The RB Series has very short depth. The series was designed with a mounting bracket that allows close horizontal mounting of as many as six units.

Panel space saving: 60mm depth

The RB Series has very short depth. The series was designed with a mounting bracket that allows close horizontal mounting of as many as six units.

Store up to 4 Set Values

Set value changeover is also possible by digital input.

Numerous inputs and outputs

The RB Series can be used for various applications.

Reinforced Insulation

Reinforced insulation retains its insulating ability even when basic insulation breaks down. The power circuits in our instruments are designed with reinforced insulation and will save costs by eliminating the need for additional safety measures to prevent break-down shock.

<Requirements for electrical equipment according to safety standards>

- Insulation safeguarding personnel from electric shock which is equal to double insulation or higher is called "reinforced insulation".
Save space and save money with a new series that gives outstanding control capability and comprehensive functions incorporated into a slim body case.

Calculates optimum PID values to stabilize control faster than ever

The improved autotuning algorithm calculates optimum PID values that shortens the time to reach stable control at the set value as well as eliminating overshoot/undershoot. The new PID algorithm also suppress overshoot/undershoot against external disturbance.

Sampling 0.25sec

The RB high performance controller provides precise control by sampling every 0.25 seconds.

Easy Fine tuning with 6-level of control response adjustment

After the PID values have been autotuned, the Fine tuning (FT) function allows the operator to adjust the control response speed with a 6-level adjustment parameter (-3 to +3) without changing PID value.

Startup tuning

Startup tuning eliminates time required for conventional autotuning as it calculates optimum PID values by temperature characteristics at start up. It is useful in applications which require a long time for conventional autotuning.

Startup-tuning at power-up

Startup-tuning at SV change

Startup-tuning at both power-up and SV change

-3 to -1: Faster response
1 to 3: Slower response
0: Function OFF

Easy parameter setup via USB loader port

The RB series has a standard loader port to connect to a PC USB port via COM-K (USB communication converter). Using Win-UCI software on the PC, parameter settings can be easily saved on the PC in CSV format, and the same parameter settings are easily copied to other controllers.

USB communication converter COM-K

Model code:
COM-K-1 (With loader communication cable)
COM-K-N (Without loader communication cable)

Cable length: 1.5m (COM-K standard accessory)

- The power to COM-K is supplied from the PC via the USB port so no power supply is necessary.
Specifications

**Input**

- Temperature input group
  - PT100 (JIS/IEC), Pt100 (JIS)
  - 3-wire system
- Voltage/Current input group
  - Voltage input: (Input impedance: Approx. 1MΩ) 0 to 1V DC, 0 to 5 V DC, 1 to 5V DC, 0 to 10V DC
  - Current input: (Input impedance: 250Ω)
- For current input, connect a 250μA shunt resistor to the input terminals. Model code: KD100-55
- Inputs is selectable within each group.

**Output**

- Relay contact output, Form a contact, 250V AC 3A
- Voltage output, 0 to 5V DC, 1 to 5V DC, 0 to 10V DC
- Voltage output: (Ambient temperature: Less than 40°C)

**Display**

- Display method PV : 11 segment (4 digits), SV : 7 segments (4 digits)
- LCD display

**Performance**

- Measuring accuracy: See measuring accuracy code table
- Influence of ambient temperature: Temperature input: ±0.06°C/°C [at 5 to 40°C]
- Close horizontal mounting error: ±1°C (1.8°F) [Less than -100°C (-146°F) input: ±2°C (3.6°F)]
- Insulation resistance: More than 20MΩ (500V DC) between measured terminals and ground
- More than 20MΩ (500V DC) between power terminals and ground
- Deflective voltage: 1000V AC for 1 minute between measured terminals and ground
- 1500V AC for 1 minute between power terminals and ground

**Setting**

- SV limiter: Scaling low to scaling high (High/Low individual setting)
- Ramp-to-setpoint: 1(0.1) to span per Time (Time: 0.1 to 100sec (selectable))
- Up/Down/In/Out setting
- SV step function: Number of SV: 4 points (Default: 1 point)
- SV selecting method: Front key, Communication, Digital input (External contact input)
- Timer function: Timer setting: 0 min 01 sec to 99 min 59 min (selectable)
  - Function:
    - 1: Control starts after the timer time elapses.
    - 2: Control is performed during the timer time and stops after the timer time elapses.
    - 3: Link function from SV1 to SV4
    - 4: Link function from SV4 to SV1
- Setting data lock: Lock level: 1 to 10 level (0: No lock)

