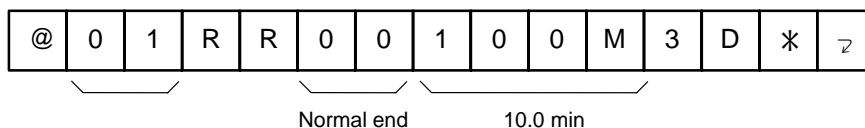
**Command****Response**

1. The response block for Ramp Value Read (RR) does not include read data if the end code of the response block is other than 00.
2. Refer to 1-4 End Codes.

**Communications Example**

In this example, the E5ZE is operated with Ramp Value Read (RR) under the following conditions.

Unit no.: 1  
Memory Bank no.: 2  
Control Point: 3  
Ramp Value: 10.0 min

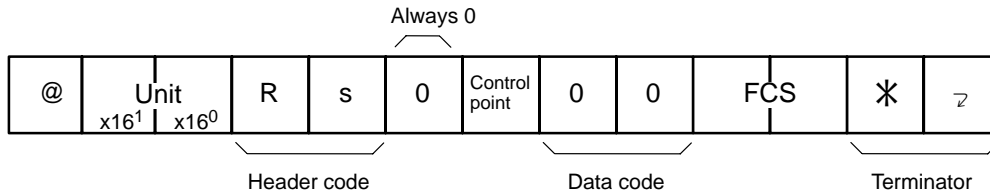
**Command****Response**

## 4-11 Present Set Point Read: Rs

### Function

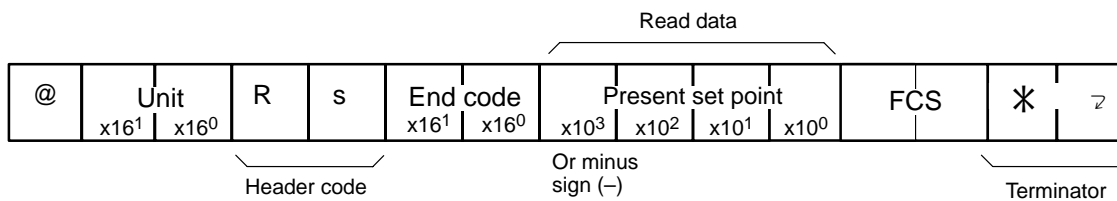
This command is used to read the present set point of a control point in ramp operation.

