

SINGLE LOOP MCU BASED DIGITAL DISPLAY TEMPERATURE INDICATOR

REX-AF4 SERIES

INSTRUCTION MANUAL

IM4AF04-E1

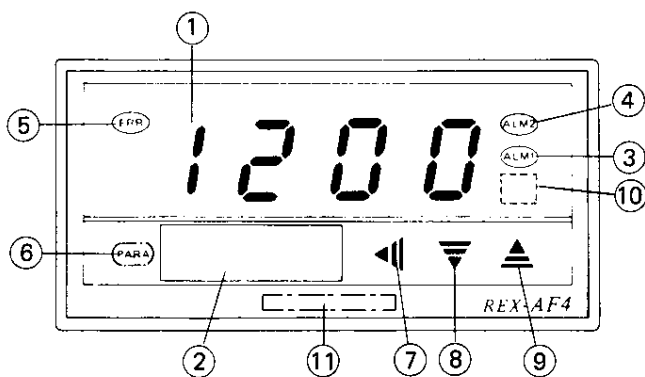
Notes:

Make sure that this Instruction Manual is always readily available to personnel who use the REX-AF4 series. The contents of the Instruction Manual are subject to change without notice. If you have any questions regarding the manual, contact one of our sales people, our nearest sales office, or the place where you have purchased this instrument.

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1. NAME OF PARTS



- ① Measured-value (PV) display unit [Green]
- ② Alarm set-value display unit [Red]
- ③ Alarm 1 (ALM1) lamp [Red]
- ④ Alarm 2 (ALM2) lamp [Red]
- ⑤ Error (ERR) lamp [Red]
- ⑥ Parameter selector key
- ⑦ Cursor shift key
- ⑧ Set-value decrement key
- ⑨ Set-value increment key
- ⑩ Hidden key
- ⑪ Input range display

2. OPERATION

2.1 Description of each parameter

The measured-value (PV) display unit displays a measured-value with the power turned ON, and the alarm set-value display unit displays nothing. Every time the (P_{ARA}) key is pressed, the parameter changes as shown in the following table (When the last parameter is displayed, it returns to the first parameter).

At this time, the measured-value (PV) display unit displays each parameter symbol and the alarm set-value display unit displays its set-value.

Measured-value (PV) display unit	Symbol	Name	Description	Setting range	Initial value prior to shipment
Measured-value			Displays measured-value. Setting is not possible.		
<i>AL1</i>	AL1	Alarm 1	Sets alarm set-value of Alarm 1.	-1999 to 9999 (The decimal point position is the same as the input range)	50 or 50.0 (Voltage/current input : 5.0)
<i>AH1</i>	AH1	Hysteresis of alarm 1	Sets hysteresis of alarm 2.	TC, RTD input: 0 to 100°C(°F) or 0.0 to 100.0°C(°F) Voltage/current input: 0.0 to 100.0% of display limit span	0 or 0.0
<i>AL2</i>	AL2	Alarm 2	Sets alarm set-value of Alarm 2.	-1999 to 9999 (The decimal point position is the same as the input range)	50 or 50.0 (Voltage/current input : 5.0)
<i>AH2</i>	AH2	Hysteresis of alarm 2	Sets hysteresis of alarm 2.	TC, RTD input: 0 to 100°C(°F) or 0.0 to 100.0°C(°F) Voltage/current input: 0.0 to 100.0% of display limit span	0 or 0.0

Notes

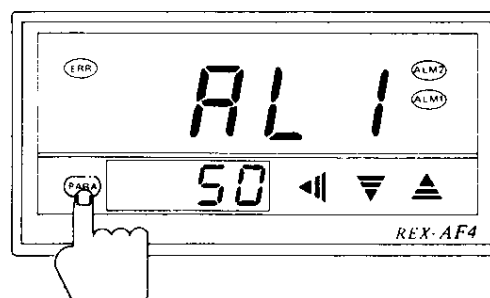
1. If alarm function is not supplied in the hardware, the display only displays the measured-value.
2. If only a single alarm is supplied, the display does not display the set-value and the hysteresis of alarm 2.
3. If the interlock function is used on either or both alarm 1 and 2, the display will not display each hysteresis.

