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

### 1. PRODUCT CHECK

**C100**

- **1(2) (3) (4) (6)**

- **F: PID action with autotuning (Reverse action)**
- **D: PID action with autotuning (Direct action)**
- **W: Heat/cool PID action with autotuning (Water cooling)**
- **A: Heat/cool PID action with autotuning (Air cooling)**

**C410**

- **5 (1) (2)**

- **M: Relay contact**
- **V: Voltage pulse**
- **G: Trigger (for triac driving)**

**C700**

- **(1) (2) (3) (4) (5) (6)**

**C900**

- **(1) (2) (3) (4) (5) (6)**

- **M: Relay contact**
- **V: Voltage pulse**
- **G: Trigger (for triac driving)**

**C100**

- **1(2) (3) (4) (6)**

- **F: PID action with autotuning (Reverse action)**
- **D: PID action with autotuning (Direct action)**
- **W: Heat/cool PID action with autotuning (Water cooling)**
- **A: Heat/cool PID action with autotuning (Air cooling)**

**Input type, (3) Range code**

See “9. INPUT RANGE TABLE.”

**First control output [OUT1]**

- **A: Heat/cool PID action with autotuning (Water cooling)**

**Second control output [OUT2]**

- **M: Relay contact**
- **V: Voltage pulse**
- **G: Trigger (for triac driving)**

**Alarm 1 [ALM1], (7) Alarm 2 [ALM2]**

- **N: No alarm**
- **A: Deviation high alarm**
- **D: Deviation high alarm**
- **E: Deviation high alarm**
- **F: Deviation low alarm**
- **G: Deviation low alarm**
- **H: Process high alarm**
- **J: Process low alarm**
- **K: Process high alarm with hold action**
- **L: Process low alarm with hold action**
- **P: Heater break alarm (CTL-6)**
- **R: Control loop break alarm**
- **S: Heater break alarm (CTL-12)**
- **T: Temperature alarm**
- **U: Temperature alarm**

- **1**

- **2**

- **3**

- **4**

- **5**

- **6**

- **7**

- **8**

- **4. Second control output [OUT2]**

- **M: Relay contact**
- **V: Voltage pulse**
- **G: Trigger (for triac driving)**

- **As control loop break alarm, only either the ALM1 or ALM2 is selected.**

- **Check that power supply voltage is also the same as that specified when ordering.**

### 2. MOUNTING

#### 2.1 Mounting Cautions

**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 ambient temperature and ambient humidity.**

- **Allowable ambient temperature:** 0 to 50 °C
- **Allowable ambient humidity:** 45 to 85% RH

**3. Avoid the following 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 splash.**
- **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.**
2.2 Dimensions

**C100**
(Unit: mm)

**C400**
(Unit: mm)

**C410**
(Unit: mm)

**C700**
(Unit: mm)

**C900**
(Unit: mm)

Panel thickness: 1 to 5 mm or 5 to 9 mm (C100) 1 to 8 mm (C400/C410/C700/C900)

2.3 Mounting procedures

- **C100**
  - When the controllers are mounted on panel with 1 to 5 mm in thickness
    Since the mounting brackets are already installed on the controller, insert the controller into the panel front without removal of the brackets.
  - When the controllers are mounted on panel with 5 to 9 mm in thickness
    Remove the mounting brackets from the controller with a slotted screwdriver. 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.

- **C400/C410/C700/C900**
  1. Prepare the panel cutout as specified in 2.2 Dimensions.
  2. Insert the instrument through the panel cutout.
  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. Do not overtighten the bracket setscrew.
  5. The other mounting bracket should be installed the same way described in 3. and 4.

**C900** is used in the above figures for explanation, but the same mounting procedures also apply to C400/C410/C700.

3. WIRING

**WARNING**

To prevent electric shock or instrument failure, do not turn on the power until all the wiring is completed.

