

REX-S100, REX-S400, REX-S900 INSTRUCTION MANUAL

IMSRE01-E5

Before using this instrument, please carefully read this manual for its correct use. In addition, after reading the manual keep it available easily anytime.

- This manual is subject to change without prior notice.
- Examples of figures, diagrams and numeric values used in this manual are for a better understanding of the text, but not for assuring the resultant operation.
- This manual may not be reproduced or copied in whole or in part without RKC's prior consent.
- This instrument and manual are manufactured, prepared, then shipped under strict quality control. However, if any defect is found, please contact your nearest RKC sales office or agent from which you bought the system.
- RKC assumes no responsibility for any of the following damage which the user or third party may suffer.
 - (1) Damage incurred as a result of using this instrument.
 - (2) Damage caused by the failure of the instrument, which cannot be predicted by RKC.
 - (3) Other indirect damage.



WARNING

WIRING PRECAUTIONS

- If failure or error of this instrument could result in a critical accident of the system, install an external protection circuit to prevent such an accident.
- In order to prevent instrument damage or failure, protect the power line and the input/output lines from high currents by using fuses with appropriate ratings.

POWER SUPPLY

- In order to prevent instrument damage or failure, supply power of the specified rating.
- In order to prevent electric shock or instrument failure, do not turn on the power supply until all of the wiring is completed.

NEVER USE THE INSTRUMENT NEAR FLAMMABLE CASES.

In order to prevent fire, explosion or instrument damage, never use this instrument at a location where flammable or explosive gases or vapor exist.

NEVER TOUCH THE INSIDE OF THE INSTRUMENT.

In order to prevent electric shock or burns, never touch the inside of the instrument. Only RKC service engineers can touch the inside of the instrument to check the circuit or to replace parts. High voltage and high temperature sections inside the instrument are extremely dangerous.

NEVER MODIFY THE INSTRUMENT.

In order to prevent accident or instrument failure, never modify the instrument.

MAINTENANCE

- In order to prevent electric shock, burns or instrument failure, only RKC service engineers may replace parts.
- In order to use this instrument continuously and safely, conduct periodic maintenance. Some parts used in this instrument have a limited service life and may deteriorate over time.

Accessories

- Mounting brackets : 2 pieces
- Instruction manual [IMSRE01-E5] : 1 copy

INSTRUMENT SAFETY CAUTIONS

- This instrument is designed to be mounted on instrumentation panels. It is therefore manufactured as part of the final product to facilitate wiring. This means that unauthorized personnel can easily access the high-voltage sections in this instrument such as power terminals, etc. Therefore, when this instrument is installed on the final product, the user should take the necessary measures for the final product to ensure that unauthorized personnel cannot access the high-voltage sections, etc.
- In order to use this instrument correctly and safely, always observe the cautions described in this manual when performing operations and maintenance. RKC assumes no responsibility for any injury or accident resulting from not following these cautions.
- This instrument is intended to be used under the following environmental conditions. (IEC1010)
[OVERVOLTAGE CATEGORY II, POLLUTION DEGREE 2]
- Before cleaning the instrument, check that the power is turned off.
- Remove stains on the display unit using a soft cloth or tissue paper.
- As the display unit is easily scratched, do not scrub or touch it with a hard object.
- The stains on the housing shall be wiped off by the cloth which is dipped into the neutral cleanser diluted by water and wrung tightly, and finish it by a dried cloth.

NOTES ON INDICATIONS

The following indications are used in this manual to ensure the safe, correct use of the REX-S100/S400/S900.

<SIGNAL WORDS>



WARNING : Where there are possible dangers such as electric shock, fire (burns), etc. Which could cause loss of life or injury, precautions to avoid such dangers are described.



CAUTION : There describe precautions to be taken in case unit damage may result if operating procedures are not strictly followed.



NOTE : Extra noted or precautions are added to operating procedures and explanations.

<SYMBOL MARKS>



: This mark is used when great care is needed especially for safety.



: This mark is used to add extra notes, precautions or supplementary explanations to table and figures.

1. PRODUCT CHECK

Check the model code from the following list to determine if the product delivered is as desired.