2.2 Each parameter setting

Following is an example of setting the alarm set-value (AL1) to 30°C.

①

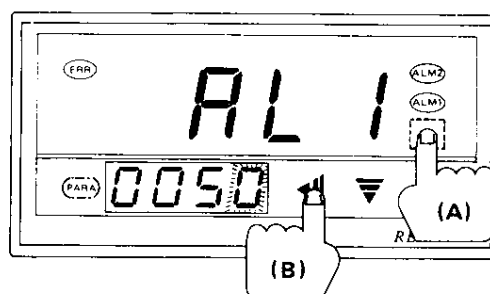
Press the **(PARA)** key to display the alarm set-value (AL1) parameter symbol (AL1) on the measured-value (PV) display unit.



②

Press the **◀||** key (B) while pressing the hidden key (A) to enter the setting mode.

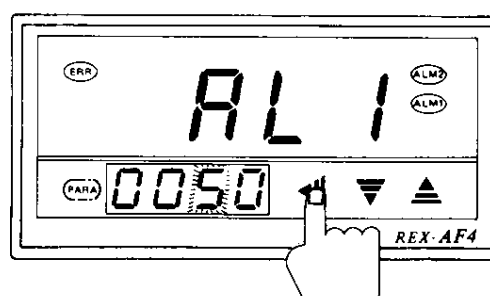
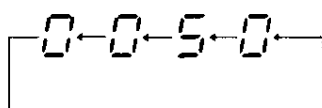
The least significant digit on the alarm set-value display unit lights brightly, and other digits light dimly. The digit which lights brightly is settable.



③

Press the **◀||** key to shift the digit which lights brightly up to the tens digit.

The digit which lights brightly shifts as follows every time the **◀||** key is pressed.



④

Press the **▼** key to set "3". Pressing the **▲** key increments numerals, and pressing the **▼** key decrements numerals.

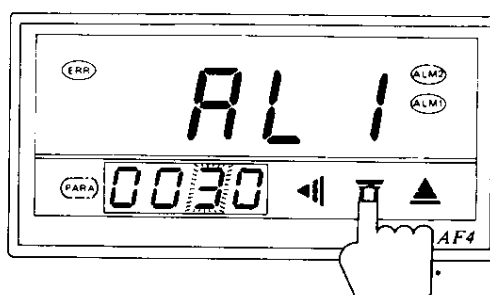
●Setting range : -1999 to 9999

(The decimal point position in the same as the input range)

When minus (-) sign is set.

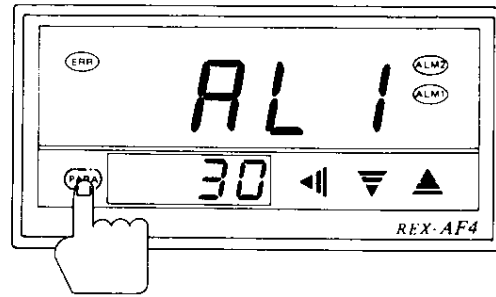
Example :

When 30 is changed to -20, shift the digit lit brightly to the tens digit, then press the **▼** key to decrement figures in order of 2 → 1 → 0 → -1 → -2.



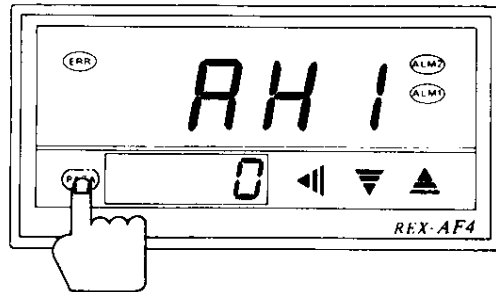
⑤

After finishing the setting, press the (PARA) key.
All of the set-value digits light brightly to indicate that the setting has ended.