3.1 Wiring Cautions

- For thermocouple input, use the appropriate compensation wire.
- For RTD input, use low resistance lead wire with no difference in resistance between the three lead wires.
- To avoid noise induction, keep input signal wire away from instrument power line, load lines and power lines of other electric equipment.
- If there is electrical noise in the vicinity of the instrument that could affect operation, use a noise filter.
  - Shorten the distance between the twisted power supply wire pitches to achieve the most effective noise reduction.
  - Always install the noise filter on a grounded panel. Minimize the wiring distance between the noise filter output and the instrument power supply terminals to achieve the most effective noise reduction.
  - Do not connect fuses or switches to the noise filter output wiring as this will reduce the effectiveness of the noise filter.
- Power supply wiring must be twisted and have a low voltage drop.
- About 5 to 6 seconds are required as preparation time for contact output every time the instrument is turned on. Use a delay relay when the output line is used for an external interlock circuit.
- This instrument is not furnished with a power supply switch or fuses. Therefore, if a fuse or power supply switch is required, install close to the instrument.
  - Fuse type: Time-lag fuse
  - Recommended fuse rating: Rated voltage 250 V  Rated current: 1 A
  - For an instrument with 24 V power supply, supply power from a SELV circuit.
### 3.2 Terminal Configuration

#### C100

- **Alarm output:** Relay contact
- **Power supply:** 100-240 V AC
- **Trigger for triac drive:**
  - Terminal numbers: 1 to 10
  - Screw size: M3 x 6
- **Control output:**
  - NO: Normally open
  - NC: Normally closed
- **Input:**
  - Terminal numbers: 11 to 13
  - Screw size: M3 x 8
  - Maximum allowance: 0.4 N-m [4 kgf-cm]

**Note:** Terminals which are not used according to the controller type are all removed.

#### C400, C410, C900

- **Alarm output:** Relay contact
- **Power supply:** 24 V DC
- **Trigger for triac drive:**
  - Terminal numbers: 17 to 24
  - Screw size: M3 x 8
  - Maximum allowance: 0.4 N-m [4 kgf-cm]
- **Control output:**
  - NO: Normally open
  - NC: Normally closed
- **Input:**
  - Terminal numbers: 1 to 10
  - Screw size: M3 x 6
  - Maximum allowance: 0.8 N-m [8 kgf-cm]

**Note:** Terminals which are not used according to the controller type are all removed.

#### C700

- **Alarm output:** Relay contact
- **Power supply:** 24 V DC
- **Trigger for triac drive:**
  - Terminal numbers: 17 to 24
  - Screw size: M3 x 8
  - Maximum allowance: 0.4 N-m [4 kgf-cm]
- **Control output:**
  - NO: Normally open
  - NC: Normally closed
- **Input:**
  - Terminal numbers: 11 to 13
  - Screw size: M3 x 6
  - Maximum allowance: 0.8 N-m [8 kgf-cm]

**Note:** Terminals which are not used according to the controller type are all removed.

### Specifications

- **Input type:**
  - Thermocouple: K, J, R, S, B, E, T, N, PLII, W5Re/W26Re, U, L
  - RTD: Pt100, JP100
  - Voltage: 0 to 5 V DC, 1 to 5 V DC
  - Input Impedance: Approx. 1 MΩ
  - Input range: 0 to 20 mA DC, 4 to 20 mA DC
  - Input Impedance: Approx. 250 Ω
  - Sampling cycle: 0.5 seconds

- **Control method:** PID control
- **ON/OFF, P, PI, or PD actions is available.**
- **Input impedance:** Approx. 1 MΩ
- **Input range:** See Input range table

- **Alarm output:**
  - Relay contact output: 250 V AC, 1A (Resistive load)
  - Electrical life: 50,000 times or more (Rated load)
  - Heater break alarm function:
    - Measured current: 0 to 30 A (CTL-6-P-N)
    - 0 to 100 A (CTL-12-S56-10L-N)
    - Input rating: 120 mA
    - Input impedance: Approx. 2.5 Ω
  - Performance:
    - Display accuracy:
      - ± (0.5 % of display value + 1 digit) or ± 3 °C [5 °F]
      - Whichsoever is greater
      - R and S input: 0 to 399 °C [0 to 799 °F]
      - ± 6 °C [12 °F]
      - B input: 0 to 399 °C [0 to 799 °F]
      - ± 6 °C [12 °F]
      - Accuracy is not guaranteed.
      - RTD:
        - ± (0.5 % of display value + 1 digit) or ± 0.8 °C [1.8 °F]
        - whichever is greater
    - Voltage/Current: ± (0.5 % of span + 1 digit)

### Memory Backup

- **Backed up by Nonvolatile Memory**
- **Number of write times:** Approx. 100,000 times
- **Data storage period:** Approx. 10 years

### Power

- **Power supply voltage:**
  - 85 to 264 V AC (Power supply voltage range), 50/60 Hz
  - Rating: 100 to 240 V AC
- **Power consumption:**
  - 6 VA max. (at 100 V AC)
  - 9 VA max. (at 240 V AC)
  - 6 VA max. (at 24 V DC)
  - 145 mA max. (at 24 V DC)

