INSTRUCTION MANUAL

CHECK MAN CM-7S





Fuji Controls Co., Ltd. 1-5-6 Iidabashi, Chiyoda-ku, Tokyo 102-0072 TEL: 03-3265-5437 FAX: 03-3265-5730

Apr 26, 2017 ver. 1.00

This equipment is designed for use in Japan. When using the equipment outside Japan, be sure to comply with the safety regulations of the country. Please keep this instruction manual on hand for reference at any time. The contents of this instruction manual are subject to change without notice for product improvement.

Safety Precautions

The following cautions are provided to ensure the safe and correct usage of this product, as well as to prevent injury of those concerned or physical damage to the equipment or property.

\Box CAUTION	N Indicates a situation where a failure to observe instructions may result in minor to moderate injury, as well as a warning against unsafe use or physical damage.			
	Applying a voltage or current exceeding the maximum allowable value as the input may damage the equipment.			
	Use a supply voltage within the permissible range. Otherwise, it may cause a fire, electric shock, or failure.			
□ CAUTION	Use the equipment at an ambient temperature from 0 to 50°C. Avoid exposure to direct sunlight and hot air, and choose a place with low dust or noise. Avoid direct contact between the equipment and organic solvents such as thinners, water, and machine oil. It may cause malfunction or failure of the equipment.			

Page

Table of Contents

1.	Befo	re Using the Equipment	1
	1-1	Terminal Connection and Description	1
	1-2	External Dimensions and Mounting Method	3
	1-3	Part Names and Functions	4
	1-4	Double Function Key Operations	4
2.	How	7 to Use Each Function	5
	2-1	Default Settings for Each Data	5
	2-2	Condition Data	5
	2-3	Comparison Setting	7
3.	How	7 to Use Other Functions	8
	3-1	Control Terminals	8
	3-2	Set Load Arrival Output	9
	3-3	MCP (1 Point/2 Point Hold) Function	9
	3-4	Analog Output1	.0
4.	Erro	or Messages 1	1
5.	Spee	ifications1	2
6.	RS-2	232C Instruction Manual1	4
7.	Wir	ing Example and Timing Chart	.6

1. Before Using the Equipment

1-1 Terminal Connection and Description

■ Upper screw terminals



Terminal No.	Description			
12	Changes the pattern used.			
3	Controls the peak hold operation.			
4	Performs measurement with the value displayed immediately before as "zero."			
5	Used when all comparison outputs are turned to OFF. Used in free run mode.			
6	Resets the peak hold value, comparison result, etc. to their initial states.			
78	Performs comparison judgment when the MCP (1 point/2 point hold) is enabled.			
9	Selects BCD output when the 2 point hold of the MCP function is enabled.			
10	Do not use. (NC)			
11121314	Photocoupler output for HI, GO, and LO (NG, GO, and AOF) (comparison output)			
	Do not apply reverse voltage.			

■ Lower screw terminals



Terminal No.	Description	
12345	Load cell terminal	
6	Holds the previous measurement data and comparison result. Used in free run mode.	
\bigcirc	Common control input terminal (insulated from the AG terminal of ③)	
8	Do not use. (NC)	
910	Connects the power supply for the main unit. (100 VAC)	

■ BCD output connector (provided with pressure connector with strain relief)

The BCD data is output through MIL standard-compliant plugs. Use the provided connectors.

They are also compatible with commercially available MIL standard-compliant sockets. The output type is NPN open collector output



RS-232C D-sub connector

No connectors are provided. Use commercially available D-sub 25p connectors. Compatible connector: 17JE-23250-02 (D8A) (manufactured by DDK)



□ CAUTION	"O" indicates a vacant terminal. Do not use.	
-----------	--	--

■ Analog output (screw terminal)



□ CAUTION	NC indicates a vacant terminal. Do not use.
-----------	---

*1) In the case of the analog output specification, output is 0 to 10 V.

1-2 External Dimensions and Mounting Method

External dimensions (The RS-232C specification is illustrated in the figure.)



★ In the case of RS-232C

■ Mounting method



1-3 Part Names and Functions



No.	. Name		Function			
1	Main		Displays measured values and errors; displays calibration values and comparison values in the			
			Setting Mode; displays data when setting the condition data.			
2	Monitor		Displays the HI and LO settings; displays messages in the Setting Mode.			
3	Pattern		Displays the patterns of the comparison data and scaling data, as well as Comparisons 1 and 2.			
4	Comparison output		Displays the output conditions of the comparison outputs.			
5	Function display E1		Turns on synchronously with the input of Load Measurement Completion 1.			
		E2	Turns on synchronously with the input of Load Measurement Completion 2.			
		LS	Turns on when the set load arrival value is exceeded. Externally outputs the set load arrival signal when the set load arrival output function is turned on in the parameter settings.			
6	Sheet switch	(Enter)				
	(Mode)					
		(Shift)				
		(Increment)				
		□ (Set)				