⑥

Pressing the (PARA) key again shifts to the next parameter.
Repeat the procedures from ② to ⑥ to set each parameter in order.



Notes

1. If the instrument does not enter the setting mode (even if the ◀ key is pressed while pressing the hidden key), the set data may be locked.
In this case, check that internal switch No. 2 inside the instrument is turned OFF. (For set data locking, see "3. MAIN FUNCTIONS").
2. This instrument uses each parameter in any digit at the time it was changed.
3. This instrument can shift the digit up and down when each parameter is changed.
For example, if "199°C" is necessary to be changed to "200°C", first shift the digit which lights brightly to the least significant digit, then press the ▲ key to change "9" to "0", thereby obtaining 200°C.
This procedure also applies to shift the digit down.
4. If key operation is not performed for more than 10 sec. with any parameter displayed by the (PARA) key (including display other than measured-value and that in the set mode), the measured-value (PV) display unit display a measured-value.

2.3 Cautions for operation

- (1) Apply power after the measuring circuit wiring has been completed, otherwise the instrument considers it as an input break and the display goes to the upscale or to the downscale.
 - Upscale TC, RTD input
 - Downscale Voltage, current input
- (2) No influence is exerted upon the controller for power failure of less than 30msec. For power failure of more than 30msec., the instrument has two modes for the action after power recovery. If the instrument has an interlock function and hot start is specified, the instrument starts from the state before power failure when power is recovered, unless otherwise the instrument performs the same operation as that at the time of power-ON. (This applies only when alarm action is turned OFF.)
- (3) When the selector unit (SP-4) is used with this instrument, alarm output may be produced because of the transfer timing.

3. MAIN FUNCTIONS

3.1 Self-diagnostic function

Self-diagnostic function	During abnormality	
	* Display	Alarm output
Non-volatile RAM check	"Err" (Err) flashes on the measured-value (PV) display unit.	OFF
A/D converter check		
CPU power monitoring	The error (ERR) lamp (red) lights.	

* Turn off the power to release the ERROR display.
If the ERROR display still appears after power is re-applied, contact our agency.

3.2 Overscale and underscale

- ① If a measured-value exceeds the high setting range limit due to input break (or shorting), etc., measured-value display starts flashing. Further, if it exceeds the high input display range limit, the measured-value (PV) display unit flashes overscale display "9999".
- ② If a measured-value falls below the low setting range limit due to input break (or shorting), etc., measured-value display starts flashing. Further, if it falls below the low input display range limit, the measured-value (PV) display unit flashes underscale display "0000".

Input	Type	Input display range
TC	K	- 30 to 1372°C, - 30 to 2502°F
	J	- 30 to 1200°C, - 30 to 2192°F
	R	- 30 to 1769°C, - 30 to 3216°F
	S	
	B	- 30 to 1820°C, - 30 to 3308°F
	E	- 30 to 1000°C, - 30 to 1832°F
	N	- 30 to 1300°C, - 30 to 2372°F
	T	- 30 to 400°C, - 30 to 752°F -199.9 to +400.0°C, -199.9 to +752.0°F
	L	- 30 to 900°C, - 30 to 1662°F
U	-199.9 to 600.0°C, -199.9 to +999.9°F	
RTD	Pt100 (JIS/IEC)	-199.9 to +649.0°C
	JPt100 (JIS)	
	Pt100 *1	-199.9 to +999.0°F
	JPt100 *2	
Voltage/Current		(Low limit of setting range) - (3% of FS) to (High limit of setting range) - (3% of FS)

*FS . . . Full Span

*1 Conforming to JIS/IEC

*2 Conforming to JIS

IEC(International Electrotechnical Commission) is equivalent to JIS, DIN and ANSI.

3.3 Interlock function

This is a function to maintain the alarm condition even after the measured-value goes out of the alarm setting range once it has entered the alarm setting range. If this interlock function is supplied, the instrument also offers the following two selections for the recovery mode form the power failure of more than 30msec. (This must have been specified at the time of ordering or set to the initial value).

- Hot start Start from the state before the power failure.
- Cold start Start from the initial state like the state when power has been initially supplied.