Model code
REX-S100
REX-S400 F □□-□*□□
REX-S900 ① ② ③ ④ ⑤ ⑥

① Control action F: PID action with AT[Reverse action]

② Input type, ③ Range code : See "Input range table."

④ Control output M: Relay contact V: Voltage pulse

⑤ First alarm [ALM1] , ⑥ Second alarm [ALM2]

N : No alarm H : Process high alarm

A : Deviation high alarm J : Process low alarm

B : Deviation low alarm K : Process high alarm *1

C : Deviation high/low alarm L : Process low alarm *1

D : Band alarm P : Heater break alarm(CTL-6)

E : Deviation high alarm *1 S : Heater break alarm(CTL-12)

F : Deviation low alarm *1 R : Control loop control alarm

G : Deviation high/low alarm *1 (*1: with hold action)

INPUT TYPE & RANGE	CODE	INPUT TYPE & RANGE	CODE
K 0 to 999 °C	K21	T -199 to +400 °C	T11
0 to 999 °F	KB1	-199 to +752 °F	TB2
J 0 to 999 °C	J13	U -199 to +600 °C	U07
0 to 999 °F	JA8	-199 to +999 °F	UA7
L 0 to 900 °C	L05	Pt -199 to +649 °C	D19
0 to 999 °F	LA4	100 -199 to +999 °F	DB6
E 0 to 999 °C	E05	JPt -199 to +649 °C	P19
0 to 999 °F	EA4	100 -199 to +999 °F	PB5
N 0 to 999 °C	N03		
0 to 999 °F	MA3		

2. MOUNTING

WARNING

● In order to prevent electric shock or instrument failure, do not turn on the power supply until all of the wiring is completed.

■ Cautions for mounting

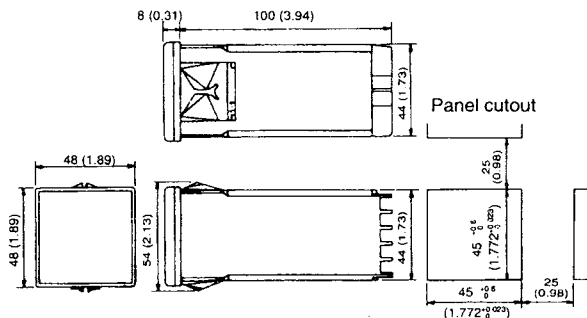
Avoid the following when selecting the mounting location.

- Ambient temperature of less than 0 °C (32 °F) or more than 50 °C (122 °F).
- Ambient humidity of less than 45% or more than 85% RH.
- Rapid changes in ambient temperature which may cause condensation.
- Corrosive or inflammable gases.
- Direct vibration or shock to the mainframe.
- Water, oil, chemicals, vapor or steam splashes.
- Excessive dust, salt or iron particles.
- Excessive induction noise, static electricity, magnetic fields or noise.
- Direct air flow from an air conditioner.
- Should be used indoors where the system is not exposed to direct sunlight.
- Heat to be accumulated radiation heat.

■ Dimensions

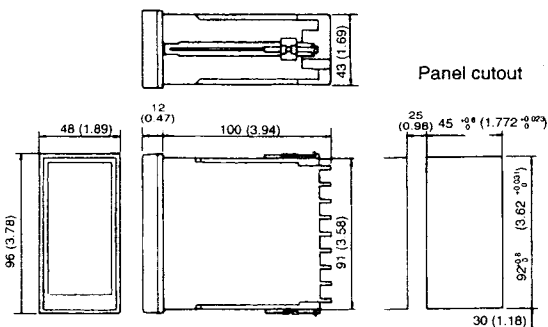
< REX - S100 >

Unit: mm (inch)

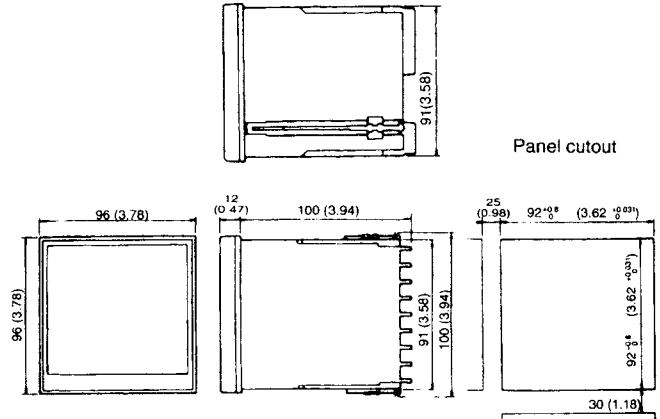


Thickness of panel board:
1 to 5 mm or 5 to 9 mm (0.04 to 0.20 inch or 0.20 to 0.35 inch)