### Weight

- C100: Approx. 170 g
- C700: Approx. 250 g
- C400/C410: Approx. 260 g
- C800: Approx. 340 g
5.1 Operation Menu

Power ON

- Input type and Input range display
  - PV/SV Display Mode
    - The controller will display the measured value (PV) and the set value (SV).
    - Press the SET key for 2 seconds.
  - SV Setting Mode
    - This is the mode used to set the SV.
    - Press the SET key for 2 seconds.
    - Factory setting: 0°C or 0.0°C

- Input type symbol
  - Unit for input and SV display
  - Celsius: °C, Fahrenheit: °F, Voltage/current input: no character shown

5.2 Parameter List

The following parameter symbols are displayed as the SET key is pressed.

### Parameter Setting Mode

This mode is used to set the parameters such as alarms, PID constants, etc. (See 5.2 Parameter List.)

#### Symbol

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Setting range</th>
<th>Description</th>
<th>Factory set value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current transformer (CT) input value monitor</td>
<td>CT</td>
<td>0.0 to 100.0 A</td>
<td>Display input value from the current transformer. (Display only)</td>
<td></td>
</tr>
<tr>
<td>Alarm 1 set value (ALM1)</td>
<td>AL1</td>
<td>Temperature input: Deviation alarm, Process alarm: −1999 to +9999 °C [°F] or −199.9 to +999.9 °C [°F]</td>
<td>Set the alarm 1 set value and alarm 2 set value. For the alarm action type, see page 7.</td>
<td>50 (50.0)</td>
</tr>
<tr>
<td>Alarm 2 set value (ALM2)</td>
<td>AL2</td>
<td>Voltage/current inputs: Deviation alarm: −199.9 to +200.0 % or −199.9 to +300.0 %</td>
<td>Alarm differential gap: Temperature input: 2 or 2.0 °C [°F] Voltage/current inputs: 0.2 % of span</td>
<td>5.0</td>
</tr>
</tbody>
</table>

- These parameter symbols are not related to existing functions on the controller.
- Parameters which are not related to existing functions on the controller are not displayed.

To avoid damage to the instrument, never use a sharp object to press keys.
<table>
<thead>
<tr>
<th>Symbol</th>
<th>Name</th>
<th>Setting range</th>
<th>Description</th>
<th>Factory set value</th>
</tr>
</thead>
<tbody>
<tr>
<td>HBA</td>
<td>Heater break alarm (HBA) set value</td>
<td>0.0 to 100.0 A</td>
<td>Alarm value is set by referring to input value from the current transformer (CT). Used only for single-phase.</td>
<td>0.0</td>
</tr>
<tr>
<td>LBA</td>
<td>Control loop break alarm (LBA) time</td>
<td>0.1 to 200.0 minutes</td>
<td>Set control loop break alarm set value.</td>
<td>8.0</td>
</tr>
<tr>
<td>LBD</td>
<td>LBA deadband</td>
<td>Temperature input: 0 to 9999 °C [°F] Voltage/current inputs: 0 to 100 % of span</td>
<td>Set the area of not outputting LBA. No LBA deadband functions with 0 set. Differential gap: Temperature input: 0.8 °C [°F] Voltage/current inputs: 0.8 % of span</td>
<td>0</td>
</tr>
<tr>
<td>RCD</td>
<td>Set data lock (LCK)</td>
<td>0100: No set data locked (All parameters changeable) 0101: Set data locked (All parameters locked) 0110: Only the set value (SV) is changeable with the set data locked</td>
<td>Performs set data change enable/disable.</td>
<td>0100</td>
</tr>
<tr>
<td>RAC</td>
<td>Autotuning (AT)</td>
<td>0: AT end or cancel 1: AT start or execution</td>
<td>Turns the autotuning ON/OFF.</td>
<td>0</td>
</tr>
<tr>
<td>P</td>
<td>Proportional band</td>
<td>Temperature input: 1 (0.1) to span 0.1 °C [°F] resolution: Within 9999.9 °C [°F] Voltage/current inputs: 0.1 to 100.0 % of span</td>
<td>Set when PI, PD or PID control is performed. Heat/cool PID action: Proportional band setting on the heat-side. OFF/OFF action control when set to 0 (0.0). ON/OFF action differential gap: Temperature input: 2 (0.2) °C [°F] Voltage/current inputs: 0.2 % of span</td>
<td>Temperature input: 30 (30.0) Voltage/current inputs: 3.0</td>
</tr>
<tr>
<td>I</td>
<td>Integral time</td>
<td>1 to 3600 seconds (0 second: PD action)</td>
<td>Set the time of integral action to eliminate the offset occurring in proportional control.</td>
<td>240</td>
</tr>
<tr>
<td>d</td>
<td>Derivative time</td>
<td>1 to 3600 seconds (0 second: PI action)</td>
<td>Set the time of derivative action to improve control stability by preparing for output changes.</td>
<td>60</td>
</tr>
<tr>
<td>ARW</td>
<td>Anti-reset windup (ARW)</td>
<td>1 to 100 % of heat-side proportional band (0 %: Integral action OFF)</td>
<td>Overshooting and undershooting are restricted by the integral effect.</td>
<td>100</td>
</tr>
<tr>
<td>HG</td>
<td>Heat-side proportion cycle</td>
<td>1 to 100 seconds (Not displayed if the control output is current output.)</td>
<td>Set control output cycle. Heat/cool PID action: Heat-side proportioning cycle Relay contact output: 20 Voltage pulse output/ Trigger output for triac driving: 2</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Cool-side proportion band</td>
<td>1 to 1000 % of heat-side proportional band</td>
<td>Set cool-side proportional band when heat/cool PID action.</td>
<td>100</td>
</tr>
<tr>
<td>DB</td>
<td>Deadband</td>
<td>Temperature input: −10.0 to +10.0 °C [°F] or −100.0 to +10.0.0 °C [°F] Voltage/current inputs: −10.0 to +10.0.0 % of span</td>
<td>Set control action deadband between heat-side and cool-side proportional bands. Minus (−) setting results in overlap.</td>
<td>0 or 0.0</td>
</tr>
<tr>
<td>T</td>
<td>Cool-side proportion cycle</td>
<td>1 to 100 seconds (Not displayed if the control output is current output.)</td>
<td>Set control cool-side output cycle for heat/cool PID action. Relay contact output: 20 Voltage pulse output: 2</td>
<td></td>
</tr>
</tbody>
</table>