**Control**

- Control method: PID control (With autotuning)
  - P, PI, PD, ON/OFF control selectable
  - Direct action/Reverse action is selectable
- Direct action/Reverse action is selectable
- Heat/Cool type PID control (With autotuning)

**Startup tuning**

- The condition to activate Startup tuning is selectable among a) to g)
  - a) At power-on and stop-to-run, one-time tuning
  - b) At SV change, one-time tuning
  - c) At power-on and stop-to-run and SV change, one-time tuning
  - d) At every power-on and stop-to-run
  - e) At every SV change
  - f) At every power-on, stop-to-run and SV change
  - g) Function off

**Fine tuning**

- Setting range: -3 to +3 (6 levels, OFF when set to 0)
- 3 to - 1: Faster response
- 1 to 3: Slower response

**Setting range**

- a) Proportional band
  - Temperature input : [0.1 to 10] (°C, °F)
  - When 0.1°C (°F) resolution, within 999.9°C (°F)
  - Voltage/Current: 0 to 100.0% of span

- b) Integral time : 1 to 3600 sec (PD control when I = 0)
- c) Derivative time : 1 to 3600 sec (PI control when D = 0)
- d) Cool side proportional band
  - 1 to 1000% of heat side proportional band
  - Invalidity when P=0.
  - * Only cooling side ON/OFF control is not available.
- e) Anti-Reset Windup (ARW): 1 to 100% of heat side proportional band
  - (Integral action is OFF when ARW = 0)
- f) Deadband/Overlap
  - Temperature input : [-10.0 to 10.0] (°C, °F)
  - Voltage/Current: -10.0 to +10.0% of span
  - Limit setting: -10.0% to +10.0% of span
- g) Derivative time action select
  - 0: PV derivative, 1: Deviation derivative
- h) Output limiter
  - PID control: -5.0 to +105.0%
  - (High/Low individual setting)
- i) Heat/Cool PID control
  - 0.0 to 105.0% (Only limiter high)
  - (Heat side/Cool side individual setting)
  - j) Proportional cycle time
    - 0.1sec, 0.25sec, 0.5sec, 1 to 100 sec
  - k) Heat/Cool PID control selection
    - Air cooling, Water cooling, Linear

**Manual output**

- a) Output range
  - PID control: Output limiter low to Output limiter high
    - Heat/Cool type PID control
    - (Heat side output limiter high) + (Heat side output limiter low)
  - Voltage/Current: 0.1 to 100.0% of span
  - (On/Off control when P = 0)
  - Differential gap at ON/OFF control
    - High/Low individual setting
  - Temperature input: Temperature: 0 to 100.0°C (°C, °F)
    - Voltage/Current: 0.0 to 10.0% of span
  - b) Auto/Manual transfer action selection
    - With bumpless/Without bumpless (Selectables)

**Control output**

- a) Relay contact output
  - Form a contact, 250V AC 3A (Resistive load)
    - Electric life: 1,000,000 cycles or more
  - b) Voltage pulse output, 0/12V DC
    - Load resistance: more than 600Ω <less than 20mA>
    - When out2 is no use, load resistance is less than 100Ω <less than 10mA>
    - See page 7 *Maximum number of digital outputs (DO)*
    - by combinations of output (OUT1 and OUT2)
  - c) Current output, 4 to 20mA DC, 0 to 20mA DC
    - (Load resistance: less than 500Ω)
    - d) SSR (Triac) output
      - Rated current: 0.5A
    - e) Voltage output, 0 to 5V DC, 0 to 5V DC, 0 to 10V DC
      - (Load resistance: More than 1kΩ)
      - (Output impedance: Less than 0.1Ω)
  - f) Open collector output (Sink type)
    - Load current: Less than 100mA
    - Load voltage: Less than 30V DC
    - Minimum load current: 0.5mA
    - ON voltage: Less than 2V (at maximum load current)
    - Power OFF leakage current: Less than 0.1mA

