# **BASIC SERIAL COMMAND SPECIFICATIONS**

PLC-XW56

Ver 1.00

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#### 1. Overview

- **1.1.** These specifications define projector control commands for PLC-XW56.
- **1.2.** The projector control commands are used to remotely control a projector through RS-232C from a computer.

### 2. Serial Interface Specifications

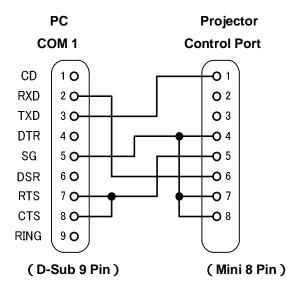
#### 2.1. Transfer Specifications

Item	Specifications
Synchronous system	Asynchronous
Transmission Speed	9600 / 19200
Data Length	8 bit
Parity	N/A
Stop Bit	1
Flow Control	N/A

- 1) Transmission speed: initial setting value is 19200.
- 2) Transmission speed can be changed in service mode.

#### 2.2. Connection

Dedicated serial cable must be used for connection to a computer and a projector.



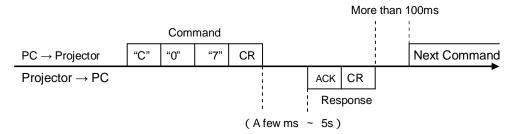
#### 3. Notes for Communication

- **3.1.** The projector control command is defined as one command/one line that starts with "C" and ends with carriage return (0x0D).
- 3.2. There are two types of Commands: Functional Execution Commands and Status Read Commands.

Example of Functional Execution Command: "C05" [CR]

Example of Status Read Command: "CR0" [CR]

- 3.3. When it takes more than one second to receive one command, it does not operate.
  It clears the information of buffer when the projector receives LF (0x0A) or EOF (0x1A) and takes more than one second to receive one command.
- 3.4. For Command pipelining, wait for the interval of 100ms after receiving a Command.



- **3.4.1.** When a command is issued before receiving a response, the function is not executed properly.
- 3.4.2. Except for when there is no Response for more than 5 seconds.
- **3.5.** It takes <u>about 5 seconds</u> for internal initialization after plugging in AC power. During this time, it cannot process commands. Do not issue any command.
- 3.6. The number of characters of response to Status Read Commands depends on commands.
  Please see [7. Status Read Commands].
- 3.7. Characters for commands must be Capital (A Z).

### 4. Functional Execution Command Table

Command	Item	Command	Item
C00	POWER ON	C20	BRIGHTNESS +
C01	POWER OFF ( Quick Power OFF )	C21	BRIGHTNESS -
C02	POWER OFF	C22	<del></del>
C03	<del></del>	C23	<del></del>
C04	<del></del>	C24	<del></del>
C05	Computer	C25	<del></del>
C06	<del></del>	C26	<del></del>
C07	Video	C27	IMAGE (Toggle)
C08	<del></del>	C28	ON START Enable
C09	VOLUME +	C29	ON START Disable
C0A	VOLUME -	C2A	Power Management Ready
C0B	AUDIO MUTE ON	C2B	Power Management OFF
C0C	AUDIO MUTE OFF	C2C	<del></del>
C0D	VIDEO MUTE ON	C2D	<del></del>
C0E	VIDEO MUTE OFF	C2E	Power Management Shut down
COF Screen Normal size (4:3)		C2F	
C10 Screen Wide size (16:9)		C30	D.ZOOM +
C11	Image Standard	C31	D.ZOOM -
C12	Image Real	C32	<del></del>
C13 Image Cinema		C33	<del></del>
C14	C14 Image 1		Computer S-video
C15	Image 2	C35	<del></del>
C16	Image 3	C36	<del></del>
C17	Image 4	C37	<del></del>
C18	C18 Blackboard		<del></del>
C19 Dynamic		C39	<del></del>
C1A	<del></del>	C3A	POINTER RIGHT
C1B		C3B	POINTER LEFT
C1C	C1C MENU ON		POINTER UP
C1D	MENU OFF	C3D	POINTER DOWN
C1E	DISPLAY CLEAR	C3E	
C1F		C3F	ENTER

——— means no function.