### Command

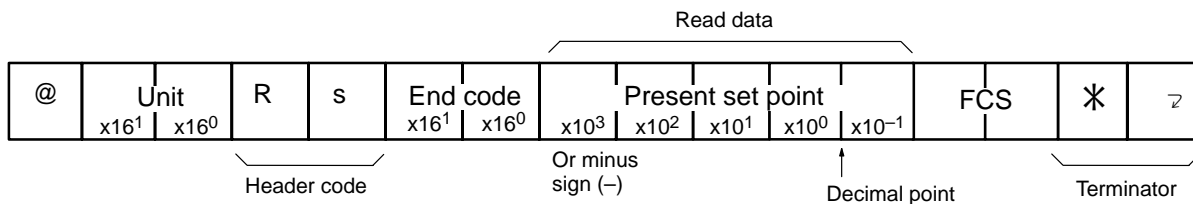


### Response Formats of E5ZE in Temperature Control Operation

#### When Setting Unit is 1



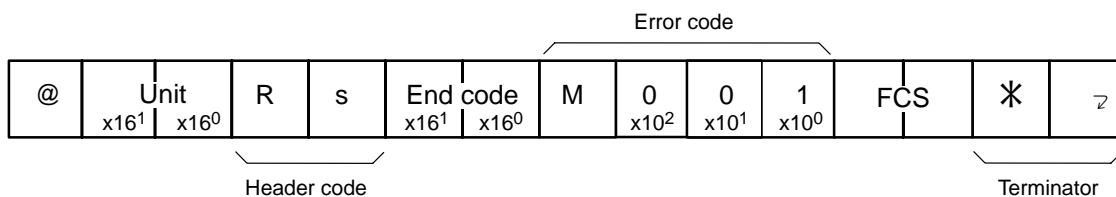
#### When Setting Unit is 0.1



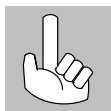
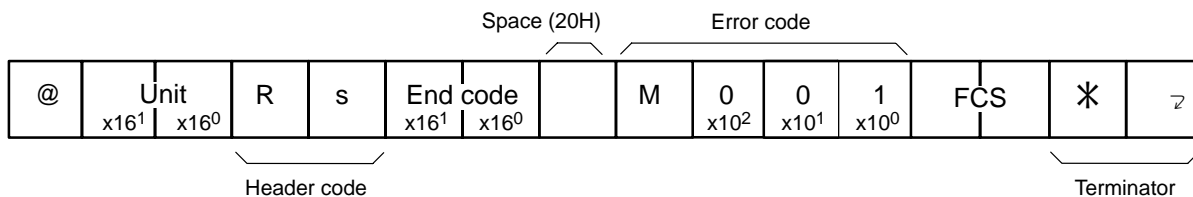
### Response Formats of E5ZE not in Temperature Control Operation

Present Set Point Read (Rs) enables the E5ZE to read error codes when the E5ZE is not in temperature control operation.

#### When Setting Unit is 1



#### When Setting Unit is 0.1



1. The response block for Present Set Point Read (Rs) does not include read data or an error code if the end code of the response block is other than 00.
2. Refer to 1-4 End Codes and 1-5 Error Codes.

**Communications Example**

In this example, the E5ZE is operated with Present Set Point Read (Rs) under the following conditions.

Unit no.: 1  
 Control Point: 3  
 Setting Unit: 1  
 Present Set Point: 200°C

**Command**

@	0	1	R	s	0	3	0	0	6	3	*	↵
---	---	---	---	---	---	---	---	---	---	---	---	---

**Response**

@	0	1	R	s	0	0	0	2	0	0	6	2	*	↵
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Normal end                      200°C

**4-12 Manual Output Value Write: WO****Function**

This command is used to write the percentage of manual output value to a control point.



1. Manual Output Value Write (WO) is used with the E5ZE only when the E5ZE is in manual operation.
2. The percentage of cooling-side output value can be written to a control point only if the E5ZE is a heating and cooling control model.
3. The E5ZE operates manually even if the E5ZE detects a sensor input error. Manual Output Value Write (WO), however, cannot be used with the E5ZE if the E5ZE detects a sensor input error.
4. If the E5ZE has an error, the E5ZE cannot operate manually and Manual Output Value Write (WO) cannot be used with the E5ZE.

**Setting Data Range**

Setting unit	0.1
Manual output value unit	%
Setting data	0000 to 1000

**Command**

		Unit		Header code		Always 0		Control point		Data code		Setting data				FCS		Terminator	
@		x16 <sup>1</sup>	x16 <sup>0</sup>	W	O	0						x10 <sup>2</sup>	x10 <sup>1</sup>	x10 <sup>0</sup>	x10 <sup>-1</sup>			*	↵

**Communications Example**

In this example, the E5ZE is operated with Manual Output Value Write (WO) under the following conditions.

Unit no.: 1

Control Point: 3

Manual Output Value: 50.0%

**Command**

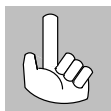
@	0	1	W	O	0	3	0	0	0	5	0	0	5	F	*	↵	
						50.0%											

**Response**

@	0	1	W	O	0	0	5	9	*	↵
			Normal end							

**4-13 Output Variable Limit Value Write: WL****Function**

This command is used to write control output variable limit values to a control point.



1. Output Variable Limit Value Write (WL) cannot be used at a control point being auto-tuned.
2. Cooling-side output variable limit values can be written to a control point provided that the E5ZE is a heating and cooling control model.

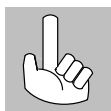


The output variable limit function will not work at a control point in the following cases.

