Thank you for purchasing this RKC product. In order to achieve maximum performance and ensure proper operation of your new instrument, carefully read all the instructions in this manual. Please place the manual in a convenient location for easy reference.

**SYMBOLS**

**WARNING** : This mark indicates precautions that must be taken if there is danger of electric shock, fire, etc., which could result in loss of life or injury.

**CAUTION** : This mark indicates that if these precautions and operating procedures are not taken, damage to the instrument may result.

**NOTE** : Extra notes or precaution are added to operating procedures and explanations.

⚠️ : This mark indicates that all precautions should be taken for safe usage.

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

---

⚠️ **WARNING**

- To prevent injury to persons, damage to instrument and equipment, a suitable external protection device shall be required.
- All wiring must be completed before power is turned on to prevent electric shock, fire or damage to instrument and equipment.
- This instrument must be used in accordance with the specifications to prevent fire or damage to instrument and equipment.
- This instrument is not intended for use in locations subject to flammable or explosive gases.
- Do not touch high-voltage connections such as power supply terminals, etc. to avoid electric shock.
- RKC is not responsible if this instrument is repaired, modified or disassembled by other than factory-approved personnel. Malfunction can occur and warranty is void under these conditions.
CAUTION

- This product is intended for use with industrial machines, test and measuring equipment. (It is not designed for use with medical equipment and nuclear energy.)
- This is a Class A instrument. In a domestic environment, this instrument may cause radio interference, in which case the user may be required to take additional measures.
- This instrument is protected from electric shock by reinforced insulation. Provide reinforced insulation between the wire for the input signal and the wires for instrument power supply, source of power and loads.
- Be sure to provide an appropriate surge control circuit respectively for the following:
  - If input/output or signal lines within the building are longer than 30 meters.
  - If input/output or signal lines leave the building, regardless the length.
- This instrument is designed for installation in an enclosed instrumentation panel. All high-voltage connections such as power supply terminals must be enclosed in the instrumentation panel to avoid electric shock by operating personnel.
- All precautions described in this manual should be taken to avoid damage to the instrument or equipment.
- All wiring must be in accordance with local codes and regulations.
- All wiring must be completed before power is turned on to prevent electric shock, instrument failure, or incorrect action. The power must be turned off before repairing work for input break and output failure including replacement of sensor, contactor or SSR, and all wiring must be completed before power is turned on again.
- To prevent instrument damage as a result of failure, protect the power line and the input/output lines from high currents with a suitable overcurrent protection device with adequate breaking capacity such as a fuse, circuit breaker, etc.
- Prevent metal fragments or lead wire scraps from falling inside instrument case to avoid electric shock, fire or malfunction.
- Tighten each terminal screw to the specified torque found in the manual to avoid electric shock, fire or malfunction.
- For proper operation of this instrument, provide adequate ventilation for heat dispensation.
- Do not connect wires to unused terminals as this will interfere with proper operation of the instrument.
- Turn off the power supply before cleaning the instrument.
- Do not use a volatile solvent such as paint thinner to clean the instrument. Deformation or discoloration will occur. Use a soft, dry cloth to remove stains from the instrument.
- To avoid damage to instrument display, do not rub with an abrasive material or push front panel with a hard object.
- When high alarm with hold action is used for Alarm function, alarm does not turn on while hold action is in operation. Take measures to prevent overheating which may occur if the control device fails.
NOTICE

- This manual assumes that the reader has a fundamental knowledge of the principles of electricity, process control, computer technology and communications.
- The figures, diagrams and numeric values used in this manual are only for purpose of illustration.
- RKC is not responsible for any damage or injury that is caused as a result of using this instrument, instrument failure or indirect damage.
- RKC is not responsible for any damage and/or injury resulting from the use of instruments made by imitating this instrument.
- Periodic maintenance is required for safe and proper operation of this instrument. Some components have a limited service life, or characteristics that change over time.
- Every effort has been made to ensure accuracy of all information contained herein. RKC makes no warranty expressed or implied, with respect to the accuracy of the information. The information in this manual is subject to change without prior notice.
- No portion of this document may be reprinted, modified, copied, transmitted, digitized, stored, processed or retrieved through any mechanical, electronic, optical or other means without prior written approval from RKC.
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1. PREPARATION

1.1 Handling procedure

Conduct necessary work according to the following procedures:

- **Check of product delivered**
  See "1.2 Check of product delivered" on page 2.

- **Check of model codes**
  See "1.3 Check of model codes" on page 3.

- **Mounting**
  See "2. MOUNTING" on page 5.
  See the attached "REX-D 100 Mounting Instructions".

- **Wiring**
  See "3. WIRING" on page 13.

- **Check of input range**
  See "5.3 SETUP set mode" on page 32.
  This is a universal type controller.
  Prior to using the instrument, set the desired input and output types.
See "5.2 Set-value (SV) changing procedure" on page 31.

Initial values prior to shipment are described on and after page 32.

**CAUTION**
Connect the input signal wiring, and then turn ON the power. If the input signal wiring opens, the controller judges than input is disconnected to cause the upscale or downscale of measured-value (PV) display.
- Upscale .......... For TC or RTD input
- Downscale ...... For TC (To be specified when ordering), voltage or current input.

### 1.2 Check of product delivered
Check than the following items are delivered without damage.
- Mainframe (1 unit)
- Mounting bracket for REX-D100 (2 pieces)
- Mounting bracket (2 pieces) *For REX-D400, D700 or D900
- REX-D series OPERATION MANUAL (1 copy) [IMDRE01-Ε□]
- Seal for engineering unit (One sheet)

**Option**
- External resistor (One piece) [shunt resistor for current input: 250Ω±0.02%±10PPM, 0.25W or more]
- Front cover [NEMA4X] (One piece), rubber packing [NEMA4X] (One piece)
1.3 Check of model codes

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

- **Model code**

**REX-D100 model code**

D100 □ - □ □ * □ □ - □ □ - □ □

1. **Control action**
   - F: PID action with auto-tuning
   - W: Heating/cooling PID action with auto-tuning *1, *2

2. **First control output [OUT1]**
   - M: Relay contact
   - V: Voltage pulse
   - 4: Continuous voltage *3
   - 0 to 5V DC
   - 5: Continuous voltage *3
   - 0 to 10V DC
   - 6: Continuous voltage *3
   - 1 to 5V DC
   - 7: Current 0 to 20mA DC *3
   - 8: Current 4 to 20mA DC *3

3. **Second control output [OUT2]**
   - N: When control action is F
   - M: Relay contact
   - V: Voltage pulse
   - 4: Continuous voltage *3
   - 0 to 5V DC
   - 5: Continuous voltage *3
   - 0 to 10V DC
   - 6: Continuous voltage *3
   - 1 to 5V DC
   - 7: Current 0 to 20mA DC *3
   - 8: Current 4 to 20mA DC *3

4. **Alarm function**
   - N: No alarm function
   - D: With alarm function 2-point

5. **Heater break alarm function**
   - N: No heater break alarm function
   - S: Heater break alarm for single-phase heater *4
   - D: Heater break alarm for three-phase heater *4, *5

6. **Contact input**
   - N: No contact input
   - 1: Contact input

7. **Analog output**
   - N: No analog output
   - 4: Voltage 0 to 5V DC
   - 5: Voltage 0 to 10V DC
   - 6: Voltage 1 to 5V DC
   - 7: Current 0 to 20mA DC
   - 8: Current 4 to 20mA DC

8. **Communication function**
   - N: No communication function
   - 4: RS-485

9. **Waterproof/dustproof specification (NEMA4X)**
   - N: No waterproof/dustproof specification
   - 1: Waterproof/dustproof specification

**Power Supply Voltage**
- 100 to 240V AC
- 24V DC
- 24V AC

**How to specify safety standard**

When you specify the models with CE mark, UL and cUL certification, please add the suffix of "/CE" to model code.

*1 If heating/cooling PID action with auto-tuning is selected, contact input, analog output communication function or heater break alarm function for three-phase heater cannot be selected.

*2 Cooling method (air or water cooling) selection can be set in SETUP mode.

*3 If continuous voltage/current output is selected, no heater break alarm function can be specified.

*4 As current transformer, either P: CTL-6-P-N or S: CTL-12-S56-10L-N is selected.

*5 Any one of contact input, analog output, heater break alarm for three-phase heater and communication function is selected.
Model code

REX-D400 • D700 • D900 model code

D400 • D700 • D900...

1. Control action
   F: PID action with auto-tuning
   W: Heating/cooling PID action with auto-tuning

2. Second control output [OUT2]
   N: When control action is F
   M: Relay contact
   V: Voltage pulse
   4: Continuous voltage
   0 to 5V DC
   5: Continuous voltage
   0 to 10V DC
   6: Continuous voltage
   1 to 5V DC
   7: Current 0 to 20mA DC
   8: Current 4 to 20mA DC

3. Alarm function
   N: No alarm function
   D: With alarm function 2-point

4. Heater break alarm function
   N: No heater break alarm function
   (With step function)
   S: Heater break alarm for single-phase heater (With step function)
   D: Heater break alarm for three-phase heater (No step function)

5. Analog output
   N: No analog output
   4: Voltage 0 to 5V DC
   5: Voltage 0 to 10V DC
   6: Voltage 1 to 5V DC
   7: Current 0 to 20mA DC
   8: Current 4 to 20mA DC

6. Communication function
   N: No communication function
   4: RS-422A
   5: RS-485

Power Supply Voltage
   100 to 240V AC
   24V AC
   24V DC

How to specify safety standard
   When you specify the models with CE mark, UL and cUL certification, please add the suffix of "/CE" to model code.