< REX - S400 >



< REX - S900 >



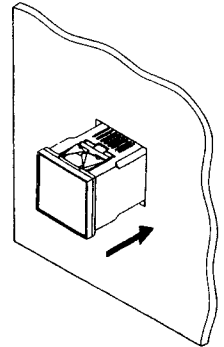
* Dimensions in inches are shown for reference.

■ Mounting procedures

< REX-S100 >

- When the controllers are mounted on panel with 1 to 5 mm in thickness.

- ① Make a rectangular cutout corresponding to the number of controllers to be mounted on panel by referring to the panel cutout dimensions.
- ② Since the mounting brackets are already installed on the controller, insert the controller into the panel from the panel front without removal of the brackets.

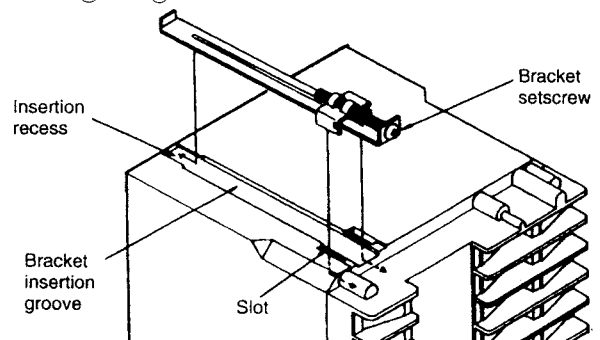


- When the controllers are mounted on panel with 5 to 9 mm in thickness.

- ① Remove the mounting brackets from the controller with a slotted screwdriver.
- ② Engage each mounting bracket with holes marked with "5-9" on the housing and then insert the controller into the panel from the panel front.

< REX - S400/S900 >

- ① Make a rectangular cutout corresponding to the number of controllers to be mounted on panel by referring to the panel cutout dimensions.
- ② Insert the controllers into the panel from the panel front.
- ③ Insert an upper mounting bracket along the bracket insertion groove from the back, and then engage a projection at the bracket end with a recess at the groove front and also insert metal fitting legs into slots.
- ④ Tighten a bracket setscrew from the rear of the bracket with Phillips screwdriver.
- ⑤ Set the other mounting bracket in the same way as in ③ and ④.



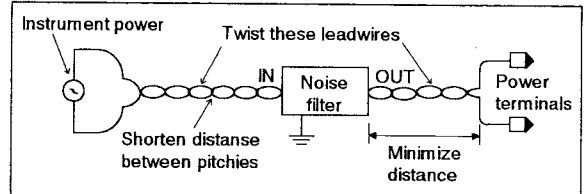
3. WIRING

⚠ WARNING

- In order to prevent electric shock or instrument failure, do not turn on the power supply until all of the wiring is completed.
- If failure or error of this instrument could result in a critical accident of the system, install an external protection circuit to prevent such an accident.
- In order to prevent instrument damage or failure, protect power line and the input/output lines from high currents by using fuses with appropriate ratings.