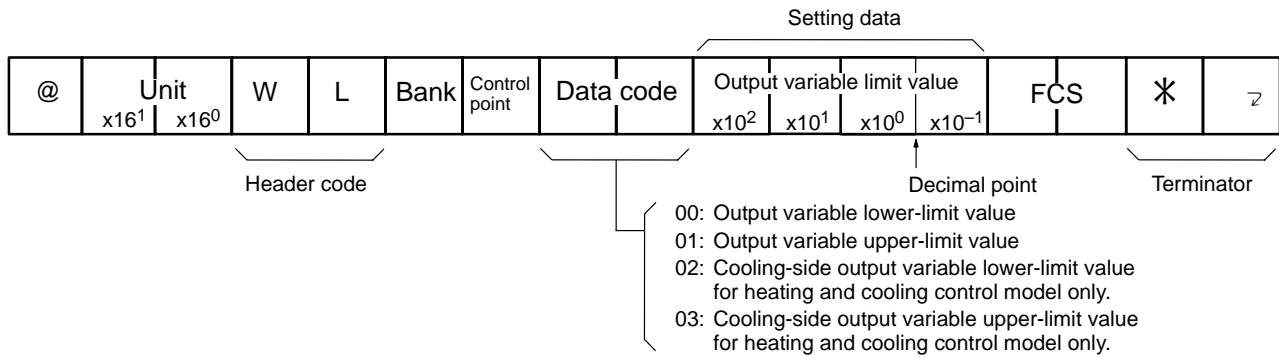
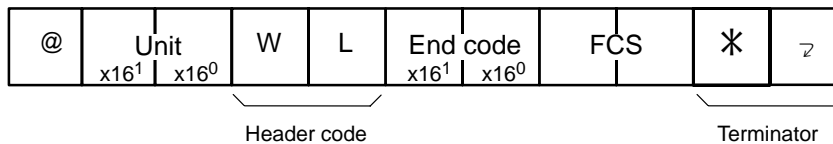
- The E5ZE is in manual operation.
- The E5ZE has an error.
- The E5ZE detects a sensor input error.
- The E5ZE is stopped.

**Setting Data Range**

Setting item	Lower limit	Upper limit
Setting unit	0.1	
Output variable limit value unit	%	
Default	0000	1000
Setting data	0000 to 1000	

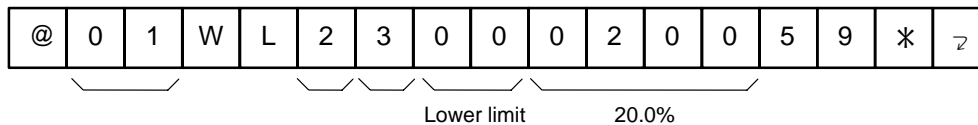
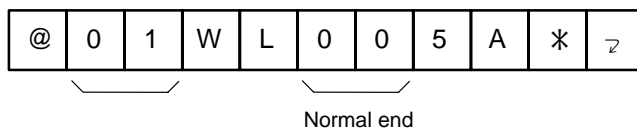


1. The output variable lower-limit value set at a control point must not be larger than the upper output variable limit value.
2. If the output variable lower-limit value set at a control point is 1000, the output value will be always 100.0%.
3. If the output variable upper-limit value set at a control point is 1000, the output value will be always 0.0%.
4. If an output variable limit value is set at a control point as both output variable lower-limit value and upper-limit value, the output value will be the output variable limit value.

**Command****Response****Communications Example**

In this example, the E5ZE is operated with Output Variable Limit Value Write (WL) under the following conditions.

Unit no.: 1  
 Memory Bank no.: 2  
 Control Point: 3  
 Output Variable Lower-limit Value: 20.0%