*1 If the heating/cooling PID action with auto-tuning is selected for REX-D400/D900, neither analog output nor communication function RS-422A can be specified.

*2 If the heating/cooling PID action with auto-tuning is selected for REX-D700, neither analog output nor heater break alarm for three-phase heater can be specified.

*3 Cooling method (air or water cooling) selection can be set in SETUP mode.

*4 If continuous voltage/current output is selected, no heater break alarm function can be specified.

*5 As current transformer, either P: CTL-6-P-N or S: CTL-12-S56-10L-N is selected.

*6 If the heater break alarm for three-phase heater is selected for REX-D400/D900, no contact input (step function) can be specified.
   For REX-D700, the contact input (step function) is provided.

*7 If the heater break alarm function is selected in REX-D700, no communication function RS-422A can be specified.

*8 If analog output is selected in REX-D400/D900, no communication function RS-422A can be specified.

*9 If analog output is selected in REX-D700, no heater break alarm for three-phase heater can be specified.
2. MOUNTING

⚠️ WARNING
To prevent electric shock or instrument failure, always turn off the power before mounting or removing the instrument.

2.1 Cautions for mounting

- **Mounting environment**
  1. This instrument is intended to be used under the following environmental conditions. (IEC61010-1) [OVERVOLTAGE CATEGORY II, POLLUTION DEGREE 2]
  2. Use this instrument within the following environment conditions:
     - Allowable ambient temperature: 5 to 40 °C
     - Allowable ambient humidity: 20 to 80 %RH
       (Absolute humidity: MAX. W. C 29.3 g/m³ dry air at 101.3 kPa)
     - Installation environment conditions: Indoor use, Altitude up to 2000 m
  3. Avoid the following conditions when selecting the mounting location:
     - 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.
     - Exposure to direct sunlight.
     - Excessive heat accumulation.

(4) Mount this instrument in the panel considering the following conditions:
- Provide adequate ventilation space so that heat does not build up.
- Do not mount this instrument directly above equipment that generates large amount of heat (heaters, transformers, semi-conductor functional devices, large-wattage resistors.)
- If the ambient temperature rises above 50 °C, cool this instrument with a forced air fan, cooler, etc. Cooled air should not blow directly on this instrument.
- In order to improve safety and the immunity to withstand noise, mount this instrument as far away as possible from high voltage equipment, power lines, and rotating machinery.
  - High voltage equipment: Do not mount within the same panel.
  - Power lines: Separate at least 200 mm.
  - Rotating machinery: Separate as far as possible.
- For correct functioning mount this instrument in a horizontal position.

(5) In case this instrument is connected to a supply by means of a permanent connection, a switch or circuit-breaker shall be included in the installation. This shall be in close proximity to the equipment and within easy reach of the operator. It shall be marked as the disconnecting device for the equipment.
2.2 Dimensions

REX-D100

Panel thickness: 1 to 10 min

Panel cutout

Dimensions in inches are shown for reference.
* Minimum

REX-D400

Panel cutout

Dimensions in inches are shown for reference.
* Minimum
REX-D700, D900

Unit: mm (inch)

Panel cutout

Dimensions in inches are shown for reference.
* Minimum

<table>
<thead>
<tr>
<th>Model</th>
<th>Sign</th>
<th>A (mm)</th>
<th>B (mm)</th>
<th>C (mm)</th>
<th>D (mm)</th>
<th>E (mm)</th>
<th>F (mm)</th>
<th>G (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>D700</td>
<td>A</td>
<td>72 (2.83)</td>
<td>72 (2.83)</td>
<td>67.8 (2.67)</td>
<td>67.8 (2.67)</td>
<td>82 (3.23)</td>
<td>68 (2.67) + 0.7 (0.027)</td>
<td>68 (2.67) + 0.7 (0.027)</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>96 (3.78)</td>
<td>96 (3.78)</td>
<td>91.8 (3.61)</td>
<td>91.8 (3.61)</td>
<td>106 (4.17)</td>
<td>92 (3.62) + 0.8 (0.031)</td>
<td>92 (3.62) + 0.8 (0.031)</td>
</tr>
<tr>
<td>D900</td>
<td>A</td>
<td>72 (2.83)</td>
<td>72 (2.83)</td>
<td>67.8 (2.67)</td>
<td>67.8 (2.67)</td>
<td>82 (3.23)</td>
<td>68 (2.67) + 0.7 (0.027)</td>
<td>68 (2.67) + 0.7 (0.027)</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>96 (3.78)</td>
<td>96 (3.78)</td>
<td>91.8 (3.61)</td>
<td>91.8 (3.61)</td>
<td>106 (4.17)</td>
<td>92 (3.62) + 0.8 (0.031)</td>
<td>92 (3.62) + 0.8 (0.031)</td>
</tr>
</tbody>
</table>
2.3 Mounting procedures

Mounting (For REX-D100)

1. Make rectangular holes corresponding to the number of controllers to be mounted through the panel by referring to the panel cutout dimensions.
2. Insert the controller into the panel from the panel front.
3. Insert the projections at the bottom of the bracket into the slots at the top of the controller [Fig. 1]
4. Push the mounting bracket in the arrow direction. [Fig. 2]
5. Install a mounting bracket also at the bottom of the case in the same way as ③ and ④ above.

* This instrument is provided with a waterproof and dustproof rubber packing. For details of replacing the packing due to deterioration, see "8. REPLACING THE WATERPROOF AND DUSTPROOF RUBBER PACKING". (Page 63)

* Check to see if the controller is firmly fixed to the panel.

**NOTE**
The front of this instrument conforms to IP55 with the instrument mounted on a control panel.
**CAUTION**

When removing the mounting bracket, use a screwdriver matching the diameter of the insertion hole. Otherwise, the mounting bracket may be damaged. Use a Phillips screwdriver as much as possible.

---

**When a Phillips screwdriver is used**

Use the screwdriver with a diameter of 5 to 7mm.

5 to 7mm

---

**When a minus-headed screwdriver is used**

Use a minus-headed screwdriver with a head width of 7mm or less and a diameter of 5 to 7mm. Insert this screwdriver into the insertion hole with the minus head faced in the vertical direction.

7mm or less

---

5 to 7mm
(1) Insert a Phillips screwdriver into the insertion hole at the rear of the mounting bracket. If the screwdriver head exceeds the line shown by A, the bracket expands to the left and right to disengage the self-locking hooks on the bracket from those on the case. [Fig. 1]

⚠️ When inserting the screwdriver into the insertion hole, do not turn, or move it up and down and left and right.

Fig. 1
(2) Pull the bracket toward you (①), then pull it upward (②) with the screwdriver inserted in the insertion hole. [Fig. 2]
Mounting (For REX-D400/D700/D900)

1. Mount the panel cutout corresponding to the number of units on the panel by referring to panel cutout dimensions.
2. Insert the instrument into the panel from the front side.
3. Engage each mounting bracket with the bracket insertion slots (Fig. 1).
4. Then tighten the mounting bracket setscrew from the rear with a Phillips screwdriver (Fig. 2). Do not overtighten the bracket setscrew. (Recommended tightening torque: 0.3N-m or less [3kgf-cm or less])
5. Install a mounting bracket also at the bottom of the case in the same way as 3 and 4 above.

* This instrument is provided with a waterproof and dustproof rubber packing. For details of replacing the packing due to deterioration, see "8. REPLACING THE WATERPROOF AND DUSTPROOF RUBBER PACKING". (Page 63)

**NOTE** The front of this instrument conforms to IP55 with the instrument mounted on a control panel.
3. WIRING

![WARNING]

- To prevent electric shock or instrument failure, do not turn on the power until all wiring is completed. Make sure that the wiring is correct before applying power to the instrument.
- To prevent injury to persons, damage to instrument and equipment, a suitable external protection device shall be required.
- To prevent instrument damage as a result of failure, protect the power line and the input/output lines from high currents with a suitable overcurrent protection device with adequate breaking capacity such as a fuse, circuit breaker, etc.

3.1 Cautions for wiring

1. For thermocouple input, use the appropriate compensation wire.
2. For RTD input, use low resistance lead wire with no difference in resistance between the three lead wires.
3. To avoid noise induction, keep input signal wire away from instrument power line, load lines and power lines of other electric equipment.
4. Signal connected to Voltage input and Current input shall be low voltage defined as “SELV” circuit per IEC 60950-1.
5. 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 controller and the controller is influenced by noise, use a noise filter.
   1. To obtain a satisfactory noise filter effect, select the most suitable type after due consideration of instrument power supply voltage and filter frequency characteristics.
   2. For instrument power wiring, if it is assumed that noise exerts a bad influence upon the controller, shorten the distance between twisted power supply wire pitches.
      (The shorter the distance between the pitches, the more effective for noise reduction.)
   3. 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 wiring, the less effective for noise.
(4) Do not install fuses and/or switches on the filter output signal since this may lessen filter effect.

[Example]

In diagram:

- Instrument power
- Leadwires
- Noise filter
- Leadwires
- Instrument power terminals

Shorten distance between pitches

(6) For wiring, use electric wires conforming to the domestic standard of each country.

(7) About 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.

(8) Display accuracy of current transformer (CT) input value at heater break alarm is within ±5% of input value or ±2A, whichever is greater. Therefore, when a heater break alarm is used, set load current flowing through the current transformer (CT) at a value to be sufficiently large.

(9) This instrument with 24 V power supply is not provided with an overcurrent protection device. For safety install an overcurrent protection device (such as fuse) with adequate breaking capacity close to the instrument.

- Fuse type: Time-lag fuse (Approved fuse according IEC60127-2 and/or UL248-14)
- Fuse rating: Rated current: 0.5 A

(10) For an instrument with 24 V power supply input, supply power from "SELV" circuit defined as IEC 60950-1.