To release the alarm state in the interlock function, call the alarm parameter to be released on the measured-value (PV) display by pressing the (PARA) key and press the ∇ key while pressing the hidden key simultaneously.

3.4 Set data locking function

Set-value change become invalid with internal switch No. 2 inside the instrument turned ON. However each set-value can be checked by the (PARA) key.

Use this function for misoperation prevention after finishing the setting.

- Set data locking procedure

As shown in the following Fig., the instrument can be withdrawn from its housing if it is pulled out forward while the stopper at the left is pushed up with fingers.

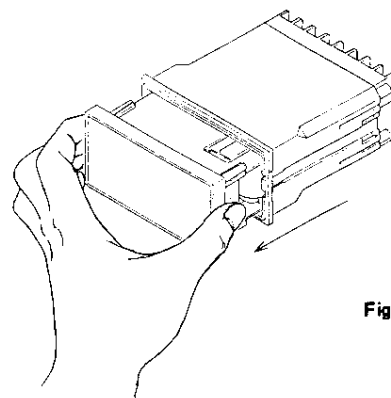


Fig. 1

Next, turn ON internal switch No. 2 at the side part of the instrument. (Do not touch other switches.) (Fig. 2)

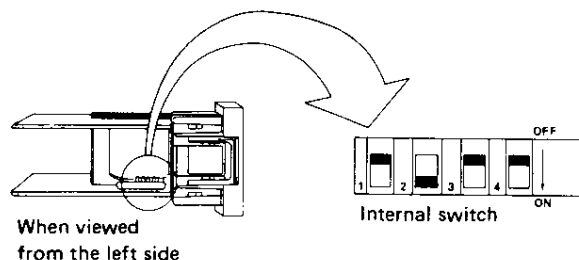


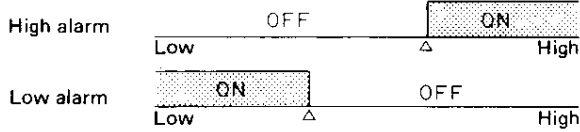
Fig. 2

Thus, the set data has been locked.
For set data locking release, turn OFF internal switch No. 2.

3.5 Alarm (ALM) function

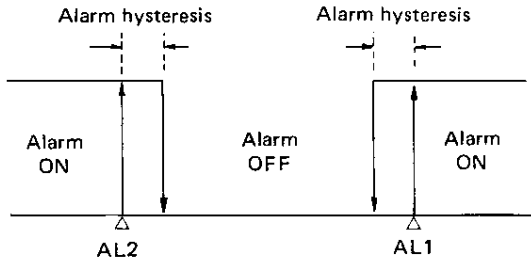
The action for each alarm becomes as follows.
 (Δ : Alarm set-value)

● Process alarm



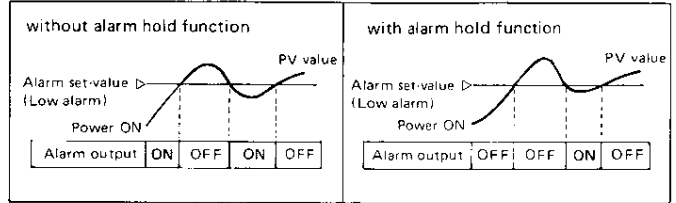
3.6 Alarm action hysteresis setting

This is the function of freely setting an alarm action hysteresis band.