1 Heater Break Alarm (HBA) function
The HBA function monitors the current flowing through the load by a dedicated current transformer (CT), compares the measured value with the HBA set value, and detects a fault in the heating circuit.

2 Control Loop Break Alarm (LBA) function
The LBA function is used to detect a load (heater) break or a failure in the external actuator (power controller, magnet relay, etc.), or a failure in the control loop caused by an input (sensor) break. The LBA function is activated when control output reaches 0 % or 100 %. LBA monitors variation of the measured value (PV) for the length of LBA time. When the LBA time has elapsed and the PV is still within the alarm determination range, the LBA will be ON.

Precaution for LBA setting:
- Displayed only for when HBA is selected as Alarm 1 or Alarm 2.
- No control loop break alarm can be used at heat/cool PID control action.
- The LBA function can not be activated when AT function is turned on.
- The LBA function is activated when control output reaches 0 % or 100 %. The time required for the LBA output to turn on includes both the time from the initial occurrence of loop failure and the LBA setting time. Recommended setting for LBA is for the set value of the LBA to be twice the value of the integral time (I).
- If LBA setting time does not match the controlled object requirements, the LBA selling time should be lengthened. If setting time is not correct, the LBA will malfunction by turning on or off at inappropriate times or not turning on at all.

Precaution for LBA setting:
- Displayed only for when LBA is selected as Alarm 1 or Alarm 2.
- No control loop break alarm can be used at heat/cool PID control action.
- The LBA function can not be activated when AT function is turned on.
- The LBA function is activated when control output reaches 0 % or 100 %. The time required for the LBA output to turn on includes both the time from the initial occurrence of loop failure and the LBA setting time. Recommended setting for LBA is for the set value of the LBA to be twice the value of the integral time (I).
- If LBA setting time does not match the controlled object requirements, the LBA selling time should be lengthened. If setting time is not correct, the LBA will malfunction by turning on or off at inappropriate times or not turning on at all.

IMNZC21-E1
5.3 Changing Parameter Settings

Procedures to change parameter settings are shown below.

To store a new value for the parameter, always press the SET key.

The display changes to the next parameter and the new value will be stored.

- A new value will not be stored without pressing SET key after the new value is displayed on the display.
- After a new value has been displayed by using the UP and DWN keys, the SET key must be pressed within one minute, or the new value is not stored and the display will return to the PV/SV monitor screen.