■ Cautions for wiring ⚠

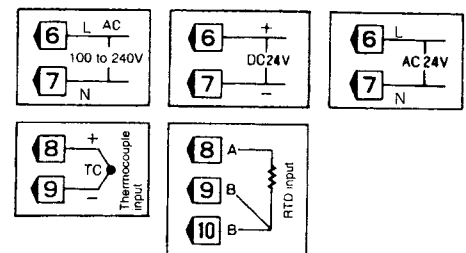
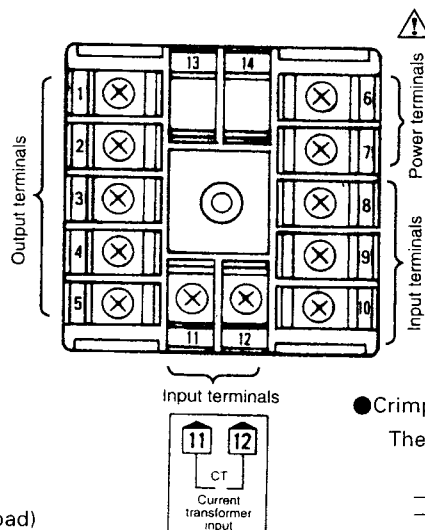
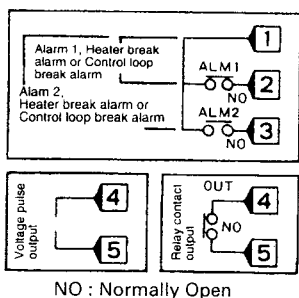
- (1) For thermocouple input, use the specified compensation wire.
- (2) For RTD input, use leads with low resistance and having no resistance differences among the 3 leads.
- (3) Conduct input signal wiring away from instrument power, electric equipment power and load lines to avoid noise induction.
- (4) Conduct instrument power wiring so as not to be influenced by noise from the electric equipment power. If the instrument may be affected by external noise, a noise filter should be used.
 - Shorten the distance between twisted power supply wire pitches. The shorter the distance between the pitches, the more effective for noise reduction.
 - 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.
 - 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.
- (6) About 5 to 6 sec are required as the preparation time for contact output after power on. Use a delay relay when the output line, is used for an external interlock circuit.
- (7) This instrument has no power supply switch nor fuses. Therefore, install the fuse close to the instrument and the switch, if required.
 - Fuse type ; Time-lag fuse
 - Recommended fuse rating : Rated voltage ; 250 V, Rated current ; 1 A



■ Terminals configuration

<REX-S100>

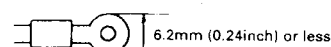
- Output rated
Relay contact output:
250V AC, 1A (Resistive load)



- Output rated
Relay contact output: 250V AC,
3A (Resistive load)
Voltage pulse output: 0/12V DC
(Load resistance 600Ω or more)

● Crimp-style terminal lug

Therefore, use the lug suitable for a screw of M3

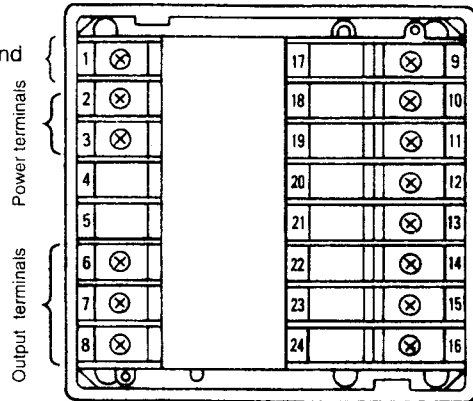
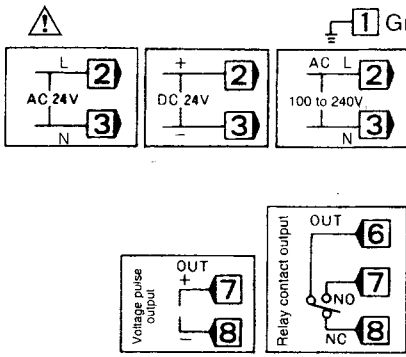


Recommended tighten torque: 0.4 N·m (4 kgf·cm)

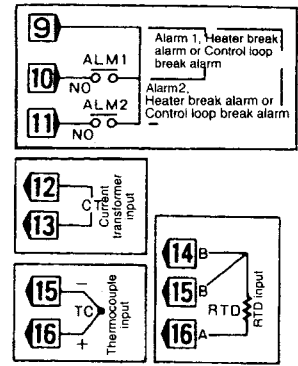
Maximum allowance tighten torque: 0.7 N·m (7 kgf·cm)

NOTE Terminals which are not used according to the controller type are all removed.

<REX-S400/S900>

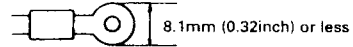


● Output rated
Relay contact output:
250V AC, 1A (Resistive load)



● Output rated
Relay contact output: 250V AC, 3A (Resistive load)
Voltage pulse output: 0/12V DC
(Load resistance 600Ω or more)

● Crimp-style terminal lug
Therefore, use the lug suitable for a screw of M3.