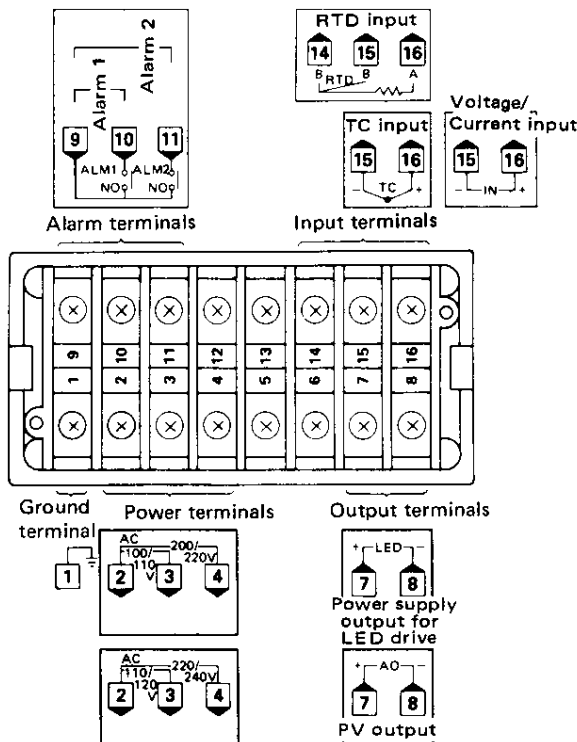
3.7 Alarm hold function

With alarm hold function, the instrument ignores alarm conditions after power-ON, generating no alarm output when the input is in the alarm zone until the input has exited once from the alarm zone.



4. WIRING

4.1 Rear terminals

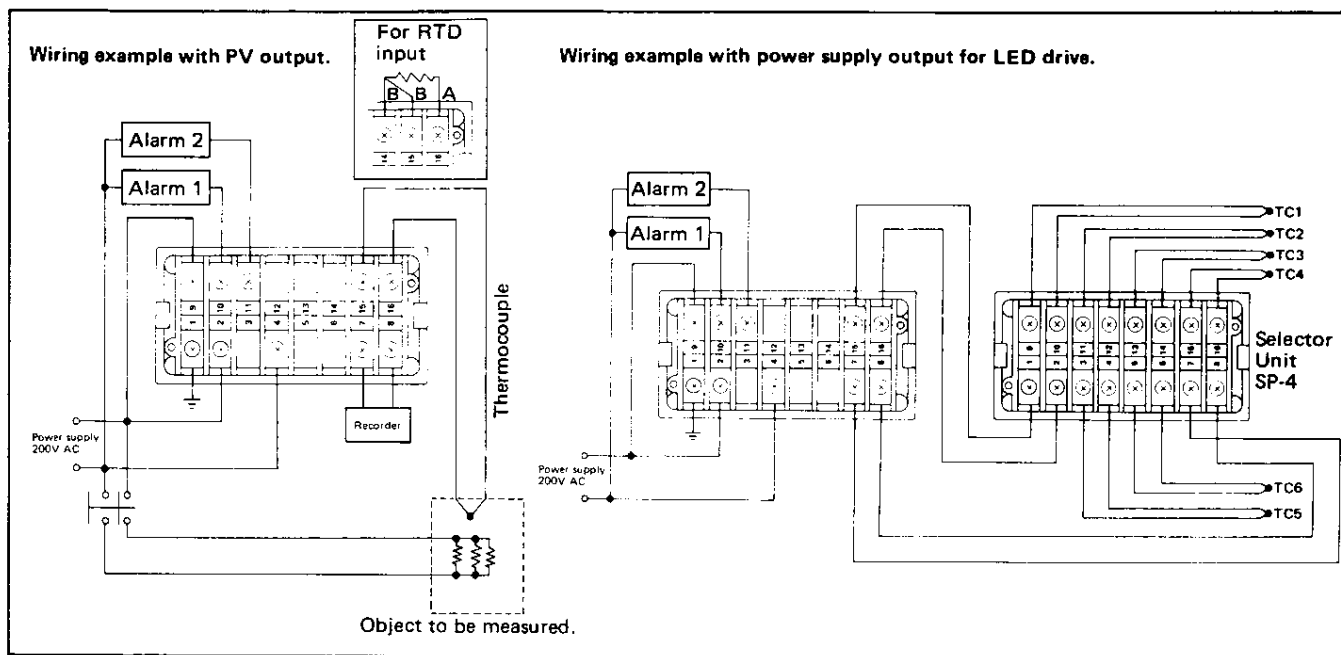


NO : Normally open

Note

All of unused terminals are covered with blind patches.