(11) A suitable power supply should be considered in end-use equipment. The power supply must be in compliance with a limited-energy circuits (maximum available current of 8 A).

(12) Use the solderless terminal appropriate to the screw size.

- Screw size: M3 × 6 (REX-D100) M3 × 8 (REX-D400, REX-D900)
- Recommended tightening torque: 0.4 N·m (4 kgf-cm)
- Specified solderless terminals: With isolation
- Applicable wire: Solid/twisted wire of 2.0 mm² or less

(13) Make sure that during field wiring parts of conductors cannot come into contact with adjacent conductive parts.
3.2 Rear terminals

- REX-D100

Conduct wiring by referring to following diagrams.

F: PID action with auto-tuning
W: Heating/cooling PID action with auto-tuning

NO: Normally open
OUT (1): Heating-side (W)
OUT (2): Cooling-side (W)
**CAUTIONS**

1. Select voltage (low) input or voltage (high) input by the switch in the mainframe. (P. 62, P. 67)
2. If current input is selected, always mount the attached external resistor. (P. 65)
3. If the heating/cooling PID action with auto-tuning is selected, contact input, analog output, communication function or heater break alarm for three-phase heater cannot be selected.
4. Do not excessively tighten the terminal screws.
   
   \[
   \text{Recommended tighten torque: } 0.4\text{N-m (4kgf-cm)}
   
   \text{Maximum allowance tighten torque: } 0.7\text{N-m (7kgf-cm)}
   \]
5. Use the lug with 6.2mm wider or less.
Conduct wiring by referring to the following diagrams.

- **NO**: Normally open
- **NC**: Normally closed

OUT (1): Heating-side (W)
OUT (2): Cooling-side (W)
CAUTIONS

1. Select voltage (low) input or voltage (high) input by the switch in the mainframe. (P. 62, P. 67)

2. If current input is selected, always mount the attached external resistor. (P. 65)

3. If the heating/cooling PID action with auto-tuning is selected for REX-D400, neither analog output nor communication function RS-422A can be specified.

4. If analog output is selected in REX-D400, no communication function RS-422A can be specified.

5. Do not excessively tighten the terminal screws.
   Recommended tighten torque: 0.4N·m (4kgf·cm)
   Maximum allowance tighten torque: 1.0N·m (10kgf·cm)

6. Use the lug with 6.2mm wider or less.

Heater break alarm function
CT input specifications

Measured current:
0 to 30A (CTL-6-P-N)
0 to 100A (CTL-12-S56-10L-N)

Input rating:
Maximum current rating: 120mA
Input impedance: 2.5Ω
Conduct wiring by referring to following diagrams.
CAUTIONS

1. Select voltage (low) input or voltage (high) input by the switch in the mainframe. (P. 62, P. 67)

2. If current input is selected, always mount the attached external resistor. (P. 65)

3. If the heater break alarm function is selected in REX-D700, no communication function RS-422A can be specified.

4. Do not excessively tighten the terminal screws.
   (Recommended tighten torque: 0.4N·m (4kgf-cm)
   Maximum allowance tighten torque: 1.0N·m (10kgf-cm)

5. Use the lug with 6.2mm wider or less.
Conduct wiring by referring to following diagrams.

- Relay contact output
- Power terminals
- Alarm terminals
- Input terminals

- External resistor
- TC input
- RTD input
- Current, voltage (high/low) input

NO: Normally open
NC: Normally closed
OUT (1): Heating-side (W)
OUT (2): Cooling-side (W)
CAUTIONS

1. Select voltage (low) input or voltage (high) input by the switch on the mainframe. (P. 62, P. 67)

2. If current input is selected, always mount the attached external resistor. (P. 65)

3. If the heating/cooling PID action with auto-tuning is selected for REX-D900, neither analog output nor communication function RS-422A can be specified.

4. If analog output is selected in REX-D900, no communication function RS-422A can be specified.

5. Do not excessively tighten the terminal screws. 
   (Recommended tighten torque: 0.4N-m (4kgf-cm))
   Maximum allowance tighten torque: 1.0N-m (10kgf-cm)

6. Use the lug with 6.2mm wider or less.
3.3 Wiring example

- PID action with auto-tuning

\[ \text{REX - D 100 F - MN * DS - 1N - NN} \]
Heating/cooling PID action with auto-tuning

REX - D 900 W - M * D S - N - 5
4. NAME OF PARTS

■ REX-D100

■ REX-D400

■ REX-D700, D900

*The arrangement of lamps and keys on REX-D700 is the same as that on REX-D900.
<table>
<thead>
<tr>
<th>Name</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured-value (PV) display unit</td>
<td>Displays measured-value (PV).</td>
</tr>
<tr>
<td></td>
<td>Displays various characters depending on the instrument status.</td>
</tr>
<tr>
<td>Set-value (SV) display unit</td>
<td>Displays set-value (SV).</td>
</tr>
<tr>
<td></td>
<td>Displays input value, output value and various characters depending on the instrument status.</td>
</tr>
<tr>
<td>Set-value decrement key</td>
<td>Used when the numeric value needs to be decreased for set-value change.</td>
</tr>
<tr>
<td></td>
<td>Used for selecting operation mode in each mode.</td>
</tr>
<tr>
<td>Set-value increment key</td>
<td>Used when the numeric value needs to be increased for set-value change.</td>
</tr>
<tr>
<td></td>
<td>Used for selecting operation mode in each mode.</td>
</tr>
<tr>
<td>MONI/MODE key</td>
<td>Used when each mode is set or each mode display is changed.</td>
</tr>
<tr>
<td>SEL key</td>
<td>Used when each mode is set or each mode display is changed.</td>
</tr>
<tr>
<td>Output lamp 1 [Green]</td>
<td>Lights when control output is turned ON.</td>
</tr>
<tr>
<td>Output lamp 2 [Green]</td>
<td>Lights when cooling side output is turned ON.</td>
</tr>
<tr>
<td>Auto-tuning (AT) lamp [Green]</td>
<td>Flashes during auto-tuning execution.</td>
</tr>
<tr>
<td>ALM 1 lamp [Red]</td>
<td>Lights with the first alarm turned ON. This lamp lights also when a control loop break alarm (LBA) occurs.</td>
</tr>
<tr>
<td>ALM 2 lamp [Red]</td>
<td>Lights with the second alarm turned ON. This lamp lights also when a heater break alarm (HBA) occurs.</td>
</tr>
<tr>
<td>SV2 lamp [Green]</td>
<td>Lights when the set-value (SV) display unit shows SV2.</td>
</tr>
<tr>
<td>MV lamp [Green]</td>
<td>Lights during manual control. The set-value (SV) display unit shows the manual output value. The manual output value is changed by the [ ] or [ ] key.</td>
</tr>
<tr>
<td>CT1 lamp [Green]</td>
<td>Lights when the set-value (SV) display unit shows CT1.</td>
</tr>
<tr>
<td>CT2 lamp [Green]</td>
<td>Lights when the set-value (SV) display unit shows CT2.</td>
</tr>
</tbody>
</table>
5. OPERATION

5.1 Calling procedure in each mode

Broadly, the following six statuses are available for this instrument.

- **PV/SV display/set mode**: Mode used to confirm and set the measured-value (PV) or set-value (SV).
- **Operator mode**: Mode used to change operation mode or to confirm the current value.
- **Operator set mode**: Mode used to set alarms and set-value.
- **Engineer mode**: Mode used to execute/stop the auto-tuning function and to lock the setting.
- **Engineer set mode**: Mode used to set and confirm various parameters.
- **SETUP set mode**: Mode used to select input/output and the operation mode function, etc. *

* The SETUP set mode accesses parameters which are not usually changed.

⚠️ Key operational cautions

- The instrument automatically returns to PV/SV display/set mode if the front key is not pressed for more than 1 min. when the instrument is any of the following modes.
  - Operator set mode
  - Engineer set mode
  - SETUP set mode
- If the instrument returns to PV/SV display/set mode during setting operation, the value now being set is not captured.
**Input type/input range display**

This instrument immediately confirms input type and range following power-ON.

1. **Input type display**
   - Display for approx. 2 sec
   - Display changes automatically

2. **Input range display**
   - Display for approx. 2 sec
   - Display changes automatically

3. **PV/SV display/set mode**
① Input type display
(Display for approx. 2 sec)
a: Input display character (InP)
b: Unit

<table>
<thead>
<tr>
<th>Display</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>°C</td>
</tr>
<tr>
<td>°F</td>
<td>°F</td>
</tr>
<tr>
<td>None</td>
<td>%</td>
</tr>
</tbody>
</table>

c: Input type

<table>
<thead>
<tr>
<th>Display</th>
<th>TC</th>
<th>RTD</th>
<th>Voltage input</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>JULENTURS</td>
<td>B</td>
<td>K</td>
</tr>
<tr>
<td>J</td>
<td>L</td>
<td>TURS</td>
<td>J</td>
</tr>
<tr>
<td>L</td>
<td>E</td>
<td>NTURS</td>
<td>P</td>
</tr>
<tr>
<td>E</td>
<td>N</td>
<td>TURS</td>
<td>JP</td>
</tr>
<tr>
<td>N</td>
<td>T</td>
<td>URS</td>
<td>PT</td>
</tr>
<tr>
<td>T</td>
<td>U</td>
<td>RS</td>
<td></td>
</tr>
<tr>
<td>U</td>
<td>R</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>S</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

② Input range display
(Display for approx. 2 sec)
d: High input range limit value
e: Low input range limit value

③ PV/SV display/set mode
The measured-value (PV) display unit shows the measured-value (PV), and the set-value (SV) display unit shows the set-value (SV). In addition, the set-value (SV) can be changed. Usually set the instrument to this mode except when changing the parameter set-value.

f: Measured-value (PV) display unit
g: Set-value (SV) display unit
5.2 Set-value (SV) changing procedure

This instrument employs the up/down method for setting each constant. The set-value can be changed by pressing the ▲ and ▼ keys on the front panel.