1-4 Double Function Key Operations

Operation Key	Function	Operation	Reference Location
\Box + \Box Sets the condition data.		Advance to the next item with the \Box (M) key, ($\Box \Box \Box$ (PRO) $\rightarrow \Box \Box \Box$	Chapter 2,
3 seconds	(Stops the measurement operation.)	\Box (BAUD)), set data with the $\Box \Box$ ($\blacktriangleright \blacktriangle$) key, and return to the	2-2
		measurement operation with the \Box (E) key.	
		Setting can be performed only when $\Box \Box \Box$ (PRO) is $\Box \Box \Box$ (OFF).	
	Sets the comparison value.	Advance to the next item with the \Box (M) key (\Box \Box (P-) \rightarrow \Box \Box	Chapter 2,
	(Stops the measurement operation.)	(PUH)), set data with the $\Box \Box$ ($\blacktriangle \triangleright$) key, and return to the measurement	2-3
		operation with the \Box (E) key.	
		Setting can be performed only when $\Box \Box \Box$ (PRO) is $\Box \Box$ (01) or $\Box \Box$	
		\Box (OFF).	
	Displays the comparison result.	Switch between Comparison 1 and 2 with the \Box (\blacktriangle) key. Return to the	Chapter 3, 3-3
	(During the measurement operation.)	measurement operation with the \Box (E) key.	
	Changes the pattern.	Switch the pattern by pressing the \Box (\blacktriangleright) + \Box (\blacktriangle) keys.	
	(During the measurement operation.)	Enabled only when the " \Box \Box \Box (PSEL)" setting of the condition data	
		is " \Box (IN)" (Internal).	

*1) When using a double function, be sure to press the □ (E), □ (S), and □ (►) keys first. If buttons are pressed in the reverse order, the operation will not be accepted.

*2) The above double function key operations without time display are accepted 0.5 seconds after the keys are pressed.

2. How to Use Each Function

2-1 Default Settings for Each Data

■ Condition data

Display	Function	Default
\square \square \square (PRO)	Key operation protection setting	
$\Box \Box \Box (SMP)$	Sampling speed setting	
$\Box \Box \Box (DCY)$	Display speed setting	
$\Box \Box \Box (MCP)$	MCP function setting	
$\Box \Box \Box$ (MAV)	Number of moving average setting	
$\Box \Box \Box (TR T)$	Zero setting 1	
$\Box \Box \Box$ (TR W)	Zero setting 2	
\square \square \square \square (PSEL)	Pattern selection control setting	
\Box \Box \Box \Box (AOHI)	Analog output HI setting	
\Box \Box \Box \Box (AOLO)	Analog output LO setting	
\square \square \square \square (BAUD)	Baud rate setting	
$\Box \Box \Box (AOF)$	Set load arrival output function setting	
\Box \Box \Box \Box (ASET)	Load arrival value setting	
\Box \Box \Box \Box (CLDZ)	Clear & digital zero interlinking setting	
\Box \Box \Box \Box (ANLO)	Analog output value switching setting	
\square \square \square \square (BCDO)	BCD output value switching setting	

Comparison data

Display	Function	Default
\Box \Box \Box \Box (S-HI)	HI comparison setting	
$\Box \Box \Box \Box \Box (S-LO)$	LO comparison setting	

Setting	P1		P2		P3		P4	
	E1	E2	E1	E2	E1	E2	E1	E2
S-HI	1000	1000	1000	1000	1000	1000	1000	1000
S-LO	500	500	500	500	500	500	500	500

2-2 Condition Data

2-2-1 Setting Condition Data

Condition data setting refers to the data setting that determines the operation mode of each function of this equipment.

When the \Box (E) + \Box (\blacktriangle) keys on the front are pressed (3 seconds), the condition data setting mode is displayed as shown on the following page. Settings can be changed when $\Box \Box \Box$ (PRO) is $\Box \Box \Box$ (OFF).

Each condition is displayed on the monitor display with each press of the \Box (M) key. Data is set with the \Box (\blacktriangle) or \Box (\blacktriangleright) key.

The configured data becomes effective when the \square (E) key is pressed, and the measurement operation starts.

During configuration, the BCD output becomes "0000" while the analog output becomes 0 V. The measurement operation stops during configuration.

2-2-2 Explanation of Condition Data



1 Return to PRO

2-2-3 Wiring Settings Required in Each Mode

Mode Input terminal		Free run	1 point hold	2 point hold				
COM input	terminal	•	•	•				
	0	Δ	Δ	Δ				
P.SEL	1	Δ	Δ	Δ				
PH		Δ	Δ	Δ				
DZ		Δ	×	×				
R.RI	3	Δ	×	×				
CLR	ł	Δ	•	•				
	E1	×	×	•				
COMP	E2	×	•	•				
BCD S	EL	×	×	Δ				
S/H		Δ	×	×				
Setting	Mode	Free run	1 point hold	2 point hold				
MCI	þ	OFF	ON2	ON1				
CLD	Z	OFF	ON	ON				

•: Required, \triangle : Configurable, \times : Not required

2-3 Comparison Setting

Setting comparison data

When you press the front \Box (E) + \Box (M) keys (0.5 seconds), the comparison data setting mode is displayed as shown in the following image. If you press \Box (M) (3 seconds), you can check only the comparison data for the currently-selected pattern.