● Change the set value (SV)

Change the set value (SV) from 0 °C to 200 °C

1. Select the SV setting mode

Press the SET key at PV/SV monitor screen until SV setting screen is displayed.

2. Shift the high-lighted digit

Press the shift key to high-light the hundreds digit. The high-lighted digit indicates which digit can be set.

3. Change the set value

Press the UP key to change the number to 2.

4. Store the set value

Press the SET key to store the new set value. The display returns to the PV/SV monitor screen.

● Change parameters other than the set value (SV)

The changing procedures are the same as those of example 2 to 4 in the above "Change the set value (SV)". Pressing the SET key after the setting end shifts to the next parameter. When no parameter setting is required, return the instrument to the PV/SV display mode.

6. OPERATION

CAUTIONS

- All mounting and wiring must be completed before the power is turned on. If the input signal wiring is disconnected or short-circuited (RTD input only), the instrument determines that burnout has occurred.
  - Displays:
    - Upscale: Thermocouple input, RTD input (when input break)
    - Downscale: Thermocouple input (specify when ordering), RTD input (when short-circuited), Voltage input (1 to 5 V DC), Current input (4 to 20 mA DC)
  - For the voltage (0 to 5 V DC) or current (0 to 20 mA DC) input, the display becomes indefinite (display of about zero value).
  - Outputs:
    - Control output: OFF (Heat/Cool control: the control output on both heat-side and cool-side is turned off)
    - Alarm output: Both of the Alarm 1 and Alarm 2 outputs of this instrument are turned on when burnout occurs regardless of any of the following actions taken. (High alarm, low alarm, etc.) In addition, when used for any purposes other than these alarms (event, etc.), specify the Z-124 specification (not to be forcibly turned on).
  - A power failure of 20 ms or less will not affect the control action. When a power failure of more than 20 ms occurs, the instrument assumes that the power has been turned off. When power returns, the controller will retain the conditions that existed prior to shut down.
  - The alarm hold action is activated when not only the power is turned on, but also the SV is changed.

6.1 Operating Precautions

(1) All mounting and wiring must be completed before the power is turned on.

(2) The settings for the SV and all parameters should be appropriate for the controlled object.

(3) A power supply switch is not furnished with this instrument. It is ready to operate as soon as the power is turned on.

6.2 Set Data Lock (LCK) Function

The set data lock restricts parameter setting changes by key operation. This function prevents the operator from making errors during operation.

<table>
<thead>
<tr>
<th>Set value</th>
<th>Parameters which can be changed</th>
</tr>
</thead>
<tbody>
<tr>
<td>0100</td>
<td>All parameters (Factory set value)</td>
</tr>
<tr>
<td>0101</td>
<td>No parameters (All Locked)</td>
</tr>
<tr>
<td>0110</td>
<td>SV</td>
</tr>
</tbody>
</table>

Parameters protected by Set Data Lock function are still displayed for monitoring.

6.3 Autotuning (AT) Function

Autotuning (AT) automatically measures, calculates and sets the optimum PID and LBA constants. The following conditions are necessary to carry out autotuning and the conditions which will cause the autotuning to stop.

Caution for using the Autotuning (AT)

When a temperature change (UP and/or Down) is 1 °C or less per minute during Autotuning, Autotuning may be cancelled before calculating PID values. In that case, adjust the PID values manually. It is possible to happen when the set value is around the ambient temperature or is close to the maximum temperature achieved by the load.

Requirements for AT start

Start the autotuning when all following conditions are satisfied:

- Prior to starting the AT function, end all the parameter settings other than PID and LBA.
- Confirm the LCK function has not been engaged.

Requirements for AT cancellation

The autotuning is canceled if any of the following conditions exist.

- When the set value (SV) is changed.
- When the PV bias value is changed.
- When the PV becomes abnormal due to burnout.
- When the power is turned off.
- When power failure longer than 20 ms occurs.

If the AT is canceled, the controller immediately changes to PID control. The PID values will be the same as before AT was activated.

When AT is completed, the controller immediately changes to PID control. If the control system does not allow the AT cycling process, set each PID constant manually to meet the needs of the application.

7. INITIAL SETTING

Parameters in the Initialization mode should be set according to the application before setting any parameter related to operation. Once the Parameters in the Initialization mode are set correctly, those parameters are not necessary to be changed for the same application under normal conditions. If they are changed unnecessarily, it may result in malfunction or failure of the instrument. RKC will not bear any responsibility for malfunction or failure as a result of improper changes in the Initialization mode.