[Example] Change the set-value (SV) to 200.0°C.

1. Set the instrument to the PV/SV display/set mode.

![Diagram of instrument display showing set-value change]

2. Numeric value change

If the instrument is set to another mode, press the MON MODE or SEL key to set the instrument to the PV/SV display/set mode.

Keep pressing the ▲ key to increase the numeric value on the set-value (SV) display unit until it reaches “200.0”. Pressing the ▲ key increases the numeric value and pressing the ▼ key decreases the numeric value.

NOTE

- Holding down the ▲ or ▼ key increases the speed at which the numeric value changes.
5.3 SETUP set mode

SETUP set mode is used to enter the input type, the range of each function and to enable or disable functions. The display sequence in SETUP set mode is shown below. Display in SETUP set mode can be changed by pressing the \textit{SEL} key.

(1) Display sequence

![Diagram showing the display sequence]

- \textbf{PV/SV display/set mode}
- Press the \textit{MONI MODE} and \textit{SEL} keys simultaneously
- Press the \textit{SEL} key
- Press the \textit{MONI MODE} key

\begin{itemize}
  \item \textbf{Always set the input type.}
  \item \textbf{Input type selection}
    \begin{itemize}
      \item The measured-value (PV) input type can be changed.
      \item Setting range: See the input range table on page 60.
      \item Initial value: 0
    \end{itemize}
  \item \textbf{Scaling high-limit setting}
    \begin{itemize}
      \item Sets the high limit of the scaling setting range.
      \item Setting range: Scaling low-limit to 9999
      \item Initial value: 999.9
    \end{itemize}
\end{itemize}
Scaling low-limit setting
Sets the low limit of the scaling setting range.
Setting range: -1999 to scaling high-limit
Initial value: -199.9

Decimal-point position selection
[Displayed for voltage/current input]
Sets the decimal-point position on the voltage/current input scale.
Setting range: 0 (No digit below decimal-point)
1 (1 digit below decimal-point)
2 (2 digits below decimal-point)
3 (3 digits below decimal-point)
Initial value: 1

Device address setting
[Displayed when the controller has the communication function]
Sets the communication device address of this controller.
Setting range: 0 to 99
Initial value: 0
Selection of manual mode (MAN) function
Selects whether to enable or disable manual control.
Setting range: 0 (Not provided) 1 (Provided)
Initial value : 0

Selection of operation STOP function
Selects whether to enable or disable the operation STOP function.
Setting range: 0 (Not provided) 1 (Provided)
Initial value : 0

CT type selection
[Displayed only when the controller has the heater break alarm function]
Selects the CT type used for the heater break alarm.
Setting range: 0 (CTL-6-P-N) 1 (CTL-12-S56-10L-N)
Initial value : 0
Selection of air cooling or water cooling
[Displayed only for heating/cooling PID action with auto-tuning.]
Selects the cooling method on the cooling side for heating/cooling PID action with auto-tuning.
Setting range: 0 (Air cooling) 1 (Water cooling)
Initial value: 0

Auto-tuning (AT) differential gap setting
Sets the differential gap during auto-tuning.
Setting range: 0 to 3600 sec
Initial value: 10

Action selection at input abnormality *1
Selects the action to be performed when an error occurs.
Setting range: 0..Not provided
1..Output OFF [Output limit (low limit)] *2
2..Output ON [Output limit (high limit)] *2
Initial value: 0

*1 Not displayed for heating/cooling PID action with auto-tuning.
*2 [Output limit (low limit)] and [Output limit (high limit)] are for continuous output.
Universal output selection
[Displayed for universal output]
Selects the universal output type.
Setting range: 0 (Relay contact output)
1 (Voltage pulse output)
2 (Continuous current output)
Initial value: 0
*Excluding the second control output of REX-D100 or REX-D400/D700/D900.
5.4 Operator mode

Operator mode is used to change each operation mode or to monitor and confirm the current value. The display sequence in operator mode is shown below. Press the MONI key to change the display in operator mode.

(1) Display sequence

PV/SV display / set mode

→ Press the MONI key

AUTO/MAN transfer

[Displayed only when there is AUTO/MAN transfer.]
Automatic or manual control is selected.
(In the Figure on the left, manual (MAN) mode is selected.)

RUN/STOP transfer *1

[Displayed only when there is RUN/STOP transfer.]
RUN or STOP is selected.
(In the Figure on the left, RUN mode is selected)

---

*1 If the instrument is stopped by “RUN/STOP” transfer when an alarm is output due to instrument failure, both alarm output and control output are turned off. (The same status as at power-OFF)
Displayed of the current transformer input value (CT1) *1
[Displayed only when the instrument has the heater break alarm for single-phase heater or heater break alarm for three-phase heater]
Displays the value input to the current transformer used when the instrument has the heater break alarm function on the set-value (SV) display unit.
Display range: 0.0 to 100.0A

Displayed of the current transformer input value (CT2) *2
[Displayed only when the instrument has the heater break alarm for three-phase heater]
Displays the value input to the current transformer used when the instrument has the heater break alarm for three-phase on the set-value (SV) display unit.
Display range: 0.0 to 100.0A

*1 The CT1 lamp lights when the current transformer input value (CT1) is displayed.
*2 The CT2 lamp lights when the current transformer input value (CT2) is displayed.
(2) Procedure for setting the manipulated output value (MV) in MAN mode.

Manipulated output (MV) in MAN mode is manually set in PV/SV display/set mode.

[Display examples]

① **Set the instrument to the PV/SV display/set mode**

If the instrument is set to another mode, press the **MON MODE** or **SEL** key to set the instrument to the PV/SV display/set mode.

* At this time, the MV lamp lights.
  The manipulated output value (MV) is displayed on the set-value (SV) display unit.

② **Numeric value change**

Pressing the **्म** key increases the manipulated output value (MV) on the set-value (SV) display unit, and pressing the **√** key decreases the value.

* Keeping pressing the **्म** or **√** key makes numeric value change faster.
5.5 Operator set mode

Operator set mode is used to change the set-value (SV) which is the control target and the alarm set values. The display sequence in the operator set mode is shown below.

The display within operator set mode is changed by pressing the \text{SEL} key, while the numeric value of each setting is changed by pressing the \text{ } \text{ } \text{ } and \text{ } \text{ } \text{ } keys.

(1) Display sequence

\begin{itemize}
  \item \text{PV/SV display/set mode} \rightarrow \text{SEL} \rightarrow \text{MON} \rightarrow \text{SEL} \rightarrow \text{SEL} \rightarrow \text{PV/SV display/set mode}
\end{itemize}

Set-value (SV1) *

Set-value (SV1) can be changed.
Setting range: Scaling low-limit to scaling high-limit
\((-1999 \text{ to } 9999)\)
Initial value: 0 (0.0)

Step set-value (SV2) *

Step set-value (SV2) can be changed.
Setting range: Scaling low-limit to scaling high-limit
\((-1999 \text{ to } 9999)\)
Initial value: 0 (0.0)

* Instrument without contact input:
  SV1 is displayed during the manual (MAN) mode or when the control is in STOP mode. SV2 is not displayed.

* Instrument with contact input:
  When the instrument is in AUTO mode and the control is in RUN mode, either SV1 or SV2 is displayed. By the contact input, the display can be switched between SV1 and SV2.
  (SV1 when contact input is CLOSE and SV2 when contact is OPEN)
First alarm set-value (AL1)
[Displayed only if alarm function is provided] *B
First alarm set-value can be changed.
Setting range: See *A
Initial value: 50 (50.0)

Second alarm set-value (AL2)
[Displayed only if alarm function is provided] *B
Second alarm set-value can be changed.
Setting range: See *A
Initial value: -50 (-50.0)

*A Deviation alarm
- High alarm, low alarm: -span to +span
- High and low alarm: -span to +span (Absolute value setting)
Band alarm: -span to +span (Absolute value setting)

Process alarm
- High/low SV alarm: Same as the input range
- High/low PV alarm: Same as the input range

*B These displays will not appear when the alarm is set to "0: Alarm OFF" or to "14: FAIL alarm" in the engineering setting mode.
Heater break alarm value (HBA1) *A

[Displayed only when the instrument has a heater break alarm]

The heater break alarm value (HBA1) can be changed.
Setting range: 0.0 to 100.0A (0.0: HBA1 OFF)
Initial value : 0.0

Heater break alarm value (HBA2) *A

[Displayed only when the instrument has a heater break alarm for three-phase heater]

The heater break alarm value (HBA2) can be changed.
Setting range: 0.0 to 100.0A (0.0: HBA2 OFF)
Initial value : 0.0

*A  ● Set heater break alarm set-value to a value about 85% current transformer input value (CT).
However, when power supply variations are large, set the alarm to a slightly smaller value.
In addition, when two or more heaters are connected in parallel, set the alarm to a slightly larger value so that it is activated even with only one heater is broken (However, within the value of CT).
● When the heater break alarm set-value is set to "0.0" or the current transformer is not connected, the heater break alarm is turned OFF.
(2) Changing the set-value (SV1) in operation STOP mode

Usually, the set-value (SV) display unit shows the set-value (SV1) in PV/SV display/set mode and thus the setting can be changed. However, when operation STOP is set, the set-value (SV) display unit shows "STOP" in PV/SV display/set mode and thus the setting cannot be changed.