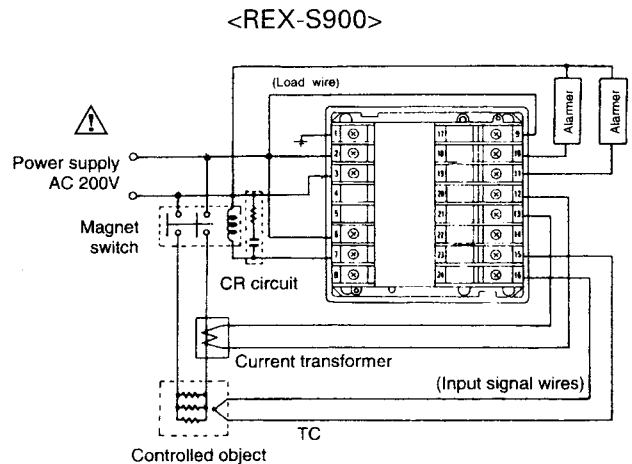
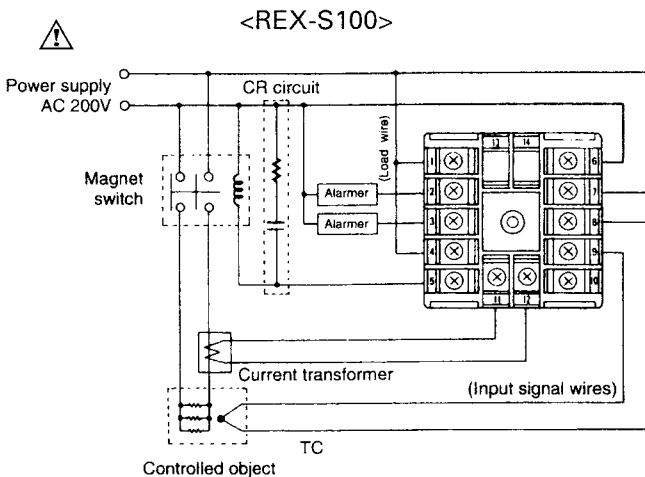


Recommended tighten torque: 0.4 N·m (4 kgf·cm)
Maximum allowance tighten torque: 1 N·m(10 kgf·cm)

NOTES

1. Terminals which are not used according to the controller type are all removed.
2. An example of the REX-S900 is described here, the same rear terminals fig. applies to REX-S400. (Terminal Nos. 17 to 24 are not provided for REX-S400)

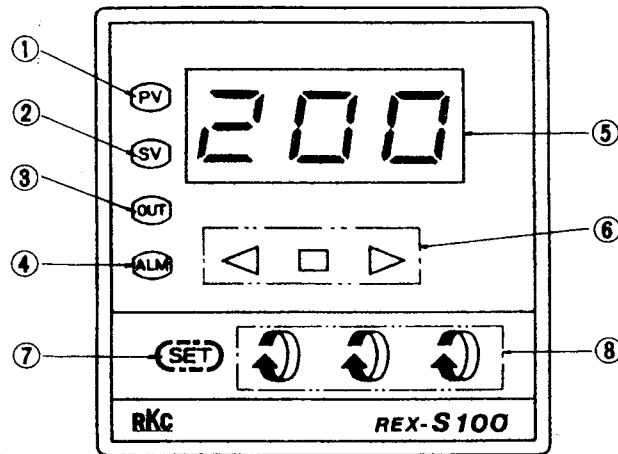
■ **Wiring example**



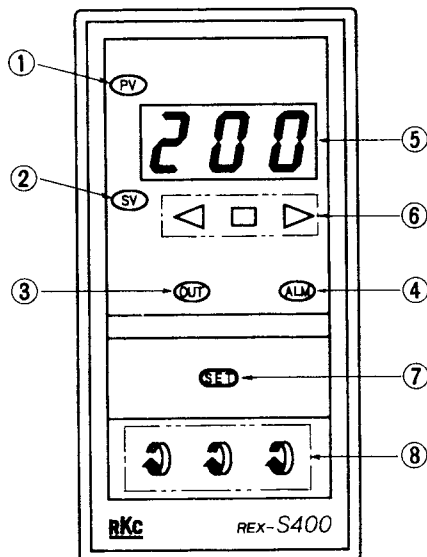
* An example of the REX-S900 is described here, the wiring example fig. applies to REX-S400. (Terminal Nos. 17 to 24 are not provided for REX-S400)