7.1 Go to Initialization Mode

1. Turn on the power to this controller. The instrument goes to the PV/SV display after confirming input type symbol and input range.

2. Press the SET key for five seconds to go to the Parameter Setting Mode from the PV/SV display.

3. Press the SET key until ‘LCK’ (Set Data Lock display) will be displayed.

4. The high-lighted digit indicates which digit can be set. Press shift key to high-light the hundreds digit. (The section in each image of the controller shows the digits which are not high-lighted.)

5. Press the DWN key to change 1 to 0.

6. Press the SET key to store the new set value. The display goes to the next parameter, and the Initialization mode is unlocked.

7. Press the shift key for five seconds while pressing the SET key to go to the Initialization Mode. When the controller goes to the Initialization Mode, "S1" will be displayed.

If the controller is set to the initial set mode, all outputs are turned OFF.

7.2 Exit Initialization Mode

When any parameter setting is changed in the Initialization Mode, check all parameter set values in SV Setting Mode and Parameter Setting Mode.

1. Press the shift key for five seconds while pressing the SET key from any display in the Initialization Mode. The controller goes back to the operation mode and the PV/SV display will be displayed.

2. Press the SET key for five seconds in the PV/SV display.

3. Press the SET key until ‘LCK’ (Set Data Lock display) will be displayed.

4. The high-lighted digit indicates which digit can be set. Press shift key to high-light the hundreds digit.

5. Press the SET key to store the new set value. The display goes to the next parameter, and the Initialization mode is locked.
7.3 Initial Setting Menu

Display flowcharts in Initialization mode are shown in the following.

Example: Change the input type from “K” to “J”
1. Press the SET key until SL2 is displayed.
2. Press the UP key to change the number to 1.
3. Press the SET key to store the new set value. The display goes to the next parameter.

7.4 Input Type Selection (SL1)

When any parameter setting is changed in the Initialization Mode, check all parameter set values in SV Setting Mode and Parameter Setting Mode. Factory set value varies depending on the input type.

<table>
<thead>
<tr>
<th>Set value</th>
<th>Input type</th>
<th>Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000</td>
<td>K</td>
<td>Thermocouple (TC)</td>
</tr>
<tr>
<td>0001</td>
<td>J</td>
<td></td>
</tr>
<tr>
<td>0010</td>
<td>L</td>
<td></td>
</tr>
<tr>
<td>0011</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>0100</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>0101</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>1000</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>1001</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>1010</td>
<td>W/S500W26Re</td>
<td></td>
</tr>
<tr>
<td>1011</td>
<td>PL II</td>
<td></td>
</tr>
<tr>
<td>0110</td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>1100</td>
<td>Pt100Ω (JIS/IEC)</td>
<td></td>
</tr>
<tr>
<td>1101</td>
<td>JPt100Ω (JIS)</td>
<td></td>
</tr>
<tr>
<td>1110</td>
<td>0 to 5 V DC</td>
<td>Voltage</td>
</tr>
<tr>
<td>1111</td>
<td>0 to 20 mA DC</td>
<td>Current</td>
</tr>
</tbody>
</table>

- Conduct setting so as to meet the instrument specification (input type).
- Setting change between different symbols may cause malfunction.
- However, when the setting is changed, always reset “SLH” and “SLL” (See page 8).

- Change Settings

Example: Change the input type from “K” to “J”
1. Press the SET key. The display will go to SL1.
2. Press the UP key to change the number to 1.
3. Press the SET key to store the new set value. The display goes to the next parameter.

7.5 Temperature Unit and Cooling Type Selection (SL2)

Inappropriate settings may result in malfunction. Control type between Heat Only and Heat/Cool cannot be changed by this parameter.

<table>
<thead>
<tr>
<th>Set value</th>
<th>Temperature unit</th>
<th>Cooling type selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000</td>
<td>°C</td>
<td>Air cooling (A type) or Heat only type (F, D type)</td>
</tr>
<tr>
<td>0001</td>
<td>°C</td>
<td>Air cooling (A type) or Heat only type (F, D type)</td>
</tr>
<tr>
<td>0010</td>
<td>°C</td>
<td>Water cooling (W type)</td>
</tr>
</tbody>
</table>

- PV Low High

7.6 Alarm 1 [ALM1] Type Selection (SL4)

Alarm 2 [ALM2] Type Selection (SL5)

If the alarm function is not provided with the instrument when shipped from the factory, no alarm output is available by changing SL4 and/or SL5.