To change the set-value (SV1) in operation STOP mode, set the instrument to operator set mode. The procedure for changing set-value (SV1) is shown below.

[Example] Change the set-value (SV) to 200.0°C

1. Set the instrument to operator set mode
2. Numeric value change
3. Setting end

Press the SEL key in PV/SV display/set mode to set the instrument to operator set mode.
First, "Set-value (SV1)" is displayed.
The measured-value (PV) display unit shows "SV1" and the set-value (SV) display unit shows the number.

Keep pressing the ▲ key to increase the numeric value on the set-value (SV) display unit until it reaches "200.0".
Pressing the ▼ key increases the numeric value and pressing the ▼ key decreases the numeric value.
*Keep pressing the ▲ or ▼ key to increase the speed with which the numeric value changes.

After the setting is completed, press the MONI or SEL key to set the instrument to the desired mode.
(The above figure shows that the instrument is in PV/SV display/set mode)
5.6 Engineer mode

Engineer mode is used to lock the set data and to switch PID/auto-tuning (AT). The display sequence in engineer mode is shown below. The display within engineer mode can be changed by pressing the MONI MODE key.

(1) Display sequence

PV/SV display / set mode

Press the MONI MODE key for 2 sec

1. : Press the MONI MODE key
2. : Press the MONI MODE or SEL key

Set data unlock (UnCK)/lock (LCK) transfer
Select whether the set data lock function is invalid (unlock) or valid. (In the Figure on the left: Unlock is selected.)
For details on the set data lock function, see page 45.

PID/auto-tuning (AT) transfer
Select PID control or auto-tuning (AT). If the auto-tuning function is selected, the instrument immediately starts this function. After the auto-tuning function is completed, the instrument is automatically transferred to PID control. (In the Figure on the left: Auto-tuning (AT) is selected.)

* If the auto-tuning function is activated, the auto-tuning lamp flashes.

NOTE After changing the engineer mode setting, the setting becomes valid when the MONI MODE key is pressed.
(2) Set data lock function
The set data function is used not to change the setting by front key operations. The following 2
levels are available for the set data lock function. Select the desired set data lock level by pressing
the ▲ or ▼ key after displaying the set data unlock (Un[L])/lock (L[L]) selection screen.

- Set data lock list

<table>
<thead>
<tr>
<th>Mode</th>
<th>Level, Symbol</th>
<th>Set data lock (Level 1)</th>
<th>Set data lock (Level 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PV/SV display/set mode</td>
<td></td>
<td>L[L]</td>
<td>L[L]^2</td>
</tr>
<tr>
<td>Operator mode</td>
<td></td>
<td>×</td>
<td>×</td>
</tr>
<tr>
<td>Engineer mode</td>
<td></td>
<td>×</td>
<td>×</td>
</tr>
<tr>
<td>Operator set mode</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineer set mode</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SETUP set mode</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

X: Setting can be changed. —: Setting cannot be change.
**Display sequence**

1. Press the **MODE** key for 2 sec.
   - Press the **✓** key
     - Press the **△** key

2. Set data lock (level 1)
   - Press the **✓** key
     - Press the **△** key

3. Set data lock (level 2)
   - Press the **✓** key

4. Press the **SEL** key or
   - Press the **MODE** key

- Dim lighting
- Bright lighting

**NOTES**

- In the same way as the normal changing procedure, set the instrument to PV/SV display/set mode when changing the set-value (SV) in the set data lock (level 2) state.

- Only the set-value (SV) displayed in PV/SV display/set mode can be changed with the set data lock function (level 2) activated. Therefore, if the instrument is provided with the step function (contact input), select the set-value (SV1) or the step set-value (SV2).

  - Contact open: Set-value (SV1) can be changed.
  - Contact close: Step set-value (SV2) can be changed.
(3) Requirements for auto-tuning (AT)

Auto-tuning (AT) is the function of automatically measuring, computing and setting the optimum PID constants. The requirements for auto-tuning (AT) start and suspension are described in the following. Auto-tuning (AT) is started/stopped by “PID/auto-tuning (AT) transfer” in the engineer mode (See page 44).

① Requirements for auto-tuning (AT) start

Start auto-tuning (AT) when all the following conditions are satisfied:
- In the operator mode
  - AUTO/MAN transfer → Auto mode
  - Operation execution RUN/STOP transfer → execution (RUN)
- Input value should not be abnormal.

② Requirements for auto-tuning (AT) suspension

- If the AT cycle does not reach 1.5 cycles about 9 hours after auto-tuning (AT) start, an auto-tuning (AT) error occurs and this function is stopped automatically.
  - When set-value (SV) is changed
  - When PV bias is changed
  - When high or low output limiter value is changed
  - When the input type is changed
  - When the direct/reverse action is changed
  - When input value becomes abnormal
  - When power failure occurs

NOTES

1. If the auto-tuning (AT) suspension condition is established, the auto-tuning (AT) function is immediately suspended to be changed to PID control. The PID constants at this time are the same as before starting auto-tuning (AT). In addition, even if the auto-tuning (AT) function is completed, it is automatically transferred to PID control.

2. Even if the auto-tuning function is activated while manipulated output is limited by the output limiter (See 5.7 Engineer set mode [P. 48]), no optimum PID constants may be obtained.
5.7 Engineer set mode

Engineer set mode is used to set the control action, input/output, alarms, operation selection of additional functions and the presence or absence of the functions. The parameter group (PG) list in engineer set mode is shown below.

Display within engineer set mode can be changed by pressing the \( \Delta \), \( \bigvee \) or \( \text{SEL} \) key.

(1) List of parameter groups (PG)

![Diagram of parameter groups]

Press the key for 2 sec.

PV/SV display/set mode

PV section

SV section

Alarm section 1

Alarm section 2

Control section

Output section 1

Output section 2

Communication section

\( P_b \)

\( S_b\rightarrow L \)

\( A_{S1} \)

\( A_{R1} \)

\( A_{L1} \)

\( A_{RH} \)

\( A_{LF} \)

\( L_{bR} \)

\( L_{bd} \)

\( P \)

\( P_d \)

\( P_r \)

\( d_b \)

\( d_H \)

\( r_r \)

\( F_{UE} \)

To PG1

To PG2

To PG3

To PG4

To PG5

To PG6

To PG7

To PG8

**NOTE** Note that certain items are not displayed depending on the specifications.
## (2) Description of parameter groups (PG)

### [Parameter group (PG1)] PV setting section

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Name</th>
<th>Setting range</th>
<th>Description</th>
<th>Initial value prior to shipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>$Pc_1$</td>
<td>Parameter group 1</td>
<td></td>
<td>The first characters of parameter group (PG1). They are also displayed first when the instrument is set to engineer set mode.</td>
<td></td>
</tr>
<tr>
<td>PG1</td>
<td>$Pb$</td>
<td>PV bias</td>
<td>Sensor correction is made by adding bias value to measured-value (PV).</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Pb</td>
<td></td>
<td>$Pb$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### [Parameter group (PG2)] SV setting section

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Name</th>
<th>Setting range</th>
<th>Description</th>
<th>Initial value prior to shipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>$Pc_2$</td>
<td>Parameter group 2</td>
<td></td>
<td>The first characters of parameter group (PG2).</td>
<td></td>
</tr>
<tr>
<td>PG2</td>
<td>$SV_{rL}$</td>
<td>SV change rate limit</td>
<td>Setting amount of set-value (SV) change per one minute when the set-value (SV) is change.</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>$SV_{rL}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Parameter group (PG3) Alarm section 1

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Name</th>
<th>Setting range</th>
<th>Description</th>
<th>Initial value prior to shipment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PG3</strong></td>
<td>Parameter group 3</td>
<td>-</td>
<td>The first characters of parameter group (PG3).</td>
<td>-</td>
</tr>
<tr>
<td><strong>AS1</strong></td>
<td>First alarm action selection</td>
<td>See <em>A</em></td>
<td>Selects first alarm action.</td>
<td>5</td>
</tr>
<tr>
<td><strong>AH1</strong></td>
<td>First alarm differential gap</td>
<td>Temperature input 0 (0.0) to 100(100.0)°C [°F], Voltage input 0.0 to 10.0% of span</td>
<td>Sets first alarm differential gap.</td>
<td>Temperature input 2 (2.0), Voltage input 0.2</td>
</tr>
<tr>
<td><strong>ALT1</strong></td>
<td>First alarm timer setting</td>
<td>0 to 600 sec</td>
<td>Sets time until alarm is turned ON after measured-value (PV) enters first alarm area.</td>
<td>0</td>
</tr>
<tr>
<td><strong>LbA</strong></td>
<td>Control loop break alarm (LBA)</td>
<td>0 to 7200 sec (0: LBA OFF)</td>
<td>Set control loop break alarm set-value (SV). Control loop break alarm turns OFF with this alarm set to “0”.</td>
<td>0</td>
</tr>
<tr>
<td><strong>Lbd</strong></td>
<td>LBA dead band (LBD)</td>
<td>Temperature input 0 to 9999°C [°F], (0: LBD OFF), Voltage input 0 to 100% of span</td>
<td>Set the area of not outputting LBA. No LBA dead band functions with “0” set.</td>
<td>0</td>
</tr>
</tbody>
</table>

*1 Displayed only when the alarm function is provided.

*2 Not displayed in heating/cooling PID action with the auto-tuning function.