Command	Item	Command	Item
C43	FREEZE ON	C83	
C44	FREEZE OFF	C84	
C45	<del></del>	C85	
C46	<del></del>	C86	
C47	<del></del>	C87	
C48		C88	
C49	<del></del>	C89	Auto PC ADJ.
C4A	<del></del>	C8A	PRESENTATION TIMER
C4B	<del></del>	C8B	
C4C	<del></del>	C8C	
C4D	<del></del>	C8D	
C4E		C8E	KEYSTONE ↑
C4F	<del></del>	C8F	KEYSTONE ↓
C50	Computer Analog RGB	C90	
C51	Computer Scart	C91	
C52		C92	
C53		C93	
C54	Computer Component	C94	

<sup>———</sup> means no function.

### 5. Status Read Command Table

Command	ltem	Memo
CR0 Status Read		
CR1	Input Mode Read	
CR2	<del></del>	
CR3	(Corresponding) Lamp Time Read	
CR4 Setting Read		
CR5 ———		
CR6 Temp Read		

——— means no function.

#### 6. Functional Execution Command

#### 6.1. Format

6.1.1. PC issues a command in format as below.

Command: two characters (See Basic Functional Execution Command Table)

**6.1.2.** A projector changes received data to decode and returns a result after being ready to receive next command.

[ACK] [ CR ]: (0x06, 0x0D ) When received Functional Execution Commands.

**6.1.3. "?"** [ CR ]: When the received data cannot be decoded.

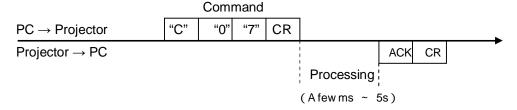
### 6.2. Command Pipelining

When some functions need the command pipelining, the performance is the same as that of the remote control;

- 6.2.1. System: issue any command every 100 ms.
- 6.2.2. When receiving the appropriate command, the function is executed for 120 ms from the moment.
- 6.2.3. When receiving the same command continuously within 120 ms, the function is executed for another 120 ms from the moment.
- 6.2.4. When there is no incoming command after 120 ms, the execution of pipelining is stopped.
- 6.2.5. When the projector receives other incoming commands within 120ms, the execution of pipelining is stopped.

#### 6.3. Transfer Example

Switch the projector to video mode with Basic Command.



### 6.4. Operation Requirements

When the projector's status in this below, Functional Execution Commands are limited.

Projector Status	Available Functional Execution Commands	
Standby Mode	C00 : POWER ON	
Processing Countdown	C00 : POWER ON → Countdown is terminated C01 : POWER OFF C02 : POWER OFF → Countdown is terminated	
Processing Cooling Down	NONE	
Cooling Down due to Abnormal Temperature	NONE	
Abnormal Temperature Status	NONE	
Processing Power Save / Cooling Down	NONE	
Power Save Status	C00 : POWER ON C01 : POWER OFF	
Input search : On1 / On2	Although transmit Input source commands, Input search does no operated.	

Note) When the status is as above, even if the projector receives other commands,

it returns [ACK] [CR].

### 6.5. POWER ON Command

Command	"C00" [CR]		
Detail		Power is ON, nothing is done. If this command during processing Countdown, Countdown is	
Response	Acceptable	[ACK] [CR]	
Response	Unacceptable	" ? "[CR]	

### **6.6. POWER OFF Command** ( Quick Power OFF )

Command	"C01" [CR]		
Detail	Power OFF (Standby) When Power is OFF with ON/STAND-BY button of the projector and remote control, "Power OFF?" is displayed. However, as soon as this command is sent, Quick Power OFF is executed.		
Response	Acceptable	[ACK] [CR]	
response	Unacceptable	" ? "[CR]	

### 6.7. POWER OFF Command

Command	"C02" [CR]		
Detail	of the projector Once this com again while it is	andby). operates the same Power OFF function as ON/STAND-BY button and remote control. mand is sent, "Power OFF?" is displayed. If this command is sent displayed, Power OFF is executed. this command during Countdown, Countdown is terminated.	
Response	Acceptable	[ACK] [CR]	
response	Unacceptable	" ? "[CR]	

### 6.8. Computer Command

Command	"C05" [CR]		
Detail	Select Comput Note) Although project is On.	er Input ctor returns "OK", this command is not executed while Input search	
Response	Acceptable	[ACK] [CR]	
Response	Unacceptable	" ? "[CR]	

