General Description

The RB Series is a high performance budget friendly process/temperature controller. Save space and save money with RB series that gives outstanding control capability and comprehensive functions incorporated into a slim body case. Applications include various plastic machines (extrudes, injection machine, etc), electric furnaces, semiconductor, food processing, environmental chambers and many others.

Features

☆ Easy-to-read with large 11-segment LCD display
☆ The depth of 60mm
☆ Sampling 0.25 sec
☆ Brilliant II PID control
☆ Start-up tuning and Autotuning

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.

Easy-to-read with large 11-segment LCD display

So bright and so large it is easy to read from a greater distance.


Numerous inputs and outputs

- Measured input: Thermocouple • RTD • DC voltage • DC current
- Digital input 2 points
- SV selection • Mode selection
- CT input 2 points
- For heater break alarm
- Loader communication
- Communication: RS-485 (ASCII/ MODBUS protocol)
- Digital output 4 points: RB100: 3 points
- Analog retransmission output: Measured value (PV) • Setting value (SV) • Manipulated value (MV)
- Control output: Heat • Cool • Heat/Cool
- Control starts after the timer time elapses.
- Control is performed during the timer time and stops after the timer time elapses.
- Ramp-to-setpoint function (PV start)
- Store up to 4 Set Values
- Set value changeover is also possible by digital input.

SV changeover using digital input

Power ON or RUN

Power ON or RUN

Ramp-to-setpoint function (PV start)
Features

Simple program control

Simple program control using a timer function / setting change proportion limiter

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.

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.

The timing of activation of start-up tuning can be selected from at power-up, at setpoint change, and at power-up/setpoint change. It is also settable to Only-once or always-ON.

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.

PLC Communication Protocol Converter: COM-JE

A communication protocol converter becomes a Master Unit to PLC, and automatically stores temperature data into registers in a PLC. This enables easy handling of temperature control system to the exiting PLC system is available.

Available PLC

- Mitsubishi MELSEC series
- Omron SYSMAC series
- RS-422A/485
- MODBUS Protocol

Mapman Function

Mapman Function enables PLCs and RKC temperature controllers to act as one.
Specsifications

Input

- **Temperature input group**
  - Thermocouple: K, J, R, S, E, B, T, N (JIS/IEC), PI1 (NBS), W5Re/W5Re (ASTM)
  - Influence of external resistance: Approx. 0.25µV/°C
  - Input break action: Up-scale / Down-scale (selectable)
  - RTD: PI100 (JIS/IEC), J1100 (JIS)
  - Influence of input lead resistance: Approx. 0.02[µΩ/°C] of reading
  - Maximum 10Ω per wire
  - Input break action: Up-scale

- **Voltage / current input group**
  - Voltage: 0 to 1V DC, 0 to 5V DC, 1 to 5V DC, 0 to 10V DC
  - Input break action: Uncertain (indicates a value around 0V)
  - Current: 4 to 20mA DC, 0 to 20mA DC
  - Inputs is selectable within each group.

**Sampling Time**
- 0.25 sec
- 0.05 sec or 0.25sec is available.

**Input Digital Filter**
- 0 to 100 sec (OFF when 0 is set.)

**PV Bias**
- Temperature input: -1999(-199.9) to +9999(999.9)°C(°F)
- Voltage / current input: span to ±span

**Performance**

- **Measuring Accuracy**
  - a) Thermocouple
    - Type: K, J, T, E, N
    - Less than -100°C (-148°F): ±(0.2°C [±0.36°F] + 1 digit)
    - -100 to 500°C (-148 to 932°F): ±(1.0°C [±1.8°F] + 1 digit)
    - More than 500°C (932°F): ±(0.2% of Reading + 1 digit)
  - Type: N, S, R, PLII, W5Re/W5Re
    - Less than 0°C (32°F): ±(4.0°C [±7.2°F] + 1 digit)
    - 0 to 1000°C (-148 to 1832°F): ±(2.0°C [±3.6°F] + 1 digit)
    - More than 1000°C (1832°C): ±(0.2% of Reading + 1 digit)
  - b) RTD
    - Less than 200°C (392°F): ±(0.4°C [±0.7°F] + 1 digit)
    - 200 to 500°C (392 to 932°F): ±(0.2% of Reading + 1 digit)
    - More than 500°C (932°F): ±(0.2% of Reading + 1 digit)
  - c) DC voltage and DC current
    - ±(0.2% of span + 1 digit)
    - Close horizontal mounting error:
      - ±2°C (3.6°F) [Less than -100°C (-146°F) input: ±3.5°C (6.3°F)]

- **Insulation Resistance**
  - More than 20MΩ (500V DC) between measured terminals and ground
  - More than 20MΩ (500V DC) between power terminals and ground

- **Dielectric Strength**
  - 1000V AC for one minute between measured terminals and ground
  - 1500V AC for one 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: 1 minute/1 hour [selectable] Up/Down individual 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 sec or 0 hr 01 min to 99 hr 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
      - (After the timer time elapses, control is continued using SV4.)
    - 4: Link function from SV1 to SV4
      - (After the timer time elapses, control is stopped.)
  - Repeat: 0 to 9999 (Continuous when 9999 is set.)