When setting is complete and the equipment returns to the measurement operation, it returns to the same state as when the clear operation is executed. The set values are displayed in the main display area. The values become effective when the \Box (E) key is pressed, and the equipment returns to the measurement operation.

*2) The equipment stops the measurement operation during configuration.

How to set comparison data

In the comparison data-setting mode, the patterns to be set on the pattern display area are displayed. Change the pattern with the \Box (\blacktriangle) key while the decimal point of the LED on the pattern display area is blinking (select from 1 to 4).

Next, when you press the \Box (M) key, the LO setting display area changes to " $\Box \Box$ (E-)." The comparison number will appear in the HI setting area, and the decimal point will start blinking. Set the number for which comparison value setting is to be performed with the \Box (\blacktriangle) key (select 1 or 2).

The setting values for the numbers set here will be used when the COMP E1 and E2 control terminals operate. Next, the items to be set will be displayed on the monitor display area each time you press the \Box (M) key, from the HI comparison setting to the LO comparison setting. On the main display, the data of each setting is displayed. Use the \Box (\blacktriangleright) key to move between digits, and set the value with the \Box (\blacktriangle) key. When the setting mode is displayed, the decimal point of the digit to be set will start blinking.

Setting range Comparison value: 0 to 9999

Setting condition S-HI > S-LO

Set comparison data

 $\square + \square (0.5 \text{ sec})$



3. How to Use Other Functions

3-1 Control Terminals

Input the control signal through no-voltage contact input. When inputting the signal by devices such as a transistor, use the open collector output.

In the case of contact input, use a contact for minute current since the amount of contact current is low.

The input rating of each control is as follows.

"0" level: 0 to 1.5 V or lower

"1" level: 3.5 to 5 V, input current -0.5 mA or lower.

3-1-1 Pattern Selection

When changing the pattern from an external terminal, connect the terminals in the following table with the COM terminals.

Pattern No.	P1	P2	P3	P4
Upper screw terminal				
①[P.SEL0]	OFF	ON	OFF	ON
②[P.SEL1]	OFF	OFF	ON	ON

The contents of the comparison settings are as described in the following table.

Setting	Р	1	P2	2	Р	3	Р	4
	E1	E2	E1	E2	E1	E2	E1	E2
S-HI	1000	1000	1000	1000	1000	1000	1000	1000
S-LO	500	500	500	500	500	500	500	500

*1) Control from the terminals is enabled when $\Box \Box \Box \Box$ (PSEL) is set to $\Box \Box \Box$ (OUT) in the condition data settings.

*2) When the pattern is changed from an external terminal, the time it takes for the data to be switched after the pattern change is 25 ms or less.

3-1-2 Peak Hold

The peak hold ((PH)/peak value) operation is performed with the contents selected in the comparison setting.

When the PH terminal and the COM terminal are short-circuited or set to level "0," the peak hold operation is performed while the terminals are short-circuited.

When the PH terminal is open or set to level "1," the peak hold operation is canceled.



3-1-3 Digital Zero (Free Run)

When the DZ terminal and the COM terminal are short-circuited or set to level "0," the value displayed immediately before is set to "zero." The value displayed thereafter will be as follows:

(Input value – Digital zero value) = Displayed value (measured value)

The digital zero operation is not accepted in the hold state; it must be set in the free run state.

*1) If the digital zero and peak hold operations are turned on simultaneously, the digital zero operation takes priority.

*2) The display range changes after the digital zero operation is performed.

Example: If the digital zero operation is performed with a display of 5000, the display upper limit is 9999 - 5000 = 4999.

3-1-4 Relay/Reset (Free Run)

When the R.RE terminal and the COM terminal are short-circuited or set to level "0," all comparison outputs are turned off. The comparison output display will also be turned off.

This control can be performed regardless of the status of Start/Hold.



3-1-5 Start/Hold (Free Run)

When the S/H terminal and the COM terminal are short-circuited or set to level "0," the result of the measurements performed immediately before and comparison result are held.

Measurement is restarted when the S/H terminal is opened or level "1" is reached.

The time required to output the measurement result depends on the sampling speed.

3-1-6 Clear

When the CLR terminal and the COM terminal are short-circuited or set to level "0," the following clear operations are performed.

- · Clears the peak value.
- Turns off comparison outputs.
- Sets the display value to zero when CLDZ is ON.
- Note: The clear operation is a one-shot operation, and is activated when the CLR terminal and COM terminal change from open to short-circuit or when the input to the terminal changes from level "1" to level "0." Therefore, all of the above operations are executed when the CLR terminal and the COM terminal are short-circuited or set to level "0" as well.

3-2 Set Load Arrival Output

Use this function to change the comparison outputs (HI, GO, LO) and to output the set load arrival signal.

Turn the function on by setting the set load arrival output function setting "

Next, input the value at which output is produced in the load arrival value setting "

As for the comparison outputs, the NG signal of HI and LO changes to HI, and the signal of LO changes to the set load arrival signal $\Box \Box \Box$ (AOF). (HI, GO, LO) \rightarrow (HI/LO, GO, AOF)

When the set load is reached (exceeded), the set load arrival signal is output to the comparison output terminal LO (AOF). The LS lamp on the panel also turns on.