### 6.9. Video Command

Command	"C07" [CR]		
Detail Select Video Input Although projector returns "OK", this command is not executed while is On.			
Response	Acceptable	[ACK] [CR]	
response	Unacceptable	" ? "[CR]	

### 6.10. VOLUME + Command

Command	"C09" [CR]	
Detail	Volume Up. This command operates the same VOLUME UP function as the remote control.	
Response	Acceptable	[ACK] [CR]
	Unacceptable	" ? "[CR]

### 6.11. VOLUME - Command

Command	"C0A" [CR]	
Detail	Volume Down This command control.	d operates the same VOLUME DOWN function as the remote
Response	Acceptable	[ACK] [CR]
	Unacceptable	" ? "[CR]

### 6.12. AUDIO MUTE ON Command

Command	"C0B" [CR]	
Detail	Sound Mute ON. This command works the same as "MUTE" button of the remote control for Mute ON, but does not work for Mute OFF.	
Response	Acceptable	[ACK] [CR]
	Unacceptable	" ? "[CR]

### 6.13. AUDIO MUTE OFF Command

Command	"C0C" [CR]	
Detail	Sound Mute OFF. This command works the same as "MUTE" button of the remote control for Mute OFF, but does not work for Mute ON.	
Response	Acceptable	[ACK] [CR]
	Unacceptable	" ? "[CR]

### 6.14. VIDEO MUTE ON Command

Command	"C0D"[CR]	
Detail	Video Mute ON. This command works the same as "NO SHOW" button of the remote control for No Show ON, but does not work for No Show OFF.	
Response	Acceptable	[ACK] [CR]
	Unacceptable	" ? "[CR]

### 6.15. VIDEO MUTE OFF Command

Command	"C0E" [CR]	
Detail	Video Mute OFF. This command works the same as "NO SHOW" button of remote control for No Show OFF, but does not work for No Show ON.	
Response	Acceptable	[ACK] [CR]
	Unacceptable	" ? "[CR]

### 6.16. Screen Normal size Command

Command	"C0F" [CR]	
Detail	Set screen size to Normal (4:3).	
Response	Acceptable	[ACK] [CR]
	Unacceptable	" ? "[CR]

#### 6.17. Screen Wide size Command

Command	"C10" [CR]	
Detail	Set screen size to Wide (16:9).	
Response	Acceptable	[ACK] [CR]
	Unacceptable	" ? "[CR]

### 6.18. Image Standard Command

Command	"C11" [CR]	
Detail	Set image to Standard mode.	
Response	Acceptable	[ACK] [CR]
	Unacceptable	" ? "[CR]

### 6.19. Image Real Command

Command	"C12" [CR]	
Detail	Set image to Real mode.	
Response	Acceptable	[ACK] [CR]
	Unacceptable	" ? "[CR]

### 6.20. Image Cinema Command

Command	"C13" [CR]	
Detail	Set image to Cinema mode.	
Response	Acceptable	[ACK] [CR]
	Unacceptable	" ? "[CR]

### 6.21. Image 1 Command

Command	"C14" [CR]	
Detail	Set image to Image 1 mode.	
Response	Acceptable	[ACK] [CR]
	Unacceptable	"?"[CR]

## 6.22. Image 2 Command

Command	"C15" [CR]	
Detail	Set image to Image 2 mode.	
Response	Acceptable	[ACK] [CR]
response	Unacceptable	" ? "[CR]

### 6.23. Image 3 Command

Command	"C16" [CR]	
Detail	Set image to Image 3 mode.	
Response	Acceptable	[ACK] [CR]
	Unacceptable	"?"[CR]

### 6.24. Image 4 Command

Command	"C17" [CR]	
Detail	Set image to Image 4 mode.	
Response	Acceptable	[ACK] [CR]
Response	Unacceptable	"?"[CR]

### 6.25. Image Blackboard (Green) Command

Command	"C18" [CR]	
Detail	Set image to Blackboard (Green) mode.	
Response	Acceptable	[ACK] [CR]
response	Unacceptable	" ? "[CR]

### 6.26. Image Dynamic Command

Command	"C19" [CR]	
Detail	Set image to Dynamic mode.	
Response	Acceptable	[ACK] [CR]
ТСЗРОПЗС	Unacceptable	"?"[CR]

### 6.27. MENU ON Command

Command	"C1C" [CR]	
Detail	Display Menu of On Screen Display.	
Response	Acceptable	[ACK] [CR]
response	Unacceptable	"?"[CR]