**Command****Response**

## 4-14 Output Variable Limit Value Read: RL

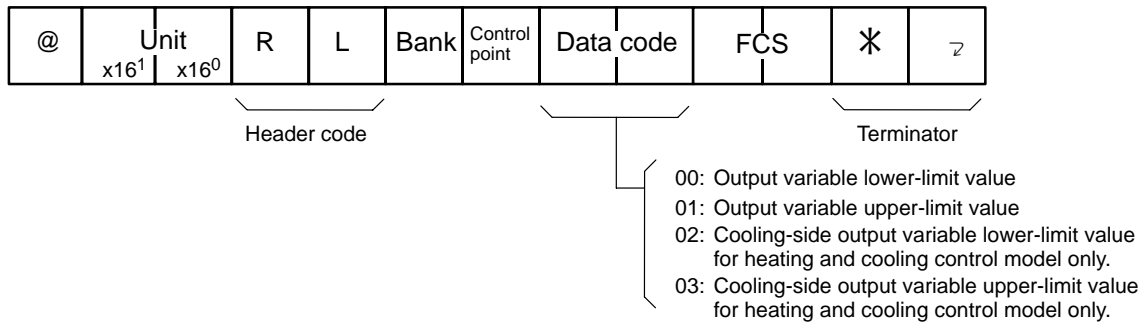
### Function

This command is used to read the output variable limit values that have been set at a control point.

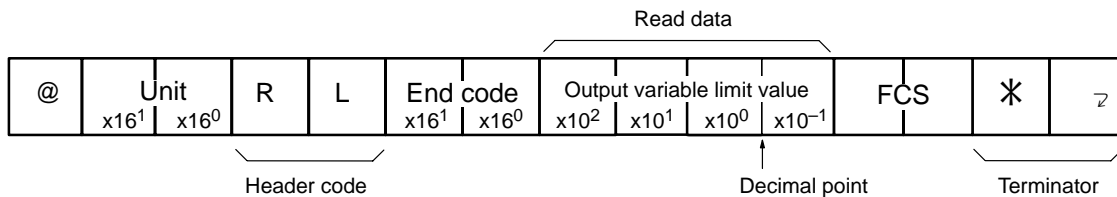


The cooling-side output variable limit values that have been set at a control point can be read provided that the E5ZE is a heating and cooling control model.

### Command



### Response



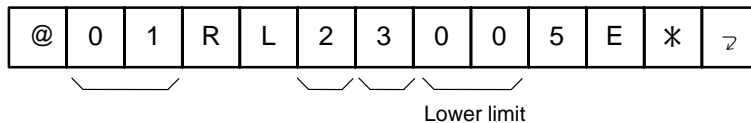
1. The response block for Output Variable Limit Value Read (RL) does not include read data if the end code of the response block is other than 00.
2. Refer to 1-4 End Codes.

### Communications Example

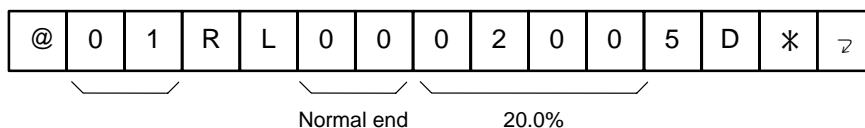
In this example, the E5ZE is operated with Output Variable Limit Value Read (RL) under the following conditions.

Unit no.: 1  
 Memory Bank no.: 2  
 Control Point: 3  
 Output Variable Lower-limit Value: 20.0%

#### Command



#### Response



## 4-15 Output Variable Change Rate Limit Value Write: WG

### Function

This command is used to write control output variable change rate limit values to a control point.



1. Output Variable Change Rate Limit Value Write (WG) cannot be used at a control point being auto-tuned.
2. The output variable change rate limit function will not work at a control point in the following cases.
  - An output variable change rate limit value of 0000 is used for the E5ZE.
  - The control point is being auto-tuned.
  - The E5ZE is in manual operation.
  - The E5ZE has an error.

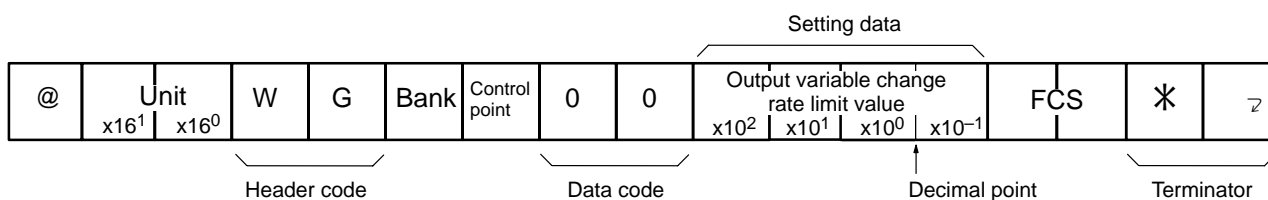
### Setting Data Range

Setting unit	0.1
Change rate unit	%/(Sampling period)
Default	0000
Setting data	0000 to 1000