3-3 MCP (1 Point/2 Point Hold) Function

This function enables comparison and judgment of arbitrary points. This function operates when $\Box \Box \Box$ (MCP) in the condition data setting is $\Box \Box \Box$ (ON1) or $\Box \Box \Box$ (ON2).

3-3-1 Operations by Comparison Terminals (E1 and E2)

Input a signal to E2 in the case of 1 point hold, and to E1 and E2 in the case of 2 point hold. 1) Operation when holding a fixed point load value

When the clear operation is executed at the CLR terminal, the previous comparison result and the hold are released.

The comparison is output when the comparison terminals E1 and E2 among the external control terminals and the COM terminal are short-circuited or set to level "0" (one-shot falling signal).

At this point, the pattern display area displays the number of the operating terminal, and the HI/LO setting display area displays the comparison setting of that terminal number.

The comparison operation ends at E2, and the measured value display and comparison result are held at this point. Operation of the comparison terminals is not accepted after this point.

2) Operation when holding the peak value

When the PH terminal and the COM terminal are short-circuited or set to level "0," the peak hold operation starts. When the clear operation is executed at the CLR terminal, the previous comparison result and hold state are released.

When E1 is operated, the peak values during the period between the input of clear and the start of the comparison selection operation are compared. Next, measured values are cleared before they are updated.

The comparison operation ends at E2, and the measured value display and comparison result are held at this point. Operation of the comparison terminals is not accepted after this point.

If the PH terminal is opened or set to level "1" while E1 is operating, the main display will become the normal display.

When the PH terminal and the COM terminal are short-circuited or set to level "0" again, the main display will become the normal display until the next comparison is executed.







E1, E2: Comparison terminal operation point

3-3-2 Matters Concerning Operations of Comparison Terminals

In the case of 2 point hold

- When the comparison result for Comparison 1 is "GO," it will be output to the monitor but not to the output terminal (when the result of Comparison 2 is GO).
- If the result is "HI" or "LO," it will also be output to the output terminal. After comparison is performed at Comparison 1, the comparison result will be held until the next comparison is executed.
- The comparison result for Comparison 2 will be displayed and output to the output terminal if the comparison result for Comparison 1 is "HI" or "LO."
- If the clear operation is performed at the CLR terminal while comparison is performed, the comparison result will be released.
- At this point, the pattern display area displays the selected pattern number.
- The HI/LO comparison display area displays \Box \Box \Box \Box (----).
- Be sure to perform holding in the order of E1 to E2. If holding is performed from E2 first, GO will not be output.

In the case of 1 point hold

• The comparison result for E2 is output as it is.

3-3-3 Comparison Result Check Function

By pressing $\Box(S) + \Box(\blacktriangle)$ while the MCP (1 point/2 point hold) function is operating, you can check the results of Comparison E1 and E2 that have been completed up to that point. The pattern number display area shows the comparison number. The main display area shows the measured value during the comparison, and the comparison display area shows the settings for Comparison 1 and 2. The selection number changes each time the $\Box(\blacktriangle)$ switch is pressed. Press the $\Box(E)$ key to return to the measurement operation. The comparison output monitor lights up the comparison result for each comparison. However, the comparison output does not change at this point. For numbers that were not compared, the main display area shows " $\Box\Box\Box\Box(----)$ " and the comparison output monitor does not light up. When the clear operation is performed at the CLR terminal, the comparison results are cleared.





3-4 Analog Output

The analog output of this equipment can produce output of 0 to 10 V over an arbitrary range of input values. The output range is set by \square \square \square (AOHI) (Analog HI setting) and \square \square \square \square (AOLO) (Analog LO setting) in the scaling data settings.

Setting is performed using the \Box (\blacktriangleright) and \Box (\blacktriangle) switches.

There are no restrictions for magnitude correlation between \Box \Box \Box (AOHI) and \Box \Box \Box \Box (AOLO).

 \Box \Box \Box \Box (AOHI): Value displayed when the analog output is 10 V

 \Box \Box \Box \Box (AOLO): Value displayed when the analog output is 0 V

Example: Set the analogue output to 10 V when the displayed value is 1000.

Set the analog output to 0 V when the displayed value is 100.

□□□ (AOHI): □□□ (1000)

□□□ (AOLO): □□□ (0100)

Setting range AOHI: -9999 to 9999

AOLO: -9999 to 9999





- *1) If the displayed value becomes larger than the analog output value, the output of 0 to 10 V will become approximately 11 V or greater. If the display is $\Box \Box$ (o.L.), the output of 0 to 10 V will become approximately 11 V or greater. If the display is $\Box \Box \Box$ (-o.L.), the output will become 0 V.
- *2) Analog output outside the setting range is not correctly output.
- *3) Output becomes 0 V for the following operations:

Condition data setting, comparison setting, and calibration setting

*4) When the power is turned on, all LEDs of the equipment turn on and the equipment becomes operable after approximately 3 seconds. However, analog output remains unstable until all LEDs have been turned on, after which analog output becomes 0 V until the equipment becomes operable.

4. Error Messages

Error messages are displayed on the main display area.