### 6.28. MENU OFF Command

Command	"C1D" [CR]	
Detail	Clear Menu of On Screen Display.	
Response	Acceptable	[ACK] [CR]
response	Unacceptable	"?"[CR]

### 6.29. DISPLAY CLEAR Command

Command	"C1E" [CR]	
Detail	Clear On Screen Display. Clear On Screen Display unconditionally.	
Response	Acceptable	[ACK] [CR]
response	Unacceptable	" ? "[CR]

#### 6.30. BRIGHTNESS + Command

Command	"C20" [CR]	
Detail	Brightness of User Control +1.	
Response	Acceptable	[ACK] [CR]
rresponse	Unacceptable	"?"[CR]

#### 6.31. BRIGHTNESS - Command

Command	"C21" [CR]	
Detail	Brightness of User Control –1.	
Response	Acceptable	[ACK] [CR]
response	Unacceptable	" ? "[CR]

# 6.32. IMAGE (Toggle) Command

Command	"C27"[CR]	
Detail	Switch Image Setting status. This command works the same as "IMAGE" button on the remote control.	
Response	Acceptable	[ACK] [CR]
response	Unacceptable	"?"[CR]

### 6.33. ON START Setting Command

Command	"C28" [CR]	
Detail	Set Power ON Start. This status is stored in EEPROM and retained regardless of Power OFF/ON.	
Response	Acceptable	[ACK] [CR]
response	Unacceptable	" ? "[CR]

### 6.34. ON START Cancel Command

Command	"C29" [CR]	
Detail	Cancel Power ON Start. This status is stored in EEPROM and retained regardless of Power OFF/ON.	
Response	Acceptable	[ACK] [CR]
Response	Unacceptable	" ? "[CR]

### 6.35. Power Management Ready Command

Command	"C2A" [CR]	
Detail	Set Power Management to Ready mode. This status is stored in EEPROM and retained regardless of Power ON/OFF.	
Response	Acceptable	[ACK] [CR]
response	Unacceptable	" ? "[CR]

# 6.36. Power Management OFF Command

Command	"C2B" [CR]	
Detail	Set Power Management OFF. This status is stored in EEPROM and retained regardless of Power ON/OFF.	
Response	Acceptable	[ACK] [CR]
ТСЗРОПЗС	Unacceptable	" ? "[CR]

### 6.37. Power Management Shut down Command

Command	"C2E" [CR]	
Detail	Set Power Management to Shut down mode. This status is stored in EEPROM and retained regardless of Power OFF/ON.	
Response	Acceptable	[ACK] [CR]
Кезропас	Unacceptable	" ? "[CR]

### 6.38. D.ZOOM + Command

Command	"C30" [CR]	
Detail	Make screen image larger.  This command works the same as "D.ZOOM ▲" button of the remote control.	
Response	Acceptable	[ACK] [CR]
Response	Unacceptable	" ? "[CR]

### 6.39. D.ZOOM - Command

Command	"C31" [CR]	
Detail	Make screen image smaller.  This command works the same as "D.ZOOM ▼" button of the remote control.	
Response	Acceptable	[ACK] [CR]
Response	Unacceptable	" ? "[CR]

### 6.40. Video S-video Command

Command	"C34" [CR]	
Detail	Select S-video of Computer input. Although projector returns "OK", this command is not executed while Input search is On.	
Response	Acceptable	[ACK] [CR]
Response	Unacceptable	" ? "[CR]

### 6.41. POINTER RIGHT Command

Command	"3CA" [CR]	
Detail	Move the Pointer of Menu on screen display to the right.  This command differs from the operation of pointer ">" of the projector and has no function of Zoom +.	
Response	Acceptable	[ACK] [CR]
ТСЭРОПЭС	Unacceptable	" ? "[CR]

### 6.42. POINTER LEFT Command

Command	"C3B" [CR]	
Detail	Move the Pointer of Menu on screen display to the left.  This command differs from the operation of pointer "<" of the projector and has no function of Zoom	
Response	Acceptable	[ACK] [CR]
response	Unacceptable	" ? "[CR]

### 6.43. POINTER UP Command

Command	"C3C" [CR]	
Detail	Move up the Pointer of Menu on screen display.  This command differs from the operation of "▲" button of the projector and has no function of Keystone +.	
Response	Acceptable	[ACK] [CR]
Response	Unacceptable	" ? "[CR]