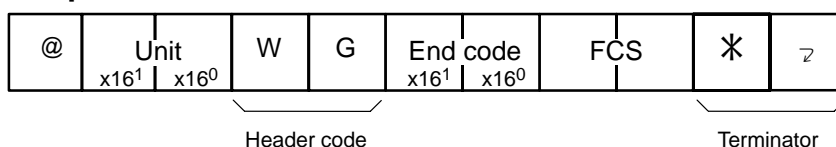


The percentage of output per sampling period of a control point must be set as the output variable change rate limit value.

### Command



### Response

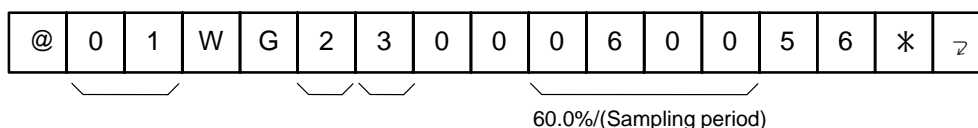


### Communications Example

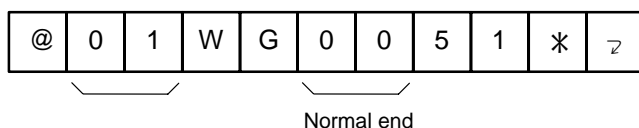
In this example, the E5ZE is operated with Output Variable Change Rate Limit Value Write (WG) under the following conditions.

Unit no.: 1  
Memory Bank no.: 2  
Control Point: 3  
Output Variable Change Rate Limit Value: 60.0% per sampling period

#### Command



#### Response



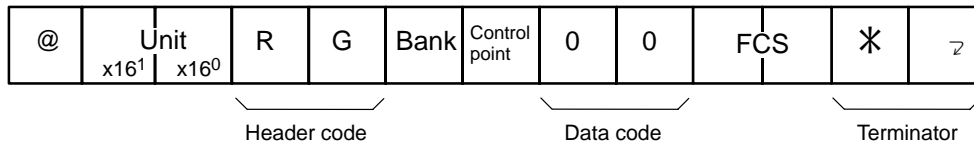


## 4-16 Output Variable Change Rate Limit Value Read: RG

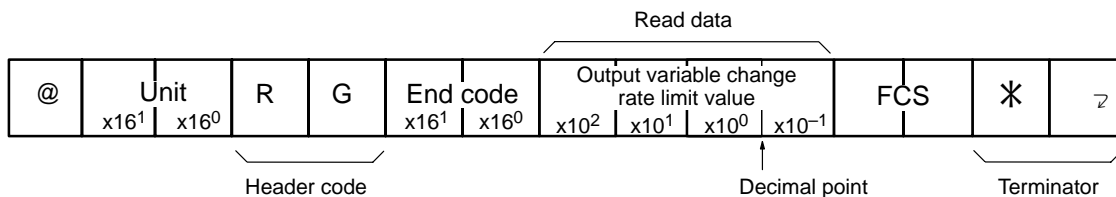
### Function

This command is used to read the output variable change rate limit values that have been set at a control point.

### Command



### Response



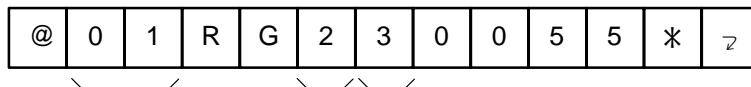
1. The response block for Output Variable Change Rate Limit Value Read (RG) does not include read data if the end code of the response block is other than 00.
2. Refer to 1-4 End Codes.