Display Content	Error Description	Recovery Method
The 100-digit segment turns on, and all digits after the decimal points are blinking.	Main unit internal memory abnormality	Turn the power off and then on again.
□ □ All digits after the decimal points are blinking.	Digital zero value Backup data abnormality	Perform a write operation of the digital zero value. (Refer to the explanation on "□□□ (BUP)" in the condition data setting.)
□□□ All digits after the decimal points are blinking.	Calibration data abnormality	Reset the calibration data.
□□□ X. All digits after the decimal points are blinking. (X: Pattern No.)	Data abnormality in the pattern displayed in X	Reset the data of the pattern number for which the abnormality has occurred.
All digits after the decimal points are blinking.	Condition data abnormality	Reset the condition data.
All digits after the decimal points are blinking (the number changes depending on the situation).	Input value or display value has exceeded the measurement range during the peak hold operation.	Cancel the peak hold operation once.
	Input value or display value has exceeded the measurement range, or the load cell is broken (Compression set, cable disconnection).	Use the equipment within the specified measurement range and display range.
	The microcomputer is waiting for data input.	If the setting is changed while the start/hold and peak hold functions are ON, cancel each operation once.

□ CAUTION	When \square
-----------	--

5. Specifications

General specifications

- 1. Accuracy: \pm (0.15% of FS + 1 digit) (23°C \pm 5°C)
- 2. Sampling speed: 2000 times/second
- 3. Temperature characteristics: $\pm (0.005\% \text{ of } rdg + 0.5 \text{ digit})/^{\circ}C$
- 4. Load cell power supply: 10 VDC \pm 10% 30 mA
- 5. Zero-point adjustment range: -0.3 to +2.0 mV/V
- 6. Gain adjustment range: 1.0 to 3.0 mV/V
- 7. Max. input voltage: 3.0 mV/V
- 8. Max. display: 9999 (full 4 digits)

External control

- 1. Hold: Short-circuit the COM terminal and the S/H terminal or set the terminal input to level "0."
- 2. Start: Open the COM terminal and the S/H terminal or set the terminal input to level "1."
- 3. Digital zero: Display the value immediately before as "0" and store the value by short-circuiting the COM terminal and the DZ terminal or setting the terminal input to level "0."
- 4. Peak hold: Short-circuit the COM terminal and the PH terminal or set the terminal input to level "0."
- 5. Pattern selection: Four patterns can be set at will by combining the COM terminal and the P.SEL terminals 0 and 1.
- 6. Comparison terminal: Short-circuit the COM terminal and the comparison terminals E1 and E2 or set the terminal input to level "0."
- 7. Clear: Clear the result of comparison by short-circuiting the COM terminal and the CLR terminal or set the terminal input to level "0."

Input rating of each control: Level "0": 0 to 1.5 V, Level "1": 3.5 to 5 V, Input current: -2 mA or lower

Comparison unit

- 1. Setting range: Upper and lower limit settings including polarity 0 to 9999
- 2. Comparison operation: 1 and 2 point comparison by comparison terminals E1 and E2, or continuous comparison

3. Comparison condition:

Comparison condition	Comparison result
Measured value > upper limit setting	HI
Upper limit setting \geq measured value \geq lower limit setting	GO
Lower limit setting > measured value	LO

4. Photocoupler output: Max. voltage 30 V, max. current 20 mA, output saturation voltage 1.2 V or lower with 20 mA current (NPN)

Others

- 1. Memory backup: Uses EEPROM, and retains setting data for approx. 10 years (guarantees 100,000 write operations).
- 2. Operating temperature/humidity range: 0 to 50°C, 35 to 85% RH (no condensation)
- 3. Storage temperature/humidity range: -10 to 70°C, 60% RH or lower
- 4. Power supply: 100 VAC \pm 10% (50/60 Hz)
- 5. Power consumption: 7 VA
- 6. External dimensions: 96 mm (W) \times 48 mm (H) \times 144 mm (D) DIN size
- 7. Weight: Approx. 550 g
- 8. Withstand voltage: Input terminal/comparison output 500 VDC; 1 min
 - Input terminal/each output COM (BCD:D.COM, ANALOG OUT:-, RS-232C:SG) 500 VDC; 1 min
 - Power supply terminal/input terminal, case, comparison output 1500 VAC; 1 min
 - Power supply terminal/each output COM (BCD:D.COM, ANALOG OUT:-, RS-232C:SG) 1500 VAC; 1 min (for 100 VAC power supply specification)
- 9. Insulation resistance: 100 $M\Omega$ or greater at 500 VDC between each terminal above
- Noise immunity: ±1500 V at power supply terminals in normal or common mode (Waveform with 1 ns rising edge and noise width of 500 ns)

■ Input/output specifications

• BCD data output (isolated from input)

Open collector (NPN type)

- 1. Measurement data: Negative logic. Transistor ON when logic is "1."
- 2. Polarity signal: Transistor ON when a negative value is displayed.
- 3. Over signal: Transistor ON when the input signal is beyond the measurement range.
- 4. Printing command signal: Transistor ON for a given period after each measurement is completed. (Depends on the sampling rate.)
- 5. Transistor output capacity: Voltage 30 V (max.), current 15 mA (max.), output saturation voltage 1.2 V or smaller at 15 mA

ENABLE input

When the ENABLE terminal and the D.COM terminal are short-circuited or set to level "0," the data output transistor will become "OFF." (In the case of TTL, data output will enter a high impedance state.)