4. NAME OF PARTS

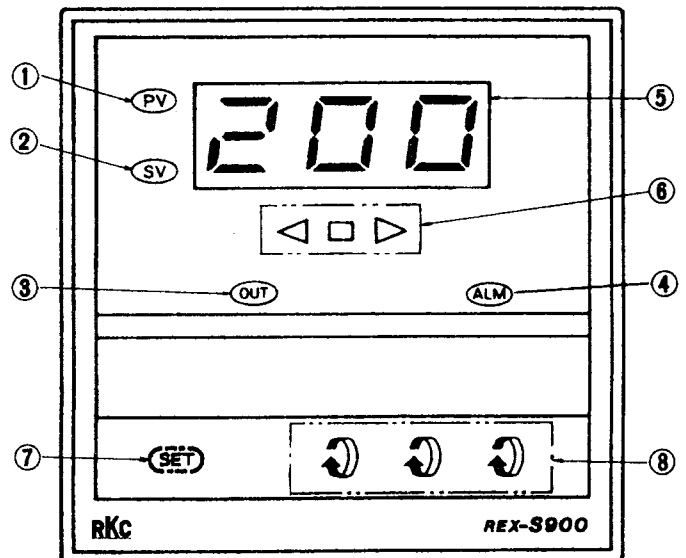
<REX-S100>



<REX-S400>



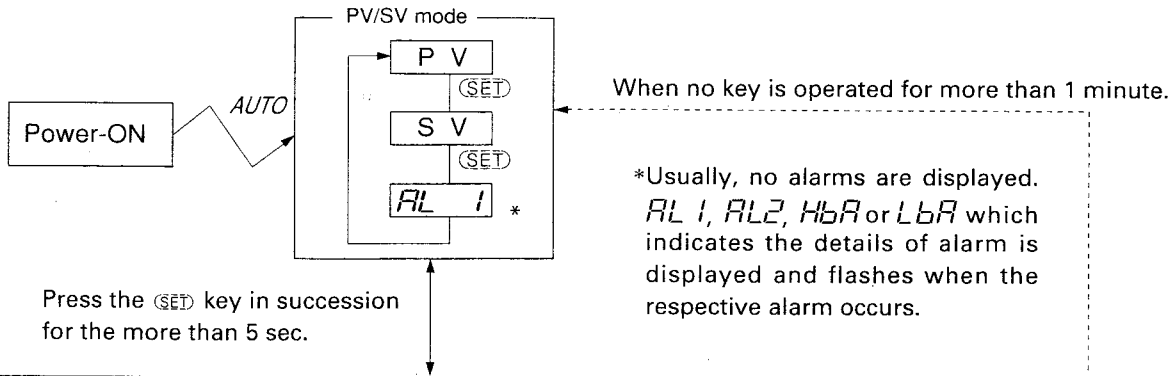
<REX-S900>



- | | |
|---|---|
| <p>① Measured value (PV) display lamp [Green]</p> <ul style="list-style-type: none"> • Light up when measured value is displayed. <p>② Set value(SV) display lamp [Red]</p> <ul style="list-style-type: none"> • Light up when set value is displayed. • Flashes when the set value is changed. • Light up when each parameter is displayed. <p>③ Control output lamp [Green]</p> <ul style="list-style-type: none"> • Light up when control output is turned ON. <p>④ Alarm (ALM) Lamp [Red]</p> <ul style="list-style-type: none"> • Lights up when the alarm (LBA, HBA) is turned. <p>⑤ Measured value (PV), Set value (SV) [Red]</p> <ul style="list-style-type: none"> • Display measured value (PV) or set value (SV). • Display a parameter symbol or parameter set value in the parameter setting mode. | <p>⑥ Deviation lamps [Red, green and red]</p> <ul style="list-style-type: none"> • The respective LED lights according to the different between the set value (SV) and measured value (PV). <p>⑦ Set (SET) key</p> <ul style="list-style-type: none"> • The set value thus changed is entered. • Can select measured value (PV) and set value (SV). • Can select PV/SV mode and parameter mode. <p>⑧ Numeric-value change key</p> <ul style="list-style-type: none"> • This key is used to select the parameter display and parameter set value. • Used to change the number of each digit. |
|---|---|