### 6.44. POINTER DOWN Command

Command	"C3D" [CR]	
Detail	Move down the Pointer of Menu on screen display.  This command differs from the operation of "▼" button of the projector and has no function of Keystone	
Response	Acceptable	[ACK] [CR]
response	Unacceptable	" ? "[CR]

### 6.45. ENTER Command

Command	"C3F" [CR]	
Detail	This command works the same as "SELECT" button of the projector and remote control.	
Response	Acceptable	[ACK] [CR]
Response	Unacceptable	"?"[CR]

### 6.46. FREEZE ON Command

Command	"C43" [CR]	
Detail	Freeze the screen. This command works the same as "FREEZE" button of the remote control for Freeze ON, but does not work for Freeze OFF.	
Response	Acceptable	[ACK] [CR]
reoponee	Unacceptable	" ? "[CR]

# 6.47. FREEZE OFF Command

Command	"C44" [CR]	
Detail	Cancel Freeze function.  This command works the same as "FREEZE" button of the remote control for Freeze OFF, but does not work for Freeze ON.	
Response	Acceptable	[ACK] [CR]
	Unacceptable	" ? "[CR]

### 6.48. INPUT 1 Analog RGB Command

Command	"C50" [CR]	
Detail	Select Analog RGB input of Computer. Although projector returns "OK", this command is not executed while Input search is On.	
Response	Acceptable	[ACK] [CR]
	Unacceptable	" ? "[CR]

### 6.49. INPUT 1 Scart Command

Command	"C51" [CR]	
Detail	Select Scart input of Computer. Although projector returns "OK", this command is not executed while Input search is On.	
Response	Acceptable	[ACK] [CR]
Теоропос	Unacceptable	"?"[CR]

### 6.50. COMPUTER Component Command

Command	"C54" [CR]	
Detail	Select Component input of Computer.  Although projector returns "OK", this command is not executed while Input search is On.	
Response	Acceptable	[ACK] [CR]
response	Unacceptable	" ? "[CR]

### 6.51. AUTO PC ADJ. Command

Command	"C89" [CR]	
Detail		C Adj. works the same as AUTO PC ADJ. button of the remote control. mmand during operation, Auto PC Adj. is suspended.
Response	Acceptable	[ACK] [CR]
	Unacceptable	" ? "[CR]

# 6.52. PRESENTATION TIMER Command

Command	"C8A" [CR]	
Detail	Execute Presentation Timer. This command works the same as "P-TIMER" button of the remote control.	
Response	Acceptable	[ACK] [CR]
	Unacceptable	" ? "[CR]

### 6.53. KEYSTONE ↑Command

Command	"C8E" [CR]	
Detail	Correct keystone distortion by reducing upper part of image.	
Response	Acceptable	[ACK] [CR]
	Unacceptable	" ? "[CR]

### 6.54. KEYSTONE ↓Command

Command	"C8F" [CR]	
Detail	Correct keystone distortion by reducing down part of image.	
Response	Acceptable	[ACK] [CR]
response	Unacceptable	"?"[CR]

#### 7. Status Read Command

### 7.1. Format

7.1.1. PC issues commands in format as below;

Command: 1 character (See Basic Status Read Command Table)

7.1.2. When a projector receives the appropriate command, it returns a character line as the required data.

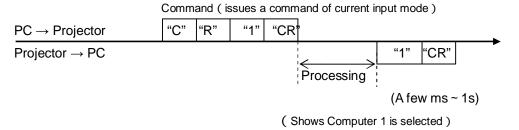
Required Data [CR]

Required Data: A character line (See Basic Status Read Command Table)

7.1.3. When the received data cannot be decoded, the projector returns "?" [CR].

### 7.2. Transfer Example

Get input mode for projector with basic commands



#### 7.3. Status Read Command

Command	"CR0" [CR]	
Detail	Get the projector status	
	Acceptable	"%1" [CR]
Response	%1	"00" = Power ON  "80" = Standby  "40" = Processing Countdown  "20" = Processing Cooling Down  "10" = Power Failure  "28" = Processing Cooling Down due to Temperature Anomaly  "88" = Coming back after Temperature Anomaly  "24" = Processing Power Save/Cooling Down  "04" = Power Save
	Unacceptable	"?" [CR]

### [Details of Response]

### "00" [CR]

Status: Power ON

Normal image is on the screen.