**Loader communication**

- Protocol: ANSI X3.28 sub-category 2.5A4 (RSK standard)
- Communication speed: 9600bps
- Maximum connection: 1 unit

---

*1: Accuracy is not guaranteed for less than 100°C.
2: Accuracy is not guaranteed for less than 400°C (752°F) for Input Type R, S, B,
and W5Re/W26Re.
### Specifications

#### Event (Alarm)

- **Number of events**: Up to 4 points (RB100: Up to 3 points, Heat/Cool type: Up to 2 points)
- **Event type**: Process high, Process low, Deviation high, Deviation low, Deviation high/low
- **Output resolution**: Approx. more than 1/2000
- **Output signal**: 4 to 20mA DC, 0 to 20mA DC (Load resistance: More than 1kΩ)
- **Output type**: Analog Retransmission Output (AO)
- **Number of output points**: 1 point
- **Output**: Relay contact output, Form a contact, 250V AC 1A, 30V DC 0.5A (Resistive load)

#### General Specifications

- **Supply voltage**: a) 90 to 264V AC (50/60Hz, Selectable) Rating: 100 to 240V AC
- **Power consumption**: a) 100 to 240V AC type
- **External dimensions**: W: 96 x 96 x 60mm (RB900), 48 x 96 x 60mm (RB400)
- **Weight**: RB900: Approx. 250g, RB400: Approx. 235g

#### Analog Retransmission Output (AO)

- **Number of outputs**: 1 point
- **Output type**: Measured value (PV), Set value (SV), Manipulated value (MV)
- **Output signal**: 4 to 20mA DC, 0 to 20mA DC (Load resistance: More than 1kΩ)
- **Output resolution**: Approx. more than 1/2000

#### Digital Input (DI)

- **Number of inputs**: 2 points (DI1, DI2)
- **Input method**: Non-voltage contact input
- **Input function**: 5V selection, STOP/RUN, Auto/Manual, Alarm interlock reset, Set value high, Set value low

#### Communications

- **Communication method**: RS-485
- **Communication speed**: 2400bps, 4800bps, 9600bps, 19200bps
- **Protocol**: a) ANSI X3.28 sub-category 2.5A4 (RKC standard)
- **Bit format**:
  - a) RKC standard protocol: Start bit: 1, Data bit: 7 or 8, Parity bit: (odd or even) or none, Stop bit: 1 or 2
  - b) MODBUS protocol: Start bit: 1, Data bit: 8 (binary or byte data), Parity bit: none, Stop bit: 1
- **Maximum connection**: 31 units
- **Terminating resistor**: 100Ω (whichever is larger)
- **Buffer mode**: Correspond (Mode in which writing to EEPROM is not performed for setting changes)

#### Waterproof/Dustproof

- **NEMA4X, IP66**: Waterproof/Dustproof protection only effective from the front in panel mounted installation.
## Model and Suffix Codes

### Input Range Code Table

**Temperature Input Group (Field-programmable)**

<table>
<thead>
<tr>
<th>Thermocouple</th>
<th>Input Code</th>
<th>Range</th>
<th>Input Code</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>K (JIS/IEC)</td>
<td>K-01</td>
<td>0 to 200°C</td>
<td>S-02</td>
<td>0 to 80°C</td>
</tr>
<tr>
<td>K</td>
<td>K-02</td>
<td>0 to 400°C</td>
<td>S-03</td>
<td>0 to 120°C</td>
</tr>
<tr>
<td>K</td>
<td>K-03</td>
<td>0 to 600°C</td>
<td>S-04</td>
<td>0 to 160°C</td>
</tr>
<tr>
<td>K</td>
<td>K-04</td>
<td>0 to 200°C</td>
<td>S-05</td>
<td>0 to 200°C</td>
</tr>
<tr>
<td>K</td>
<td>K-05</td>
<td>0 to 400°C</td>
<td>S-06</td>
<td>0 to 400°C</td>
</tr>
<tr>
<td>K</td>
<td>K-06</td>
<td>0 to 600°C</td>
<td>S-07</td>
<td>0 to 600°C</td>
</tr>
<tr>
<td>K</td>
<td>K-07</td>
<td>0 to 800°C</td>
<td>S-08</td>
<td>0 to 800°C</td>
</tr>
<tr>
<td>K</td>
<td>K-08</td>
<td>0 to 1000°C</td>
<td>S-09</td>
<td>0 to 1000°C</td>
</tr>
<tr>
<td>J (JIS/IEC)</td>
<td>J-01</td>
<td>0 to 200°C</td>
<td>T-01</td>
<td>0 to 200°C</td>
</tr>
<tr>
<td>J</td>
<td>J-02</td>
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<td>T-02</td>
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<td>T-03</td>
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<td>T-05</td>
<td>0 to 1000°C</td>
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<td>J-06</td>
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<td>T-06</td>
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<tr>
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<td>J-07</td>
<td>0 to 1400°C</td>
<td>T-07</td>
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<tr>
<td>J</td>
<td>J-08</td>
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<td>T-08</td>
<td>0 to 1600°C</td>
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<tr>
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<td>J-09</td>
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<td>T-09</td>
<td>0 to 1800°C</td>
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<td>T-10</td>
<td>0 to 2000°C</td>
</tr>
<tr>
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<tr>
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<tr>
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<td>T-46</td>
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<td>J-47</td>
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<td>T-49</td>
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<tr>
<td>J</td>
<td>J-50</td>
<td>0 to 10000°C</td>
<td>T-50</td>
<td>0 to 10000°C</td>
</tr>
</tbody>
</table>