Level "0": 0 to 1.5 V, Level "1": 3.5 to 5 V, Input current: -0.5 mA or smaller

Output

• Under the 2 point hold mode (MCP setting ON1)

The hold values when input is made to E1 and E2 are output.

When the BCD SEL terminal and the D.COM terminal are short-circuited or set to level "0," data for E2 is output. When the terminal is open or set to level "1," data for E1 is output.

• Under the 1 point hold mode (MCP setting ON2), the hold values when input is made to E2 are output.

• Under the free run mode (MCP setting OFF)

Output is produced constantly. Output of the input value or displayed value can be selected using the BCD output value switching setting of the condition data.

*1) Output becomes "0000" for the following operations:

Condition data setting, comparison setting, and calibration setting

*2) When the display is 🗌 (o.L.) or 🗌 🗋 (-o.L.), the value immediately before is output and the over signal becomes level "1" or "ON."

*3) When the power is turned on, all LEDs of the equipment turn on and the equipment becomes operable after approximately 3 seconds. However, BCD output remains unstable until all LEDs have been turned on, after which the BCD output becomes level "0" until the equipment becomes operable (transistor "OFF" when open collector output is used).

• RS-232C (isolated from input)

1. Electrical characteristics: Compliant with EIA RS-232C

- 2. Synchronization method: Start-stop synchronization method
- 3. Communication method: Full-duplex communication
- 4. Transmission rate: 2400/4800/9600/19200 bps
- 5. Start bit: 1 bit
- 6. Data length: 7 bit
- 7. Error detection: Even parity
- 8. Stop bit: 2 bit
- 9. Delimiter: CR/LF
- 10. Character code: ASCII
- 11. Transmission control procedure: No procedure

• Analog output (isolated from input)

The display range in which analog output is produced can be set at will.

- 1. Resolution: Equivalent 14 bits
- 2. Temperature coefficient: ±200 ppm/°C
- 3. Output response: 700 µs or less (10% to 90%)

Output	Load resistance	Accuracy	Ripple		
0 to 10 V	$10 \text{ k}\Omega$ or greater	$\pm 0.5\%$ of FS	50 mVP-P		
Note: Accu	racy is measured u	nder the condition o	$f(23^{\circ}C \pm 5^{\circ}C, 3)$	- 35 to 85% RI	H)

Output

• Under the 1 point/2 point hold modes (MCP setting ON1, ON2)

The current input value is output.

• Under the free run mode (MCP setting OFF)

Output is constantly produced. Output of the input value or displayed value can be selected using the analog output value switching setting of the condition data.

6. RS-232C Instruction Manual

6-1 Terminal Connections

This equipment uses five data lines of Transmit Data (TXD), Receive Data (RXD), Request to Send (RTS), Clear to Send (CTS), and Signal Ground (SG), and does not use other control signals. Additionally, RS-232C is used in various forms to conform to standards, and connector pin arrangement or control methods for control signals may differ depending on the computer. Please check these matters in the operation manuals of the computers to be used.



* Compatible connector: 17JE-23250-02 (D8A) (manufactured by DDK)



6-2 Setting Baud Rate

Enter the condition data setting mode by pressing the \Box (\blacktriangle) switch while holding down the \Box (E) switch. Keep pressing the \Box (M) switch until the " \Box \Box \Box (BAUD)" (baud rate setting) item appears. Once \Box \Box \Box (BAUD) appears, set the desired baud rate. After setting is complete, press the \Box (E) switch to return to the measurement operation.

6-3 Operation Check

After the baud rate setting is complete, perform operation check using Windows HyperTerminal or other tools.

6-4 Commands

6-4-1 RS-232C Command Format and Response Format

6-4-2 Responses



6-5 Commands and Formats

Functio	n descrip	otion Host	side H	Equipment meter s	side	
	No.	Function	1 2 3 4 5 6 7 812	Character length	1 2 3 4 5 6 7 19	Character length
	7-2-2	Protection setting	PRODOFCRLF	6	YES CRLF	4
		[W]			Response from the equipment	

This is a command that writes data to EEPROM.