### "80" [CR]

Status: Standby

When the status is Standby, Status Read Commands are always acceptable, but Functional Execution Commands are not acceptable except POWER ON Command.

#### "40" [CR]

Status: Processing Countdown

When "Display" in Setting Menu is ON and POWER ON is executed, it starts processing Countdown.

When "Display" in Setting Menu is OFF, processing Countdown is canceled and the status quickly moves to Power ON.

### "20" [CR]

Status: Processing Cooling Down

When the status is Power ON, and POWER OFF Command ("C01"[CR]) is executed, it moves to Cooling Down status.

This status automatically moves to Standby after lamp turns off and the fan spin finishes after about 90 seconds. The fan spin time depends on a model.

This function is used to cool down the lamps and other optical parts and is quite important for projector's reliability.

During this time, Functional Execution Commands are invalid.

#### "10" [CR]

Status: Power Failure

When the power supply voltage inside the projector reaches abnormal status, the projector is automatically turned off. The projector returns "10"[CR], which shows it moves to Power OFF status due to power failure. Fan also stops unlike Cooling Down status.

#### "28" [CR]

Status: Processing Cooling Down due to Temperature Anomaly

When the inside temperature is out of the operating temperature, it automatically starts Cooling Down. Response for this status is "28"[CR].

Even if the temperature decreases during this process, Cooling Down is executed.

### "88"[CR]

Status: Coming back after temperature anomaly

When the status moves to Standby after Cooling Down due to temperature anomaly, it returns "88" [CR].

This shows that the status turns to Standby because of abnormal temperature.

This status maintains until next operation is done. When Power On is executed, the information of temperature anomaly is canceled and normal operation is executed.

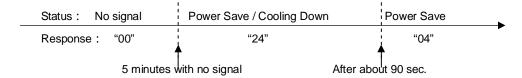
#### "24"[CR]

Status: Processing Power Save / Cooling Down

Power management function in Setting menu works and the status goes to Power Save / Cooling Down.

During this time, Functional Execution Commands are invalid (not executed).

This status moves to Power Save at set hours after the operation of Cooling Down.



#### "04"[CR]

Status: Power Save

This shows that it moves to Power Save status by Power management function in Setting menu.

### 7.4. Input Mode Read Command

Command	"CR1" [CR]	
Detail	Get the selected Input.	
	Acceptable	"%1" [CR]
Response	%1	"1" = Computer is selected "3" = Video is selected
	Unacceptable	"?" [CR]

# 7.5. Lamp Time Read Command

Command	"CR3" [CR]	
Detail	Get the total lamp running hours (corresponding value).	
Acceptable "%1" [CR]		"%1" [CR]
Response	%1	Shows the time period with 5 digits numbers.  Example: "00410"[CR] ····shows 410 hours
	Unacceptable	"?" [CR]

# 7.6. Setting Read Command

Command	"CR4" [CR]	
Detail	Get the screen setting status such as Ceiling / Rear.	
Response	Acceptable	"%1" [CR]
	%1	"11"[CR] = Normal Screen Setting "10"[CR] = Picture is top/bottom reversed.  (Status: Rear & Ceiling ON)  "01"[CR] = Picture is left/right reversed. (Status: Rear ON)  "00"[CR] = Picture is top/bottom and left/right reversed.  (Status: Ceiling ON)
	Unacceptable	"?" [CR]

### 7.7. Temp Read Command

Command	"CR6" [CR]	
Detail	Get the temperature data inside the projector. With some temperature sensors installed in the projector, it is possible to get all the temperature at once.	
	Acceptable	"%1_%2_%3" [CR]
Response	%1 %2 %3	%1 = Temperature of sensor 1 %2 = Temperature of sensor 2 %3 = Temperature of sensor 3 Temperature data is shown as "00.0". When the temperature goes down to -, the first character becomes "-" instead of a space, like "-05.5" [CR]. When no temperature data can be returned due to hardware problems, the first character becomes "E" like"E00.0" [CR]. When several temperature sensors are equipped, Responses are returned continuously. "_31.535.233.4"[CR] The first data is sensor 1, then one space, and the data of sensor 2 follows.
	Unacceptable	"?"[CR]