**Note:**

1. Accuracy is not guaranteed for less than 100°C (140°F).
2. Accuracy is not guaranteed for less than 400°C (752°F) for Input Type R, S, B, and WSRw286Re.

### Output 1 Code Table

<table>
<thead>
<tr>
<th>Relay contact output</th>
<th>Code</th>
<th>Voltage pulse output</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>V</td>
<td>B</td>
<td>R</td>
</tr>
<tr>
<td>Y</td>
<td>M</td>
<td>C</td>
<td>T</td>
</tr>
</tbody>
</table>

### Output 2 Code Table

<table>
<thead>
<tr>
<th>Relay contact output</th>
<th>Code</th>
<th>Voltage pulse output</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>V</td>
<td>B</td>
<td>R</td>
</tr>
<tr>
<td>Y</td>
<td>M</td>
<td>C</td>
<td>T</td>
</tr>
</tbody>
</table>

### Output Type Code Table

<table>
<thead>
<tr>
<th>Output Type</th>
<th>Code</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Only PID control</td>
<td></td>
</tr>
<tr>
<td>Y</td>
<td>Only PID control</td>
<td></td>
</tr>
</tbody>
</table>

### Maximum number of digital outputs (DO) by combinations of output (OUT1 and OUT2)

<table>
<thead>
<tr>
<th>OUT1</th>
<th>OUT2</th>
<th>M</th>
<th>T</th>
<th>D</th>
<th>V (10 mA)</th>
<th>V (20 mA)</th>
<th>Current output</th>
<th>Voltage output</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>N</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>N</td>
<td>N</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>N</td>
<td>N</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

*1 When the instrument has two digital outputs (DO1 and DO2) and no OUT2 output. *V* type output (load: 40mA) can be specified for OUT1.
Quick start code

- Quick start code tells the factory to ship with each parameter preset to the values detailed as specified by the customer.
- Quick start code is not necessarily specified when ordering, unless the preset is requested.
- These parameters are software selectable items and can be re-programmed in the field via the manual.