5. OPERATION

■ Calling-up procedure of each mode and parameter types



Parameter mode			Initial value prior to shipment
Name	Description/Setting range		
CF (SET)	Current transformer input (CT) Display input value from the current transformer.	—	—
AL1 (SET)	First alarm Deviation alarm·Process alarm: -199 to 999°C [°F] Differential gap: 2°C [°F]	50	
AL2 (SET)	Second alarm Deviation alarm·Process alarm: -199 to 999°C [°F] Differential gap: 2°C [°F]	50	
HbA (SET)	Heater break alarm Alarm value is set by referring to input value from the current transformer (CT) Setting range: 0 to 100A	0	
LbA (SET)	Control loop break alarm Set control loop break alarm set value. Cannot be set to "0.0" Setting range: 0.1 to 99.9 min.	8.0	
Lbd (SET)	LBA deadband Set the area of not outputting LBA. No LBA deadband functions with "0" set. Setting range: 1 to 999°C [°F] Differential gap: 0.8°C [°F]	0	
AFU (SET)	Autotuning 0: Autotuning end or stop 1: Autotuning start	0	
P (SET)	Proportional band ON/OFF action with P set to "0". Setting range: 1 to span	30	
I (SET)	Integral time Eliminates offset occurring control is performed. I action turns OFF with I set to "0". Setting range: 1 to 999 sec.	240	
d (SET)	Derivative time Prevents ripples by predicting output change thereby improving control stability. D action turns OFF with D set to "0". Setting range: 1 to 999 sec.	60	
AR (SET)	Anti-reset windup (ARW) Prevents overshoot and/or undershoot caused by integral action. Setting range: 1 to 100% of proportional band	100	
r (SET)	Proportional cycle Set control output cycle. Setting range: 1 to 100 sec.		Relay contact output: 20 Voltage pulses output: 2
LCP (SET)	Set data lock 0: No set data locked 1: Set data locked	0	

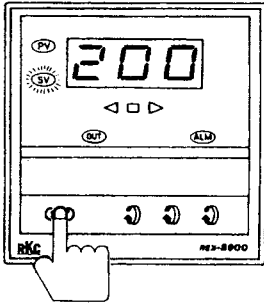
● Some parameter symbols may not be displayed depending on the specification.

Parameter setting procedure

Setting set value (SV)

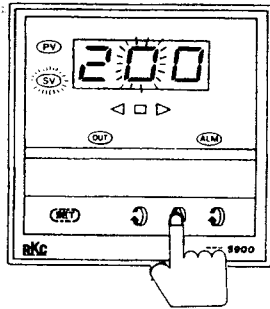
When set value (SV) of 200°C is changed to 210°C.

① Set to the set mode



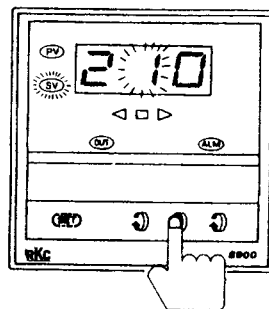
Press the **SET** key enter the SV mode.

② Set to SV changing mode



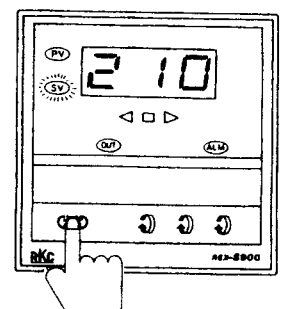
Press the **2** key corresponding to the digit to be set. (The set digit brightly lights.)

③ Numeric value change



Keep pressing the **1** key corresponding to the digit to be set until the desired number is displayed.

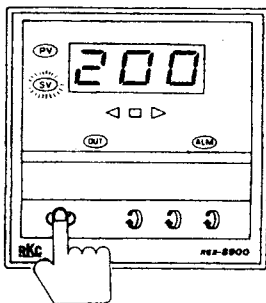
④ Set value entry



After finishing the setting, press the **SET** key.