### Communications Example

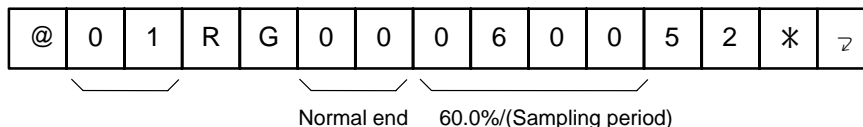
In this example, the E5ZE is operated with Output Variable Change Rate Limit Value Read (RG) under the following conditions.

Unit no.: 1  
Memory Bank no.: 2  
Control Point: 3  
Output Variable Change Rate Limit Value: 60.0% per sampling period

### Command



### Response



## 4-17 Memory Write: WE

### Function

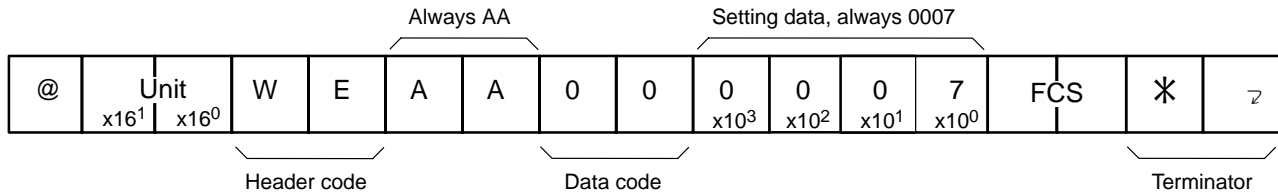
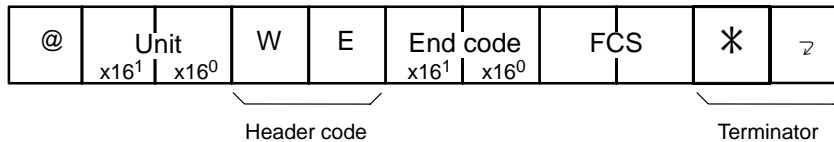
This command is used to write the setting data set with the E5ZE to the memory.

When the E5ZE is turned ON, the setting data stored in the memory will be read by the E5ZE automatically for temperature control use.

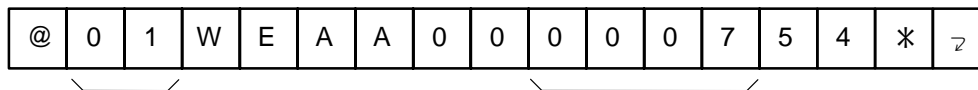
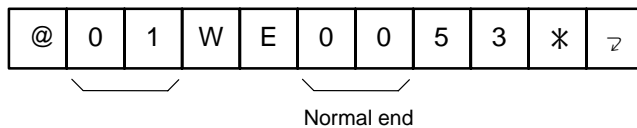


If the E5ZE is turned OFF before the E5ZE returns a response to Memory Write (WE) to the host computer connected to the E5ZE, the setting data set with the E5ZE may not be written to the memory, in which case a memory error will occur.



**Command****Response****Communications Example**

In this example, setting data, the unit number of which has been set to 1, are written to the memory with Memory Write (WE).

**Command****Response****4-18 Initialize Setting Data: MC****Function**

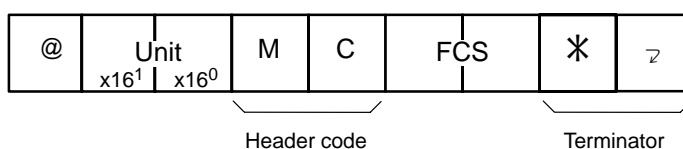
This command is used to set the memory to the factory-set default setting data.

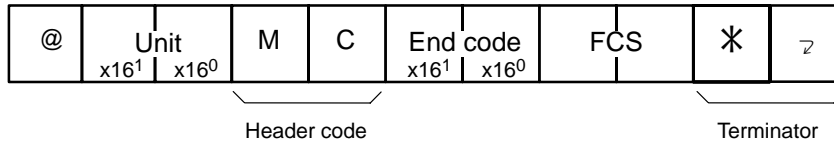


1. Initialize Setting Data (MC) can be used only when the E5ZE is stopped.
2. Initialize Setting Data (MC) cannot be used to reset a particular control point or memory bank individually.
3. Initialize Setting Data (MC) does not affect the contents of the memory and saved calibration values. To initialize the stored set data of the E5ZE, send this command and then Memory Write (WE) with the factory-set setting data.