### Event Code Table (Programmable)

<table>
<thead>
<tr>
<th>Code</th>
<th>Event Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Deviation High</td>
</tr>
<tr>
<td>B</td>
<td>Deviation Low</td>
</tr>
<tr>
<td>C</td>
<td>Deviation High/Low (Common high/low setting)</td>
</tr>
<tr>
<td>D</td>
<td>Band (Common high/low setting)</td>
</tr>
<tr>
<td>E</td>
<td>Deviation High with Hold</td>
</tr>
<tr>
<td>F</td>
<td>Deviation Low with Hold</td>
</tr>
<tr>
<td>G</td>
<td>Deviation High/Low with Hold (Common high/low setting)</td>
</tr>
<tr>
<td>H</td>
<td>Process High</td>
</tr>
<tr>
<td>J</td>
<td>Process Low</td>
</tr>
<tr>
<td>K</td>
<td>Process High with Hold</td>
</tr>
<tr>
<td>L</td>
<td>Process Low with Hold</td>
</tr>
<tr>
<td>Q</td>
<td>Deviation High with Alarm Re-hold</td>
</tr>
<tr>
<td>R</td>
<td>Deviation Low with Alarm Re-hold</td>
</tr>
<tr>
<td>U</td>
<td>Band (Individual high and low settings)</td>
</tr>
<tr>
<td>V</td>
<td>Set value High</td>
</tr>
<tr>
<td>W</td>
<td>Set value Low</td>
</tr>
<tr>
<td>X</td>
<td>Deviation High/Low (Individual high and low settings)</td>
</tr>
<tr>
<td>Y</td>
<td>Deviation High/Low with Hold (Individual high and low settings)</td>
</tr>
<tr>
<td>Z</td>
<td>Deviation High/Low with Alarm Re-hold (Individual high and low settings)</td>
</tr>
</tbody>
</table>

1. On the RB100, this can be specified when event 3 (Code : "P") is selected in output 2.
2. On the RB100, this is fixed at "none".

### Accessories (Sold separately)

- 250Ω shunt resistor for current input
  - Model code: KD100-55

### Front Cover

- Model Code: KRB900-36
- Model Code: KRB400-36
- Model Code: KRB100-36

### Terminal Cover

- Model Code: KFB400-58
- Model Code: KCA100-517

### Current transformer for heater break alarm (HBA)

- Model code: CTL-6-P-N (0 to 30A)
- Model code: CTL-12-556-10L-N (0 to 100A)

### Interfaces

- Digital output (Alarm) : 2 point (Deviation High, Deviation Low)
- Digital input : 2 point (STOP/RUN, MANUAL/AUTO)
- Analog retransmission output : 0 to 10V DC

### Model Code and Quick start code

**Example of Model Code and Quick start code**

**Model Code**: RB400 F K09 8 Y 2 1

**Quick start code**: ABNN 5

**Specifications**

- Control Method: PID control (Reverse action)
- Input and range: 0 to 400.0°C
- Output 1 (Heat output): 4 to 20mA
- Output 2 (Analog Transmission): 0 to 10V DC
- Digital output (Alarm output): 2 points (DO1+DO2)
- Analog input: Thermocouple K

**Input**: Thermodeck 0.0 to 400.0°C
- Control: Digital control for Heating
- Output: 4 to 20mA DC
- Digital output (Alarm): 2 point (Deviation High, Deviation Low)
- Analog retransmission output: 0 to 10V DC
- Digital input: 2 point (STOP/RUN, MANUAL/AUTO)

**Specifications**

- Power: Supply Waterproof/Dustproof
- Communication: CT input
- Case color
- Instrument version
- Output of the communication monitoring result

**Accessories** (Sold separately)

- Current transformer for heater break alarm (HBA)
- Front Cover RB900, RB400, RB100
- Terminal Cover RB900, RB400, RB100
**Rear Terminals**

**RB900**

- Use a solderless terminal for screw size M3, width 5.8mm or less.

**RB400**

- Use a solderless terminal for screw size M3, width 5.8mm or less.

**RB100**

- Use a solderless terminal for screw size M3, width 5.8mm or less.

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**Panel Cutout Dimensions**

*Panel thickness must be between 1 to 10mm*

- **RB900**
  - Width: 92 x 92 x 25 mm
  - (Panel thickness must be between 1 to 10mm)

- **RB400**
  - Width: 45 x 50 x 25 mm
  - (Panel thickness must be between 1 to 10mm)

- **RB100**
  - Width: 45 x 45 x 25 mm
  - (Panel thickness must be between 1 to 10mm)

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**Caution for the export trade**

All transactions must comply with laws, regulations, and treaties.

**Caution for imitated products**

As products imitating our product now appear on the market, be careful that you don't purchase these imitated products. We will not warrant such products nor bear the responsibility for any damage and/or accident caused by their use.

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**Before operating this product, read the instruction manual carefully to avoid incorrect operation.**

- *This product is intended for use with industrial machines, test and measuring equipment. It is not designed for use with medical equipment.*
- *If it is possible that an accident may occur as a result of the failure of the product or some other abnormality, an appropriate independent protection device must be installed.*

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