4.2 Wiring examples

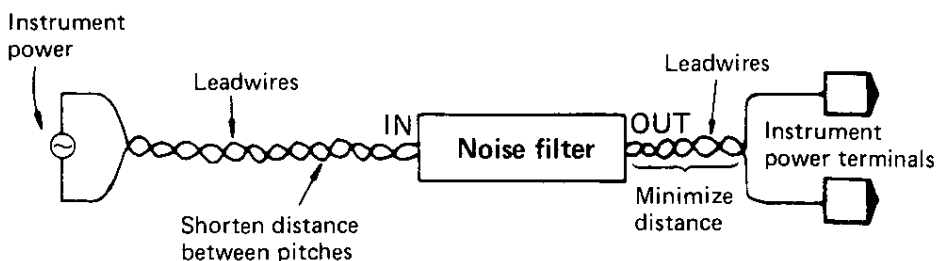


4.3 Cautions for wiring

- (1) Power supply output for LED drive is used to turn LED's on 3 sets of SP-4 selector unit (2 sets with transfer and 1 set without transfer). If four or more SP-4 are used, connect a CS-4 power box.
- (2) If SP-4 is used with the instrument with PV output, connect a CS-4. (This supplies power to SP-4 for LED lighting.)
- (3) Conduct input signal wiring away from instrument, electric equipment power and load lines as such as possible to avoid noise induction.
- (4) Conduct instrument power wiring so as not to be influenced by noise from the electric equipment power.

If it is assumed that a noise generation source is located near the instrument and the instrument is influenced by noise, use a noise filter (select the filter by checking instrument power supply voltage).

- Sufficient effect may not be obtained depending on the filter. Therefore, select the filter by referring to its frequency characteristic, etc.
- ① For instrument power wiring, if it is assumed that noise exerts a bad influence upon the instrument, shorten the distance between twisted power supply wire pitches. (The shorter the distance between the pitches, the more effective for noise reduction).
- ② Install the noise filter on the panel which is always grounded and minimize the wiring distance between the noise filter output side and the instrument power terminals. Otherwise, the longer the distance between output side and instrument power terminals, the less effective for noise.
- ③ Do not install fuses and/or switches on the filter output signal since this may lessen filter effect.



- (5) For wiring, use wires conforming to the domestic standard of each country. (For instrument grounding, use wires with nominal sectional area of 1.25 to 2.0 mm², and securely ground the instrument at the minimum distance.)
- (6) About 1 to 2 sec. are required as the preparation time of contact output during power-ON. Use a delay relay when the output line, is used for an external interlock circuit.

5. SPECIFICATION

(1) Input

Influence of external resistance	Approx. 0.35 $\mu\text{V}/\Omega$ (For TC input)
Influence of input lead	Approx. 0.0075 %/ Ω of reading (For RTD input)
Sampling cycle	0.5 sec.
Display accuracy	<ul style="list-style-type: none"> • Within $\pm(0.3\%$ of displayed value +1 digit) or $\{\pm 2^\circ\text{C}[\pm 4^\circ\text{F}]\}$ (For TC input) $\{\pm 0.8^\circ\text{C}[\pm 1.6^\circ\text{F}]\}$ (For RTD input) * Whichever is greater. • Within $\pm(0.2\%$ of display limit span +1 digit) (For voltage/current input)

* Input scale range

Input	Type	Scale range
TC	K	0 to 1372°C, 0 to 2502°F
	J	0 to 1200°C, 0 to 2192°F
	R	0 to 1769°C, 0 to 3216°F
	S	
	B	0 to 1820°C, 0 to 3308°F
	E	0 to 1000°C, 0 to 1832°F
	N	0 to 1300°C, 0 to 2372°F
	T	0 to 400°C, 0 to 752°F -199.9 to +400.0°C, -199.9 to +752.0°F
	L	0 to 900°C, 0 to 1652°F
U	-199.9 to 600.0°C, -199.9 to +999.9°F	
RTD	Pt100 (JIS/IEC)	-199.9 to +649.0°C
	JPt100 (JIS)	
	Pt100 *1	-199.9 to +999.9°F
	JPt100 *2	
Voltage/Current		(Low limit of setting range) - (3% of FS) to (High limit of setting range) - (3% of FS)

* FS Full Span

* For thermocouple inputs, R, S and B, display accuracy and setting accuracy differ from those of other thermocouple inputs.