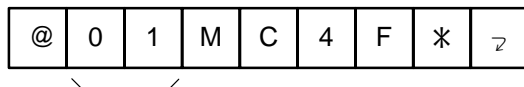
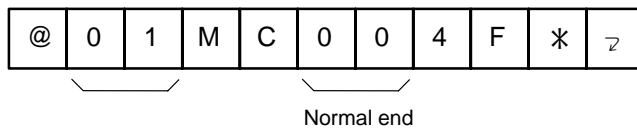


If the temperature unit is changed from °C to °F or vice versa or the input type connected to the E5ZE is changed at a control point, set the RAM to the factory-set default setting data and reset data with the E5ZE.

**Command**

**Response****Communications Example**

In this example, setting data, the unit number of which has been set to 1, are reset to the factory-set default setting data with Initialize Setting Data (MC).

**Command****Response****4-19 Communication Test: TS****Function**

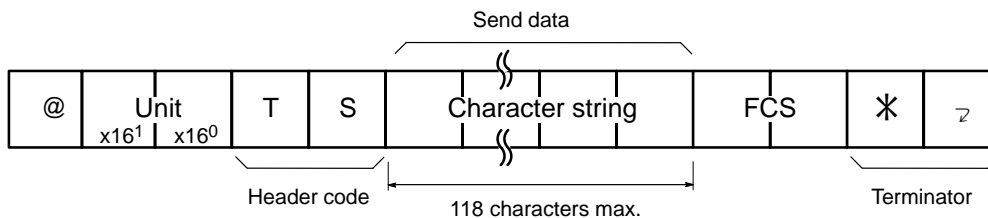
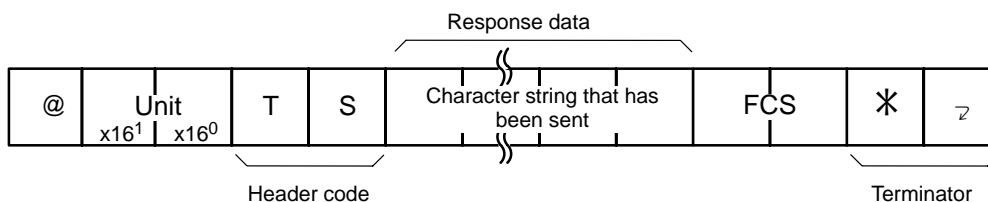
This command is used to enable a control point to send back to the host system connected to the E5ZE the character strings received at the control point from the host system.

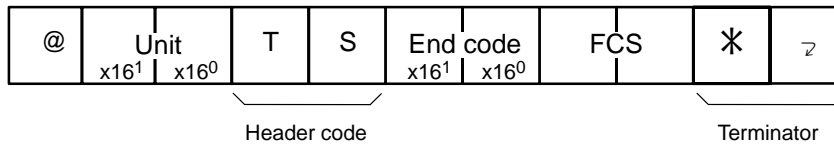


Character strings can contain all characters except the following characters.

@: (40H)

↵: (carriage return) (0DH)

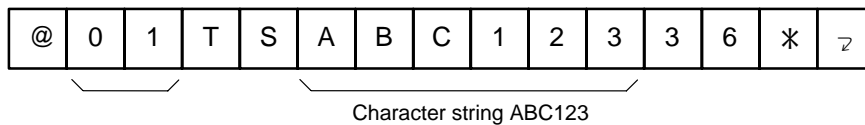
**Command****Response**

**Response Block with Error Detected**

1. The contents of the error will be indicated by the end code in the response block.
2. Refer to 1-4 End Codes.

**Communications Example**

In this example, character string ABC123 is sent to the E5ZE, the unit number of which has been set to 1, with the Communication Test (TS).

**Command****Response**