*A 0: Alarm OFF
1: High-limit SV alarm
2: Low-limit SV alarm
3: High-limit PV alarm
4: Low-limit PV alarm
5: Deviation high alarm
6: Deviation low alarm
7: Deviation high/lower alarm
8: Band alarm
9: High-limit PV alarm (With hold action)
10: Low-limit PV alarm (With hold action)
11: Deviation high alarm (With hold action)
12: Deviation low alarm (With hold action)
13: Deviation high/lower alarm (With hold action)
14: FAIL alarm
### Parameter group (PG4) Alarm section 2

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Name</th>
<th>Setting range</th>
<th>Description</th>
<th>Initial value prior to shipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>PG4</td>
<td>Parameter group 4</td>
<td></td>
<td>The first characters of parameter group (PG4).</td>
<td></td>
</tr>
<tr>
<td>AS2</td>
<td>Second alarm action selection</td>
<td>See *A</td>
<td>Selects second alarm action.</td>
<td>6</td>
</tr>
<tr>
<td>AH2</td>
<td>Second alarm differential gap</td>
<td>Temperature input 0 (0.0) to 100 (100.0°C [°F]) Voltage input 0.0 to 10.0% of span</td>
<td>Sets second alarm differential gap.</td>
<td>Temperature input 2 (2.0) Voltage input 0.2</td>
</tr>
<tr>
<td>ALT2</td>
<td>Second alarm timer setting</td>
<td>0 to 600 sec</td>
<td>Sets timer until alarm is turned ON after measured-value (PV) enters second alarm area.</td>
<td>0</td>
</tr>
<tr>
<td>HbAT</td>
<td>HBA delay timer</td>
<td>0 to 600 sec</td>
<td>Set to the time until a heater break alarm is turned ON after a heater break occurs.</td>
<td>3</td>
</tr>
</tbody>
</table>

*1 Displayed only when the alarm function is provided.

*2 Displayed only when the heater break (HBA) function is provided.

*A
0: Alarm OFF
1: High-limit SV alarm
2: Low-limit SV alarm
3: High-limit PV alarm
4: Low-limit PV alarm
5: Deviation high alarm
6: Deviation low alarm
7: Deviation high/low alarm
(Absolute-value setting)
8: Band alarm
9: High-limit PV alarm (With hold action)
10: Low-limit PV alarm (With hold action)
11: Deviation high alarm (With hold action)
12: Deviation low alarm (With hold action)
13: Deviation high/low alarm (With hold action)
(Absolute-value setting)
14: FAIL alarm
### [Parameter group (PG5)] Control section

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Name</th>
<th>Setting range</th>
<th>Description</th>
<th>Initial value prior to shipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>PG5</td>
<td>Parameter group 5</td>
<td></td>
<td>The first characters of parameter group (PG5).</td>
<td></td>
</tr>
<tr>
<td>*1</td>
<td>$P$</td>
<td>Proportional band</td>
<td>Temperature input $0 \ (0.0)$ to input span to $9999 \ (999.9)^\circ C \ (\ ^F)$</td>
<td>Voltage input $0.0$ to $100.0%$ of span</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Set when PI or PID control is performed. For heating/cooling PID action: Proportional band setting on the heating-side.</td>
<td></td>
</tr>
<tr>
<td>*2</td>
<td>$I$</td>
<td>Integral time</td>
<td>OFF, 1 to 3600 sec</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Eliminates offset occurring in proportional control.</td>
<td>240</td>
</tr>
<tr>
<td>*2</td>
<td>$d$</td>
<td>Derivative time</td>
<td>OFF, 1 to 3600 sec</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Prevents ripples by predicting output change, thereby improving control stability.</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>$Ar$</td>
<td>Anti-reset wind-up (ARW)</td>
<td>1 to 100% of proportional band</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Prevents overshoot and/or undershoot caused by integral action effect.</td>
<td></td>
</tr>
<tr>
<td>*3</td>
<td>$Pc$</td>
<td>Cooling-side proportional band</td>
<td>1 to 3000% of proportional band</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sets cooling-side proportional band when heating/cooling PID action is performed.</td>
<td></td>
</tr>
<tr>
<td>*3</td>
<td>*4</td>
<td>$db$ Deadband/overlap</td>
<td>Temperature input $-10 \ (-10.0)$ to $10 \ (10.0)^\circ C \ (\ ^F)$</td>
<td>Voltage input $-10.0$ to $10.0%$ of span</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sets control deadband between heating-side and cooling-side proportional bands. Minus (-) setting results in overlap.</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td></td>
<td>$oH$</td>
<td>ON/OFF action differential gap</td>
<td>Temperature input $0 \ (0.0)$ to $50 \ (50.0)^\circ C \ (\ ^F)$</td>
<td>Voltage input $0.0$ to $10.0%$ of span</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Set the differential gap during ON/OFF action.</td>
<td>2 (2.0)</td>
</tr>
<tr>
<td></td>
<td>$Mr$</td>
<td>Manual reset</td>
<td>$-50.0$ to $50.0%$ (Heating/cooling $-100.0$ to $100.0%$)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Corrects the manipulated variable (MV) to eliminate the offset occurring in proportional control.</td>
<td>0.0</td>
</tr>
<tr>
<td>Symbol</td>
<td>Name</td>
<td>Setting range</td>
<td>Description</td>
<td>Initial value prior to shipment</td>
</tr>
<tr>
<td>--------</td>
<td>----------------</td>
<td>----------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>PG 6</td>
<td>Parameter group 6</td>
<td></td>
<td>The first characters of parameter group (PG6).</td>
<td></td>
</tr>
<tr>
<td>CY1</td>
<td>Proportioning cycle</td>
<td>1 to 100 sec</td>
<td>Sets control output cycle. For heating/cooling PID: Heating-side proportioning cycle</td>
<td></td>
</tr>
<tr>
<td>CYL</td>
<td>Output limit (high limit)</td>
<td>Output limit (low limit) to 105.0% (Heating/cooling 0.0 to 105.0%)</td>
<td>High limit of manipulated output value (MV). For heating/cooling PID action: Output limit (high limit) on the heating-side output.</td>
<td>105.0</td>
</tr>
<tr>
<td>oLL</td>
<td>Output limit (low limit)</td>
<td>-5.0% to output limit (high limit)</td>
<td>The high limit of manipulated output value (MV) on the cooling side for the heating/cooling PID action with auto-tuning.</td>
<td>-5.0</td>
</tr>
<tr>
<td>oS1</td>
<td>Direct/reverse action selection</td>
<td>0: Direct action 1: Reverse action</td>
<td>Selects direct or reverse control action.</td>
<td>1</td>
</tr>
</tbody>
</table>

*1 Not displayed for continuous voltage or current output.

A heater break alarm may malfunction at a low load factor (short ON time) depending on the input timing of a measured signal to the CT. (The alarm occurs even if no heater breaks.) In this case, set the proportioning cycle to more than 5 sec.

*2 Not displayed in heating/cooling PID action with the auto-tuning function.

*1 When set to 0 (0.0), the controller is in ON/OFF action.
*2 The setting can be changed even in ON/OFF action, but is not activated.
*3 Activated only during heating/cooling PID action with the auto-tuning function.
   The setting can be changed even in ON/OFF action, but is not activated.
*4 If the overlap setting exceeds the proportional band on the heating or cooling side, the controller sets the overlap value to the proportional band on the heating or cooling side, whichever is smaller. If manual output is specified, the overlap value can be changed, but the data becomes invalid.
### Parameter group (PG7) Output section 2

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Name</th>
<th>Setting range</th>
<th>Description</th>
<th>Initial value prior to shipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>PG7</td>
<td>Parameter group 7</td>
<td></td>
<td>The first characters of parameter group (PG7).</td>
<td></td>
</tr>
<tr>
<td>CY2</td>
<td>Cooling-side proportioning cycle</td>
<td>1 to 100 sec</td>
<td>Sets cooling-side output cycle for heating/cooling PID action.</td>
<td>20</td>
</tr>
<tr>
<td>oHc</td>
<td>Output limit (high limit)</td>
<td>0.0 to 105.0% (cooling-side output)</td>
<td>The high limit of manipulated output value (MV) on the heating/cooling PID action.</td>
<td>105.0</td>
</tr>
<tr>
<td>Ao</td>
<td>Analog output specification selection</td>
<td>0 : Measured-value (PV)</td>
<td>Selects analog output type.</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 : Deviation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 : Set-value (SV)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 : Control output (Heating-side)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 : Heater current value (CT1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AHS</td>
<td>High limit analog output range</td>
<td>Specification selection</td>
<td>Sets high limit of analog output range.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0, 2: Scaling low-limit to scaling high-limit</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 : span (−1999) to span (9999)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 : 0.0 to 100.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 : 0.0 to 100.0A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALS</td>
<td>Low limit analog output range</td>
<td>Specification selection</td>
<td>Sets low limit of analog output range.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0, 2: Scaling low-limit to scaling high-limit</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 : span (−1999) to span (9999)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 : 0.0 to 100.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 : 0.0 to 100.0A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*1 Displayed if the control output is relay contact output or voltage pulse output.

   A heater break alarm may malfunction at a low load factor (short ON time) depending on the input timing of a measured signal to the CT. (The alarm occurs even if no heater breaks.) In this case, set the proportioning cycle to more than 5 sec.

*2 Displayed only during heating/cooling PID action with the auto-tuning function.

*3 Displayed only for analog output. [Option]
### [Parameter group (PG8)] Communication section

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Name</th>
<th>Setting range</th>
<th>Description</th>
<th>Initial value prior to shipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>PG8</td>
<td>Parameter group 8</td>
<td></td>
<td>The first characters of parameter group (PG8).</td>
<td></td>
</tr>
<tr>
<td>* bPS</td>
<td>Communication speed</td>
<td>0: 1200bps</td>
<td>Selects communication speed.</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1: 2400bps</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2: 4800bps</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3: 9600bps</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4: 19200bps</td>
<td></td>
<td></td>
</tr>
<tr>
<td>* bIT</td>
<td>Communication data bit configuration</td>
<td>See *A.</td>
<td>Selects data bit configuration during communication.</td>
<td>0</td>
</tr>
</tbody>
</table>

* Not displayed when there is no communication function.