R, S Within $\pm 4^\circ\text{C}(8^\circ\text{F})$ for the range of 0 to 199°C (0 to 399°F).

B Out of the guaranteed range for the range of 0 to 399°C (0 to 799°F).

*1 Conforming to JIS/IEC

*2 Conforming to JIS

IEC(International Electrotechnical Commission) is equivalent to JIS, DIN and ANSI.

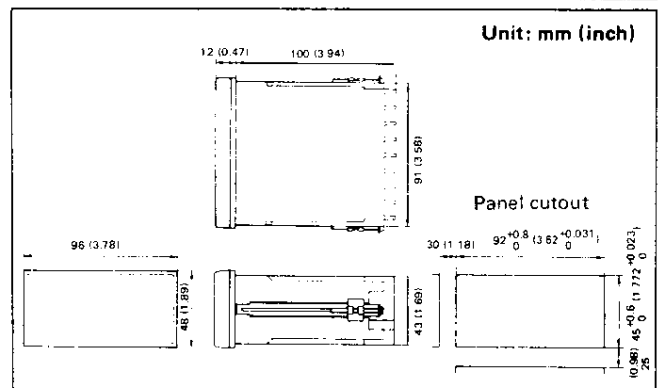
(2) Alarm

Type	Process alarm	
Action	High alarm, Low alarm	
Setting range	-1999 to +9999	
Setting resolution	Same as input display accuracy	
Setting accuracy		
Hysteresis	0 to 100(0.0 to 100.0)°C(°F)(For TC or RTD input) 0.0 to 100.0% of display limit span. (For voltage/current input)	
Output	No. of points	Energized alarm : 2 points, max.
	Rating	Relay contact: 250V AC, 1A (Resistive load) 1 "a" contact Electrical life : 50,000 times or more (Rated load)
Additional function	Alarm hold function, Interlock function	

(3) Other specifications

Power Supply Voltage	100/110V, 200/220V or 110/120, 220/240V AC (50/60Hz) * Whichever is specified.
Allowable voltage variation	Within $\pm 10\%$ of rating
Power Consumption	6AV or less
Allowable ambient temp.	0 to 50°C (32 to 122°F)
Allowable relative humidity	45 to 85% RH
Insulation resistance	Between measuring and grounding terminals; 20M Ω or more at 500V DC Between power and grounding terminals; 20M Ω or more at 500V DC
Dielectric strength	Between measuring and grounding terminals; For 1 min. at 1000V AC Between power and grounding terminals; For 1 min. at 1500V AC
Weight	Approx. 500g (1.1 lb)

6. DIMENSIONS



* Dimension in inches are shown for reference.

7. MODEL NO.

The REX-AF4 Model No. is shown inside the instrument.

Model	Suffix code	Description
REX-AF4	<input type="checkbox"/> <input type="checkbox"/> - M <input type="checkbox"/> <input type="checkbox"/>	MCU-based digital indicator with alarm
Alarm action	N	Not supplied
	S	1 point alarm action
	D	2 point alarm action
Input	C	Thermocouple input
	R	RTD input
	<input type="checkbox"/>	Voltage or current input. See the table of signal code (shown in the following)
Alarm output	M	Relay contact output
Option	AN	Power supply for LED drive
	<input type="checkbox"/>	Retransmission output (See signal code).

Signal code

1: 0 to 10mV	2: 0 to 100mV	3: 0 to 1V	4: 0 to 5V
5: 0 to 10V	6: 1 to 5V	7: 0 to 20mA	8: 4 to 20mA
9: Others			

RKC RKC INSTRUMENT INC.

IM4AF04-E1

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