Function	1	2	3	4	5	6	7	8	9	10	11	12	Character	1	2	3	4	5	6	8	9	10	11	12	13	14	15	16	17	18	19	Character
Persona of the protection setting	T D	2 D	5	T CD	J		ŕ	0	-	10		12	length 2	T D	2 D	0	-	0			1	Dot	11	12	of th	1.4	1.5	10	aordi	nato		length 6
Returns the equipment setting contents.	г	к	0	CK	LF								3	г Р	R	0	-	0	2 C	R LI		the	equit	omer	it sta	tus.	pons			ligito	·	6
														Р	R	0	_	0	3 C	r Li												6
														Р	R	0	-	0	F 1	CF	LF											7
Protection setting [W]	р	R	0		0	1	CR	IF					6	v	Е	s			Е													4
Sets prohibition on changing the comparison	Р	R	0	_	0	2	CR	LF					6		-		-															·
setting, condition data, and calibration settings	Р	R	0	_	0	3	CR	LF					6																			
while measuring.	Р	R	0	-	0	F	CR	LF					6																			
Response of the sampling speed	S	м	Р	CR	LE					-	8		3	S	м	Р		2	0 0	0	CR	LF		-	H			+	+	+	-	5-8
Returns the equipment setting contents.	_		-										-			-	-	-														
Setting of the sampling speed [W]	S	М	Р	-	х	х	х	х	CR	LF			5-8	Y	Е	S	-	CR I	F													4
Settings: 2000, 1000, 500, 200, 100, 50, 20, 10, 5, 2, 1	1																															
Response of the MCP (1 point/2 point hold) function	М	С	Р	CR	LF					-			3	М	С	Р		0	N	CF	LF				\vdash			\dashv	+	+		7
Returns the equipment setting contents.			-										3	М	Ĉ	Р	_	0	N 1	CF	LF											7
													3	М	С	Р	-	0	F 1	7 CF	LF											7
Setting of the MCP (1 point/2 point hold) function [w] Enables 2 point hold	м	c	Р		0	N	1	CR	LE				7	v	Е	s			F													4
Enables 1 point hold.	М	c	Р	_	0	N	2	CR	LF				7	Y	E	S	_	CR I	F													4
Disables the MCP function.	М	С	Р	-	0	F	CR	LF					6	Y	Е	s	-	CR I	F													4
Response of the moving average setting	м	Δ	v	CR	LE						8		3	м	Δ	v		0	F 1		LE				\square			\dashv	-	+	-	7
Returns the equipment setting contents.				en									5	М	A	v	_	X	x z		LF											5-7
Setting of the moving average [W] Settings: 0 (OFF) 2 4 8 16 32 64 128 256	М	Α	v	-	х	х	х	CR	LF				5–7	Y	Е	s	-	CR	JF													4
Settings. 0 (011), 2, 4, 0, 10, 52, 04, 120, 250																																
Response of the pattern selection	Р	S	L	CR	LF						l		3	Р	S	L	-	XC	CR L	F												5
Returns the selected pattern number. X: 1–4	р		т		v		LE						E	v	Б	c			Б													4
Setting of the pattern selection [w] Switches the pattern number, X: 1–4 Configurable who	en 🗆			– PSEI	L) in	the	cond	lition	ı data	l 1 seti	tings	is 🗆	\Box (IN).	Ŷ	Е	5	-	CK	-F													4
When the MCP (1 point/2 point hold) function is enab	led, t	he p	atter	n is s	switc	hed	when	the	next	clea	aring	oper	ration is p	erfor	med	afte	r the	comn	nand	is exe	cuted											
When the MCP (1 point/2 point hold) function is disab	led (free 1	run),	the	patte	ern is	s swit	chec	limn	nedia	ately	after	r the com	mano	l is e	xecu	ted.															
Response of the comparison data	R	D	x	x	x	CR	LE				8		5	x	x	x	x	x	'R I	F	-	1			\square			\dashv	+	+	-	1-5
Returns the HI and LO settings for each pattern.						- CA							5																			
RD (Pattern No. 1 to 4) (MCP No. 1 or 2) (Setting No	. 1 fc	or HI	, 2 f	or LO	0) C	R LF																										
Example: Response of the HI setting of the first hold p	oint P	of P	atter	n 1 -	→ TI	he H	I set	tingi	is 1.5	00.				1		5	0	0	ד סי	F												
Example: Response of the LO setting of the second hol	ld po	int o	f Pa	ttern	3 -	> Th	e LO	sett	ing i	l s 0.0	20.			1	•	5	0															
· · ·	Ŕ	D	3	2	2	CR	LF		Ŭ					0		0	2	0 0	CR L	F												
			v	v	v		v	v	v	v			7.10	v	F																	
Setting of the comparison data [W] Sets the HI and LO values for each pattern	w	к	х	х	х	-	х	х	х	х	СК	LF	/-10	Ŷ	Е	5	-	СКТ	_F													4
WR (Pattern No. 1 to 4) (MCP No. 1 or 2) (Setting No.	b. 1 f	or H	I, 2 1	for L	.0) [) (Se	tting	1 to	4 di	gits)	CR I	LF																			
Example: Set the HI setting of the first hold point of P	atter	n 1 t	o 0.	650	→ Y	ES is	retu	rned	whe	n the	e con	figur	ation is s	et suc	cess	fully																
	w	R	1	1	1	-	6	5	0					Y	Е	s	-	CR	JF													4
Result (display) response											Ì							Ť	1	1	1	İ						\neg	+	1		
When the MCP (1 point/2 point hold) function is enab	led ()	X is a	i nur	neric	al va	ilue,	Y is	HI, C	50, c	or LO), th	ie nu	mbers aft	er th	e dec	imal	poin	ts are	inva	id.												