**A**

<table>
<thead>
<tr>
<th>Setting</th>
<th>Parity bit</th>
<th>Data bit [bit]</th>
<th>Stop bit [bit]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>None</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>None</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Even</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Even</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Odd</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Odd</td>
<td>7</td>
<td>2</td>
</tr>
</tbody>
</table>
5.8 Basic operation during setting change

(1) Basic operation procedure

① Set the instrument to the PV/SV display/set mode.
② Set to the mode whose setting needs to be changed.
③ Display the parameter whose setting needs to be changed.
④ Press the ▲ or ▼ key to change the numeric value.
⑤ Save the numeric value by pressing the MONI or SEL key.

(2) Setting change examples

[Example] When the proportional band (P) of the parameter group (PG5) is set to 100.0.

① Set the instrument to the PV/SV display/set mode
② Call up engineer set mode
③ Set the parameter group (PG5).

If the instrument is set to another mode, press the MONI or SEL key to set the instrument to the PV/SV display/set mode.
Press the SEL key for 2 sec. with the controller set to PV/SV display/set mode to call up engineer set mode. First, "Parameter group (PG1)" is displayed.
Press the ▲ key to call up the parameter group (PG5). Next, press the SEL key to display the proportional band (P). The measured value (PV) display unit shows "P" and the set-value (SV) display unit shows the numeric value.
(4) Numeric value change

Keep pressing the ▲ key to increase the numeric value on the set-value (SV) display unit until it reaches "100.0". Pressing the 【SEL】 key then makes the setting effective.

(5) Setting end

After the setting is completed, press the MONI MODE or 【SEL】 key to set the instrument to the desired mode. (The above figure shows that the instrument is in PV/SV display/set mode)

NOTE When validating the set items

For set-value (SV) or manipulated output value (MV) → If the ▲ or ▼ key is released after the setting is finished, data thus set becomes valid.

In operator or engineer mode → Validated by pressing the MONI MODE key after setting completion.

Changing the set-value (SV1) in operation STOP mode Operator set mode, Engineer set mode or SETUP set mode

Validator by pressing the 【SEL】 key after setting completion.
6. DISPLAY AT ABNORMALITY

- For input abnormality

<table>
<thead>
<tr>
<th>Display</th>
<th>Details</th>
<th>Action (output)</th>
<th>Measures</th>
</tr>
</thead>
</table>
| Measured-value (PV) Flashing | Input abnormality
  Measured-value (PV) rose above the high input range limit or fell below the low input range limit. | - Action at input abnormality
  If overscale or downscale occurs in the controller, the controller takes the action for input abnormality set as a result of action selection mode for input abnormality. |                      |
| 0000 Flashing    | Overscale
  Measured-value (PV) is beyond the effective input range.                                                                 | In order to prevent electric shock, prior to replacing the sensor, always turn OFF the power. |
| 0000 Flashing    | Underscale
  Measured-value (PV) is below the effective input range.                                                                 | Check input type, range, sensor and sensor connection.                          |
• Self-diagnostic function
If an error is detected by the self-diagnostic function, the PV display unit flashes "Err", and the SV display unit shows the error code.
If two or more errors occur simultaneously, the total summation of these error codes is displayed.

<table>
<thead>
<tr>
<th>Error code</th>
<th>Details</th>
<th>Action (output)</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Adjusted data destroyed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 or 4</td>
<td>RAM error</td>
<td>Outputs are all turned OFF</td>
<td>Turn OFF the power once. If an error occurs after the power is turned ON again, contact your nearest RKC sales office or agent from which you bought the controller.</td>
</tr>
<tr>
<td>8</td>
<td>Temperature compensation error</td>
<td></td>
<td></td>
</tr>
<tr>
<td>128</td>
<td>Input error</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[Example] If the adjusted data is destroyed and an input error occurs simultaneously

The PV display unit flashes " **Err** " and the SV display unit shows the number 129:1 (adjusted data destroyed) plus 128 (input error).
# 7. INPUT RANGE TABLE

<table>
<thead>
<tr>
<th>Group</th>
<th>Input type</th>
<th>Input select</th>
</tr>
</thead>
<tbody>
<tr>
<td>K(κ')</td>
<td>-199.9 to 999.9 °C</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>-200 to 1372 °C</td>
<td>1</td>
</tr>
<tr>
<td>J(J')</td>
<td>-199.9 to 999.9 °C</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>-200 to 1200 °C</td>
<td>3</td>
</tr>
<tr>
<td>T(T)</td>
<td>-199.9 to 400.0 °C</td>
<td>4</td>
</tr>
<tr>
<td>R(R)</td>
<td>0 to 1769 °C</td>
<td>5</td>
</tr>
<tr>
<td>S(S)</td>
<td>0 to 1769 °C</td>
<td>6</td>
</tr>
<tr>
<td>B(B)</td>
<td>0 to 1820 °C</td>
<td>7</td>
</tr>
<tr>
<td>E(E)</td>
<td>-200 to 1000 °C</td>
<td>8</td>
</tr>
<tr>
<td>N(N)</td>
<td>0 to 1300 °C</td>
<td>9</td>
</tr>
<tr>
<td>PLII(P)</td>
<td>0 to 1390 °C</td>
<td>10</td>
</tr>
<tr>
<td>W5Re/W26Re(γ)</td>
<td>0 to 2320 °C</td>
<td>11</td>
</tr>
<tr>
<td>U(U)</td>
<td>0 to 600 °C</td>
<td>12</td>
</tr>
<tr>
<td>L(L)</td>
<td>0 to 900 °C</td>
<td>13</td>
</tr>
</tbody>
</table>

* Accuracy in the range of 0 to 400°C (0 to 800°F): Not guaranteed.
<table>
<thead>
<tr>
<th>Group</th>
<th>Input type</th>
<th>Input select</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC</td>
<td><strong>K (°F)</strong></td>
<td>-199.9 to 999.9 °F</td>
</tr>
<tr>
<td></td>
<td><strong>J (°F)</strong></td>
<td>-330 to 2500 °F</td>
</tr>
<tr>
<td></td>
<td><strong>T (°F)</strong></td>
<td>-199.9 to 752.0 °F</td>
</tr>
<tr>
<td></td>
<td><strong>R (°F)</strong></td>
<td>0 to 3216 °F</td>
</tr>
<tr>
<td></td>
<td><strong>S (°F)</strong></td>
<td>0 to 3216 °F</td>
</tr>
<tr>
<td></td>
<td><strong>B (°F)</strong></td>
<td>0 to 3308 °F</td>
</tr>
<tr>
<td></td>
<td><strong>E (°F)</strong></td>
<td>-330 to 1832 °F</td>
</tr>
<tr>
<td></td>
<td><strong>N (°F)</strong></td>
<td>0 to 2372 °F</td>
</tr>
<tr>
<td></td>
<td><strong>PLII (°F)</strong></td>
<td>0 to 2534 °F</td>
</tr>
<tr>
<td></td>
<td><strong>W5Re/W26Re (°F)</strong></td>
<td>0 to 4208 °F</td>
</tr>
<tr>
<td></td>
<td><strong>U (°F)</strong></td>
<td>0 to 1100 °F</td>
</tr>
<tr>
<td></td>
<td><strong>L (°F)</strong></td>
<td>0 to 1600 °F</td>
</tr>
<tr>
<td>RTD</td>
<td><strong>JPt100Ω</strong></td>
<td>-199.9 to 510.0 °C</td>
</tr>
<tr>
<td></td>
<td><strong>Pt100Ω</strong></td>
<td>-199.9 to 660.0 °C</td>
</tr>
<tr>
<td></td>
<td><strong>JPt100Ω</strong></td>
<td>-199.9 to 950.0 °F</td>
</tr>
<tr>
<td></td>
<td><strong>Pt100Ω</strong></td>
<td>-199.9 to 999.9 °F</td>
</tr>
</tbody>
</table>

* Accuracy in the range of 0 to 400°C (0 to 800°F): Not guaranteed.
<table>
<thead>
<tr>
<th>Group</th>
<th>Input type</th>
<th>Input select</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage input (Low)</td>
<td>mV, V (V)</td>
<td>0 to 10 mV DC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 to 100 mV DC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 to 1 V DC</td>
</tr>
<tr>
<td>Voltage input (High)</td>
<td>V (V)</td>
<td>0 to 5 V DC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 to 5 V DC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 to 10 V DC</td>
</tr>
<tr>
<td>Current input</td>
<td>mA (mA)</td>
<td>0 to 20 mA DC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 to 20 mA DC</td>
</tr>
</tbody>
</table>

*1 If voltage (high) input is used, the internal switch needs to be switched.

*2 If a current input of 0 to 20 mA is used, select a voltage (high) input of 0 to 5 V, and if a current input of 4 to 20 mA is used, select a voltage (high) input of 1 to 5 V. In either case, connect an external resistor (250Ω±0.02%±10PPM, 0.25 W or more).

**Switch selection**
Always turn OFF the power, then pull out the internal chassis.  

**CAUTIONS**
- No data is backed up when the power supply is turned off during setting change.
- If the setting is changed during auto-tuning, the auto-tuning function is suspended.
8. REPLACING THE WATERPROOF AND DUSTPROOF RUBBER PACKING

⚠️ WARNING

- In order to prevent electric shock, always turn off the power supply before replacing the rubber packing.
- In order to prevent electric shock, and instrument failure, always turn off the power supply before pulling out the internal chassis.
- In order to prevent injury or instrument failure, do not touch the internal printed circuit board.