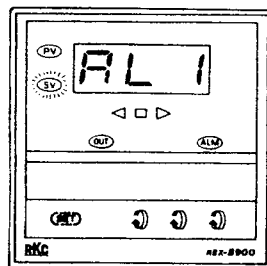
Setting parameters other than set-value

In the PV/SV mode



For more than 5 sec.

In the parameter mode



Press the **SET** key for more than 5 sec. to set controller to the parameter mode.

Press the **SET** key by the required number of times until the parameter symbol to be set is displayed.

The setting procedures are the same as those of example ② to ④ in the above "Setting set-value (SV)" (Pressing the **SET** key after the setting is finished in the parameters).

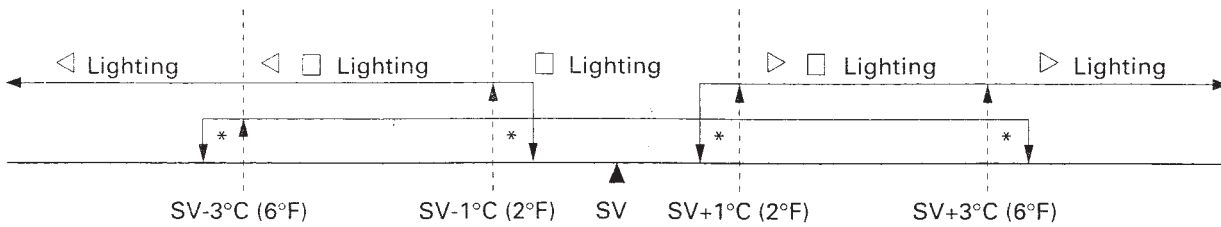
When no parameter setting is required, return the controller to the PV/SV mode.

⚠ Key operational cautions

- For this controller, the value whose setting was changed is not registered. It is registered for the first time it is shifted to the next parameter by pressing the **SET** key.
- When the controller is not set to the SV changing mode (the set value (SV) does not light brightly or dimly even with the **SET** key pressed) or each value dose not light brightly or dimly even with the controller moved to the parameter setting mode, set data lock is activated. In this case, change the "LCK" parameter set value to "0".
- This controller returns to the PV/SV mode status if key operation is not performed for more than 1 minute.

■ Displaying on deviation lamps

The deviation lamps (◁ □ ▷) light as follows.



*Differential gap (0.5°C [°F])

NOTE

- Display during autotuning
The deviation LED flashes as follows during autotuning.

■ Set data locking procedure

This controller is provided with a set data locking function which disables each set value change by the front key and also the autotuning function. Use this function for malfunction prevention.

- Press the **(SET)** key by the required number of times to show "LCK" on the display unit.
- Press the **(◀)** keys to set the number in the table at right. Thus the set data lock state can be selected.

0	No set data locked. (All parameters changeable)
1	Set data locked. (All parameters not changeable)

CAUTIONS

1. Do not set to numeric values other than 0 and 1, as it may cause a malfunction.
2. Checking each set value is possible during data lock.

■ Caution for operation

- Do not use the autotuning function in a control system where hunting causes trouble. In this case, set each PID constant appropriate to the controlled object.
- Connect the input signal wiring, and then turn ON the power. If the input signal wiring opens, the controller judges that input is disconnected to cause the upscale of measured value display.
- No influence is exerted upon the controller for power failure of 20 ms or less. For power failure of 20 ms or more, the controller performs the same operation as that at the time of power-ON after power recovery.
- When the set value (SV) is changed during progress in the autotuning function, suspend the autotuning to perform PID control using the values before autotuning start.
- When the autotuning function is suspended halfway, no values of PID and control loop break alarm are changed. (The value before autotuning function start is maintained.)

■ Display at error occurrence

<Error display>

Err	● RAM failure (Incorrect set data write, etc.)	Please contact us or your nearest RKC agent.
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<Overscale, Underscale>

000 (Flashing)	Overscale (Measured value exceeds the high input display range limit.)	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> WARNING! </div> <p>In order to prevent electric shock, prior to replacing the sensor, always turn OFF the power.</p> <p>Sensor or input lead check</p>
UUU (Flashing)	Underscale (Measured value below the low input display range limit.)	

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