SL4 is set to 0000 in the following cases.
- When the instrument does not have ALM1 output
- When Control Loop Break Alarm (LBA) is provided and assigned to ALM1

SL5 is set to 0000 in the following cases.
- When the instrument does not have ALM2 output
- When Control Loop Break Alarm (LBA) is provided and assigned to ALM2
- When the Heater Break Alarm (HBA) is provided

Factory set value varies depending on the instrument specification.

Set value | Details of setting
--- | ---
0000 | No alarm
0001 | Deviation high alarm
0101 | Deviation low alarm
0010 | Deviation high/low alarm
0110 | Band alarm
0111 | Process high/low alarm
1001 | Deviation high alarm with hold action *
1101 | Deviation low alarm with hold action *
1010 | Deviation high/low alarm with hold action *
1111 | Process high/low alarm with hold action *

- Hold action:
  When Hold action is ON, the alarm action is suppressed at start-up or the control set value change until the measured value enters the non-alarm range.

- Alarm action type

Both of the Alarm 1 and Alarm 2 outputs of this instrument are turned on when the alarm occurs regardless of any of the following actions taken (High alarm, low alarm, etc.). In addition, when used for any purposes other than these alarms (event, etc.), specify the Z-124 specification (not to be forcibly turned on).

- Change Settings

Example: Change the ALM1 type from “Deviation high alarm (0001)” to “Deviation low alarm (0101)”
1. Press the SET key three times at SL1 until SL4 is displayed.
2. Press the shift key to high-light the hundreds digit.
3. Press the UP key to change the digit to 0.
4. Press the SET key to store the new set value. The display goes to the next parameter.

7.7 PV bias (Pb)

The value set in the PV bias is added to the input value (actual measured value) to correct the input value. The PV bias is used to correct the individual variations in the sensors or when there is difference between the measured values (PV) of other instruments.

Setting range: Temperature input: -19999 to +99999 °C [°F] or -999.9 to +999.9 °C [°F]
Voltage/current inputs: -199.9 to +9999 %
Factory set value: Temperature input: 0 °C [°F] or 0.0 °C [°F]
Voltage/current inputs: 0.0 %
1. Press the SET key at "SLH" is displayed.

2. Press the shift key to high-light the tens digit.

3. Press the DOWN key to change the number to 8.

4. Press the SET key to store the new set value.

The display goes to the next parameter.

8. ERROR DISPLAYS

<table>
<thead>
<tr>
<th>Error display</th>
<th>RAM failure (Incorrect set data write, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Turn off the power once. If an error occurs after the power is turned on again, please contact RKC sales office or the agent.</td>
</tr>
</tbody>
</table>

9. INPUT RANGE TABLE

<table>
<thead>
<tr>
<th>Input type</th>
<th>Range</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC/RTD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>0 to 200 °C</td>
<td>B1</td>
</tr>
<tr>
<td>J</td>
<td>0 to 800 °C</td>
<td>B1</td>
</tr>
<tr>
<td>R</td>
<td>0 to 1600 °C</td>
<td>B1</td>
</tr>
<tr>
<td>S</td>
<td>0 to 1600 °C</td>
<td>B1</td>
</tr>
<tr>
<td>T</td>
<td>0 to 1600 °C</td>
<td>B1</td>
</tr>
<tr>
<td>U</td>
<td>0 to 1600 °C</td>
<td>B1</td>
</tr>
<tr>
<td>W5Re/W26Re</td>
<td>0 to 2000 °C</td>
<td>B1</td>
</tr>
<tr>
<td>PL1</td>
<td>0 to 400 °C</td>
<td>A1</td>
</tr>
<tr>
<td>T100</td>
<td>0 to 1200 °C</td>
<td>A1</td>
</tr>
<tr>
<td>RTD</td>
<td>0 to 1200 °C</td>
<td>A1</td>
</tr>
</tbody>
</table>

| Setting range * | 0 to 137.2 °C | 0 to 2502 °F |
|------------------|----------------|
| R                | 0 to 176 °C    | 0 to 3216 °F |
| S                | 0 to 176 °C    | 0 to 3216 °F |
| B                | 0 to 182 °C    | 0 to 3308 °F |
| E                | 0 to 1000 °C   | 0 to 1832 °F |
| N                | 0 to 1300 °C   | 0 to 2372 °F |
| T                | -199.9 to +400 °C | -339.8 to +720.0 °F |
| W5Re/W26Re      | 0 to 2320 °C   | 0 to 4208 °F |
| PL1              | 0 to 600 °C    | 0 to 1032 °F |
| T100             | 0 to 600 °C    | 0 to 1032 °F |
| RTD              | 0 to 600 °C    | 0 to 1032 °F |