2 point hold (MCP ON1)	М	С	D	CR	LF								3	E	1	-	X V	X	X Z	-	Y	Y	CR CP	LF								10
														Б	2	-	Λ	^	^	· -	1	1	CK	LF								10
1 point hold (MCP ON2)	М	С	D	CR	LF								3	Е	1	-	-	-			-	_	CR	LF								10
														Е	2	-	Х	X	X	- 1	Y	Y	CR	LF								10
When the MCP (1 point/2 point hold) function is disab	led (w is I	PH.		(). X	isa	nume	erical	l Vali	le. Y	is H	I. GO. or	LO).	the	num	bers a	lfter t	l he de	l cimal	poin	l is are	vali	d.								
Free run	D	s	Р	CR	LF	Í							3	w	w	_	Х	X	x i	x x	1_	Y	Y	CR	LF							11
* If DSP is executed when the MCP (1 point/2 point	hold) fun	ctior	ı is e	nable	ed, th	ne dis	play	ed v	alues	are	retur	ned.																			
Response of the set load arrival output function	А	0	F	CR	LE						1		3	А	0	F		0	NC	RLF	7	1			\square			\dashv	+	+	-	5
Returns the equipment setting contents.				en	2.								5	A	0	F	_	0	F 1	CF	LF											6
Setting of the set load arrival output function [W]																																
Enables the above function.	A	0	F	-	0	N E	CR	LF					6	Y	E	S	-	CR I	F													4
Disables the above function.	Â		1	-	0	1.	CK	LI					0	1	г	3	-		-1													4
Response of the set load arrival output value	А	s	Е	Т	CR	LF							4	А	s	Е	Т	_	x z	x x	X	х	CR	LF								6-10
Returns the equipment setting contents.		c	Б	т		v	v	v	v	CP	IЕ		6.0	v	Б	6		CD	Б													4
Sets the load arrival value. X: 1–9999		3	Ľ	1	-				Λ	CR	LL		0-9	1	Ľ	3	-		-1													4
																														_		
Response of the Start/Hold terminal state	E	S d (fr	A	CR	LF								3	S U	T	A	R	TCP	RL	F												5
Returns the terminal state when the MCF function is u	sabie		ee nu											п	0	L	D		-1													4
Response of the Relay/Reset terminal state	Е	R	Α	CR	LF						İ		3	0	Ν	CR	LF	İ				ĺ										2
Returns the terminal state when the MCP function is di	sable	d (fr	ee ru	n).										0	F	F	CR	LF														3
Response of the Digital Zero terminal state	Е	Z	А	CR	LF					-	1		3	Е	Z	R		0	N C	R LF		<u> </u>		Outpu	at is pro	oduced	l when	digital	zero is	turned	on.	6
Returns the terminal state when the MCP function is di	sable	d (fr	ee ru	m).										Е	Z	R	_	x	x z	x	CR	LF		Outpu	ıt is pro	oduced	l when	digital	zero is	turned	on.	5-8
														Е	Z	R	-	0	FI	CF	LF											7
Response of the Peak Hold terminal	Е	Р	Α	CR	LF								3	Р	v	Н	-	0	N C	R LF		l							-	1		6
Returns the terminal state when the MCP function is di	sable	d (fr	ee ru	m).										Р	v	Н	-	0	F	CF	LF									-		7
Abnormality		\square												Ν	0	_	?	_ 0	RL	F								\neg	+			5
Format error, undefined command																		00000										,				
Internal memory abnormality Condition data abnormality														Ы	Δ	т	Δ		Ъ	, ,	Т		c	0	N	р	СР					14
(Recovery method: Reset the condition data using the	e mai	n un	it sw	itch.)											1	A	-	- [`		1	-	Ľ	5	1	U.		-1				.4
Comparison data abnormality x: Number of the broke	en pa	ttern	1											D	Α	Т	А	-	L C	s	Т	-	С	0	М	x	CR	LF				14
(Recovery method: Reset the comparison data using t	he m	ain 1	unit	switc	h.)											т		0000	, I.				~		T		1.5	,				12
(Recovery method: Reset the calibration data using the	l ne ma	l I	l nit sv	l vitch	l L)										А	1	А		- 10		1	-	C	А	L	СК	LLL					13
Digital zero data abnormality					Ĺ									D	Α	Т	Α	_	гļс	s	Т	_	D		z	CR	LF					13
(Recovery method: Refresh digital zero.)																т		00000	. I.					CD								
(Recovery method: Turn the power off and then on a	Igain	I If t	he er	ror d	loes	not r	ecov	er af	l fter t	hat.	plea	l se co	ntact us)		А	1	А		- [1	-	х	CK	LL							11

7. Wiring Example and Timing Chart

CM-7S Wiring Example (1 Point/2 Point Hold)





- * Output under the 2 point hold mode when E1 or E2 is input and one of the compared values is NG (HI or LO).
- ** Output under the 1 point hold mode when E2 is input and the compared value is OK (GO).
 *** Output under the 2 point hold mode only when E1 and E2 are input and both of the compared values are OK (GO) (GO is not output when E2 is input before E1).
 - Output under the 1 point hold mode when the value is OK (GO) after E2 is input.

CM-7S Wiring Example (Free Run)





* Holds the display while the S/H signal is input.

** Turns off the comparison output (display) while the R.RE signal is input.