If the waterproof and dustproof rubber packing deteriorates, contact your nearest RKC sales office or agent from which you bought the controller.

<table>
<thead>
<tr>
<th>Type</th>
<th>Parts code</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>REX-D100</td>
<td>KD100-35</td>
<td>For the board</td>
</tr>
<tr>
<td>REX-D100</td>
<td>KD100-310</td>
<td>For the case</td>
</tr>
<tr>
<td>REX-D400</td>
<td>KF400N-32</td>
<td>For the board</td>
</tr>
<tr>
<td>REX-D400</td>
<td>KD400-35</td>
<td>For the case</td>
</tr>
<tr>
<td>REX-D700</td>
<td>KF700N-32</td>
<td>For the board</td>
</tr>
<tr>
<td>REX-D700</td>
<td>KD700-34</td>
<td>For the case</td>
</tr>
<tr>
<td>REX-D900</td>
<td>KF900N-32</td>
<td>For the board</td>
</tr>
<tr>
<td>REX-D900</td>
<td>KD900-35</td>
<td>For the case</td>
</tr>
</tbody>
</table>
• Replacement of dustproof and waterproof rubber packing

CAUTION
Prior to replacing the rubber packing, first confirm that no water remains, then turn on the power supply. If the water remains, shorting may result.

[For the board]
1. Pull the internal assembly out of the case, then remove the old rubber packing.

   ![Diagram of internal assembly]

   Rubber packing

2. Replace the old rubber packing with a new one, then put the internal chassis in the case.

   ![Diagram of internal chassis]

   Hook
   Rubber packing

* Firmly push the rubber packing in the board until it also contacts the hook.

[For the case]
1. Remove the mounting bracket and disconnect all of the lead wires from the rear terminal board of this instrument, then remove the instrument from the control panel. Next, remove the deteriorated rubber packing from this instrument.

   ![Diagram of case with rubber packing]

   Rubber packing

2. Firmly push the new rubber packing into the instrument, then re-mount the instrument in the panel.

   ![Diagram of instrument re-mounted in panel]
9. EXTERNAL RESISTOR 🔴 (shunt resistor for current input)

9.1 Prior to connecting external resistor (shunt resistor for current input)

If the current input specification is selected, it becomes necessary to change voltage input and also to connect an external resistor (shunt resistor for current input [250Ω±0.02%±10PPM, 0.25W or more]). If a current input of 0 to 20mA is used, select a voltage (high) input of 0 to 5V, or if a current input of 4 to 20mA is used, select a voltage (high) input of 1 to 5V. In either case, connect an external resistor (shunt resistor for current input [250Ω±0.02%±10PPM, 0.25W or more]) between the input terminals at the rear of the controller case. The setting procedure for current input is described in the following.

9.2 Setting procedure

[Example of changing the setting] When changing to a current input of 0 to 20mA

(1) In order to prevent electric shock, always turn off the power supply. 🔴

Next, connect the external resistor between the No. 9 and No. 10 input terminals at the rear of the case (for REX-D100). However, for REX-D400/D900, connect the external resistor between the No. 10 and No. 11 input terminals, or for REX-D700, between the No. 14 and No. 15 input terminals.

![External Resistor Diagram]

<table>
<thead>
<tr>
<th>Model</th>
<th>Recommended Tighten Torque</th>
<th>Maximum Allowance Tighten Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>REX-D100</td>
<td>0.4N·m (4kgf·cm)</td>
<td>0.7N·m (7kgf·cm)</td>
</tr>
<tr>
<td>REX-D400, D700, D900</td>
<td>0.4N·m (4kgf·cm)</td>
<td>1.0N·m (10kgf·cm)</td>
</tr>
</tbody>
</table>
**WARNING**

- In order to prevent electric shock and instrument failure, always turn off the power supply before pulling out the internal chassis.
- In order to prevent injury or instrument failure, do not touch the internal printed circuit board.

(2) Remove the internal assembly from the case by pressing the latch located at the bottom of the front panel and pulling it forward.
(3) Change voltage (low) input to voltage (high) input by the internal switch. For REX-D100/D700, the internal switch is located on the left printed wiring board when viewed from the front, or for REX-D400/D900, on the right printed wiring board when viewed from the front.

(4) Put the internal chassis into the case, then turn ON the power. As a result, the input type and range are displayed. (See "Input type/input range display" on page 29.)
(5) Next, simultaneously press the [MONI MODE] and [SEL] keys to call up SETUP set mode. First, “Input type selection (1nP)” is displayed.  

![Image of a control panel with the keys highlighted.]

Press the keys to simultaneously.

(6) Keep pressing the [△] keys to increase the numeric value on the set-value (SV) display unit.  
Press the [△] key to set the input to a voltage (high) input of 0 to 5V (input selection: 35).  
For input selection, see P. 60.  
After the numeric value is set, this setting becomes valid if [SEL] key is pressed.  

![Image of a control panel with the keys highlighted and the number 35 displayed.]
(7) After the setting is completed, press the MONI MODE or SEL key to set the instrument to the desired mode.
(Figure on the under: PV/SV display/set mode)

* Follow the same steps for setting REX-D400/D700/D900.
10. FRONT COVER (NEMA4X)

10.1 Check of product delivered
Check that the front cover and rubber packing both conforming to NEMA4X shown in the figure at the right are ready at hand.

10.2 Mounting
(1) Check that the REX-D100 is firmly fixed to the panel.
(2) Push the hooks inside the front cover into the grooves in the case until a click sound is produced.
At this time, firmly fix the front cover to the instrument front so that no gaps exist between the front cover and rubber packing, and between the front cover and instrument front.
With the front cover (NEMA4X) attached to the instrument front

Check that no gaps exist between the front cover and rubber packing, and between the front cover and instrument front.
10.3 Dismounting
Push the front cover to the left while pushing it from the top and bottom to disengage the hook at the left from the groove (①). The front cover can also be pushed to the right first under this condition to disengage the hook at the right from the groove.
Next, disengage the other hook from the relevant groove to remove the front cover (②).

10.4 Maintenance
If the rubber packing or the rubber packing at the rear of the front cover conforming to NEMA4X deteriorates, place orders of new rubber packings with your nearest RKC sales office or agent from which you bought these rubber packings.

<table>
<thead>
<tr>
<th>Name</th>
<th>Parts code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front cover (NEMA4X)</td>
<td>KD100-316</td>
</tr>
<tr>
<td>Rubber packing (NEMA4X)</td>
<td>KD100-315</td>
</tr>
</tbody>
</table>
# Output rated table

<Check the output type by the model code. (P. 3, P. 4)>  

| Control output | Relay contact output | 250 V AC 3 A (Resistive load)  
<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Electrical life: 300,000 times or more (Rated load)</th>
</tr>
</thead>
</table>
| Voltage pulse output |                       | • 0-12 V DC [D100]  
|                |                     | (Allowable load resistance 600 Ω or more)  
|                |                     | • 0-15 V DC [D400, D700, D900]  
|                |                     | (Allowable load resistance 1 kΩ or more) |
| Continuous voltage output |                   | • 0 to 5 V DC (Allowable load resistance 1 kΩ or more)  
|                |                     | • 0 to 10 V DC (Allowable load resistance 1 kΩ or more)  
|                |                     | • 1 to 5 V DC (Allowable load resistance 1 kΩ or more) |
| Current output |                       | • 0 to 20 mA DC (Allowable load resistance 600 Ω or less)  
|                |                     | • 4 to 20 mA DC (Allowable load resistance 600 Ω or less) |
| Alarm output | Relay contact output | 250 V AC 0.5 A (Resistive load)  
|                |                    | Electrical life: 50,000 times or more |
| Analog output | Voltage output |                       | • 0 to 5 V DC (Allowable load resistance 1 kΩ or more)  
|                |                    | • 0 to 10 V DC (Allowable load resistance 1 kΩ or more)  
|                |                    | • 1 to 5 V DC (Allowable load resistance 1 kΩ or more) |
|                | Current output      |                       | • 0 to 20 mA DC (Allowable load resistance 600 Ω or less)  
|                |                     | • 4 to 20 mA DC (Allowable load resistance 600 Ω or less) |

*1 There is no output setting for the first control output (OUT1) of the REX-D400/D700/D900.  
*2 Including heater break alarm, control loop break alarm and FAIL alarm.
Input type
Thermocouple: K, J, T, R, S, B, E, N, PL11, W5Re/W26Re, U, L (Input impedance: 1 MΩ or more)
RTD: JPt100, Pt100
Voltage: 0 to 10 mV DC, 0 to 100 mV DC, 0 to 1 V DC, 0 to 5 V DC, 1 to 5 V DC, 0 to 10 V DC
Current: 0 to 20 mA DC, 4 to 20 mA DC

Power supply and Power consumption
Power supply voltage: 90 to 264 V AC (Power supply voltage range), 50/60 Hz
(Rating: 100 to 240 V AC)
21.6 to 26.4 V AC (Power supply voltage range), 50/60 Hz
(Rating: 24 V AC)
21.6 to 26.4 V DC (Ripple factor: Less than 10% P-P)
(Rating: 24 V DC)
Power consumption: 7 VA max. (at 100 V AC)
11 VA max. (at 240 V AC)
7 VA max. (at 24 V AC)
180 mA max. (at 24 V DC)

Weight:
REX-D100: Approx. 180 g
REX-D400: Approx. 250 g
REX-D900: Approx. 360 g