| Setting range | 0 to 1300 °C | 0 to 2372 °F |
|---------------|--------------|
| R              | -199.9 to -599.9 °C | -339.8 to -999.9 °F |
| S              | -199.9 to -599.9 °C | -339.8 to -999.9 °F |
| B              | -199.9 to -599.9 °C | -339.8 to -999.9 °F |
| E              | -199.9 to -599.9 °C | -339.8 to -999.9 °F |
| N              | -199.9 to -599.9 °C | -339.8 to -999.9 °F |
| T              | -199.9 to -599.9 °C | -339.8 to -999.9 °F |

* Limit setting becomes SLH = SLL.

When changing the high-limit (SLH) and the low-limit (SLL) limiter settings, always set the selected value (SV) within the limiter range.

1. Press the SET key at "SLH" is displayed.

2. Press the shift key to high-light the tens digit.

3. Press the DOWN key to change the number to 8.

4. Press the SET key to store the new set value.

The display goes to the next parameter.

9. INPUT RANGE TABLE

<table>
<thead>
<tr>
<th>Input type</th>
<th>Range</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC/RTD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>0 to 200 °C</td>
<td>B1</td>
</tr>
<tr>
<td>J</td>
<td>0 to 800 °C</td>
<td>B1</td>
</tr>
<tr>
<td>R</td>
<td>0 to 1600 °C</td>
<td>B1</td>
</tr>
<tr>
<td>S</td>
<td>0 to 1600 °C</td>
<td>B1</td>
</tr>
<tr>
<td>T</td>
<td>0 to 1600 °C</td>
<td>B1</td>
</tr>
<tr>
<td>U</td>
<td>0 to 1600 °C</td>
<td>B1</td>
</tr>
<tr>
<td>W5Re/W26Re</td>
<td>0 to 2000 °C</td>
<td>B1</td>
</tr>
<tr>
<td>PL1</td>
<td>0 to 400 °C</td>
<td>A1</td>
</tr>
<tr>
<td>T100</td>
<td>0 to 1200 °C</td>
<td>A1</td>
</tr>
<tr>
<td>RTD</td>
<td>0 to 1200 °C</td>
<td>A1</td>
</tr>
</tbody>
</table>

| Setting range | 0 to 137.2 °C | 0 to 2502 °F |
|---------------|----------------|
| R              | 0 to 176 °C    | 0 to 3216 °F |
| S              | 0 to 176 °C    | 0 to 3216 °F |
| B              | 0 to 182 °C    | 0 to 3308 °F |
| E              | 0 to 1000 °C   | 0 to 1832 °F |
| N              | 0 to 1300 °C   | 0 to 2372 °F |
| T              | -199.9 to +400 °C | -339.8 to +720.0 °F |
| W5Re/W26Re    | 0 to 2320 °C   | 0 to 4208 °F |
| PL1           | 0 to 600 °C    | 0 to 1032 °F |
| T100          | 0 to 600 °C    | 0 to 1032 °F |
| RTD           | 0 to 600 °C    | 0 to 1032 °F |

| Setting range | 0 to 1300 °C | 0 to 2372 °F |
|---------------|--------------|
| R              | -199.9 to -599.9 °C | -339.8 to -999.9 °F |
| S              | -199.9 to -599.9 °C | -339.8 to -999.9 °F |
| B              | -199.9 to -599.9 °C | -339.8 to -999.9 °F |
| E              | -199.9 to -599.9 °C | -339.8 to -999.9 °F |
| N              | -199.9 to -599.9 °C | -339.8 to -999.9 °F |
| T              | -199.9 to -599.9 °C | -339.8 to -999.9 °F |

<table>
<thead>
<tr>
<th>Overscale and Underscale</th>
<th>Measured value (PV)</th>
<th>Flashing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overrange</td>
<td>PV is outside of input range limit.</td>
<td></td>
</tr>
<tr>
<td>Underscale</td>
<td>PV is below the low input display range limit.</td>
<td></td>
</tr>
</tbody>
</table>

Check input type, input range, sensor and sensor connection.

1. Press the SET key at "SLH" is displayed.

2. Press the shift key to high-light the tens digit.

3. Press the DOWN key to change the number to 8.

4. Press the SET key to store the new set value.

The display goes to the next parameter.