- **Auto-tuning Method**
  - a) PID control
    - P, PI, PD, ON/OFF control selectable
    - Direct action/Reverse action is selectable
  - b) Heat/Cool type PID control

- **Auto-tuning Tuning**
  - The condition to activate Auto-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, 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

- **Start up tuning**
  - Setting range: -3 to +3 (6 levels, OFF when set to 0.)
  - -3 to 1: Faster response
  - 1 to 3: Slower response
  - OFF: Function OFF

- **Major Setting Range**
  - Set value: Same as input range.
  - Proportional band: 0(0.0) to input span (Temperature input)
    - When 0°C (0°F) resolution, within 999.9°C (999.9°F)
    - 0 to 1000.0% of span (Voltage, Current input)
    - ON/OFF control when P = 0
    - Differential gap at ON/OFF control
      - (High/Low individual setting):
        - Temperature input: 0(0.0) to 100 (100.0)°C(°F)
        - Voltage / Current input: 0 to 10.0% of span
  - Integral time:
    - 0 to 3600sec (P + D action when I = 0)
    - 0 to 3600sec (P + I action when D = 0)
  - Derivative time:
    - 0 to 1000.0% of span (Voltage, Current input)
  - Cool-side proportional band: 1 to 1000% of heat side proportional band
  - Anti-Reset Windup (ARW): 1 to 100% of heat side proportional band
  - Deadband/Overlap:
    - -10 (10.0°C) (Temperature input)
    - -10 to +10.0% of span (Voltage, Current input)
  - Minimum setting:
    - Overlap
  - Output derivative action select:
    - 0: PV derivative, 1: Deviation derivative
  - Output limiter:
    - 0.0 to +105.0% (PV control)
    - (High/Low individual setting)
    - 0.0 to 105.0% (Heat/Cool type PID control)
  - Proportional cycle time:
    - 0.1sec, 0.25sec, 0.5sec, 1 to 100 sec
  - Manual output:
    - Output limiter low to Output limiter high
    - Auto / Manual transfer action selection
      - With bumpless/Without bumpy

- **Control output**
  - Relay output:
    - Form A contact, 250V AC 3A (resistive load)
    - Electric life: 1,000,000 cycles or more
  - Voltage pulse output:
    - 0/12V DC
    - (Load resistance: more than 600Ω <less than 20mA>)
    - When out is no use, load resistance is more than 300Ω -less than 10mA-
      - See page 7 Maximum number of digital outputs (DO) by combinations of output (OUT1 and OUT2)
    - 4 to 20mA DC, 0 to 20mA DC
    - (Load resistance: less than 500Ω)
  - SSR (Triac) output:
    - Rated current: 0.5A
    - (Ambient temperature: Less than 40°C)
  - Voltage output:
    - 0 to 5V DC, 1 to 5V DC, 0 to 10V DC
    - (Load resistance: More than 1kΩ)
    - (Output impedance: Less than 0.1Ω)
  - 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
### General Specifications

**Supply Voltage**
- a) 90 to 264V AC (Including supply voltage variation)
  - [Rating: 100 to 240V AC] (50/60Hz selectable)
- b) 21.6 to 26.4V AC (Including supply voltage variation)
  - [Rating: 24V AC] (50/60Hz selectable)
- c) 21.6 to 26.4V DC (Ripple rate 10% p-p or less)
  - [Rating: 24VDC]

**Power Consumption**
- RB100: Less than 8.5VA for AC type (at 240V AC)
- Less than 4.7VA for 24V AC type
- Less than 108mA for 24V DC type
- RB400: Less than 8.7VA for AC type (at 240V AC)
- Less than 5.8VA for 24V AC type
- Less than 141mA for 24V DC type
- RB900: Less than 9.0VA for AC type (at 240V AC)
- Less than 6.0VA for 24V AC type
- Less than 141mA for 24V DC type

**Power Failure Effect**
- A power failure of 20m sec or less will not affect the control action.
- RB100, 24V AC/DC type: 10msec or less

**Operating Environments**
- 0 to 50°C [32 to 122°F]
- 10 to 90% RH (Non condensing)
- Absolute humidity: MAX. W.C 29.3g/m³ dry air at 101.3kPa.

**Memory Backup**
- Backed up by non-volatile memory
- Data retaining period: Approx. 10 years
- Number of writing: Approx. 1,000,000 times.
- (Depending on storage and operating conditions.)

**Net Weight**
- RB100: Approx. 120g
- RB400: Approx. 185g
- RB900: Approx. 250g

**External Dimensions**
- (W x H x D)
  - RB100: 48 x 48 x 60mm
  - RB400: 48 x 96 x 60mm
  - RB900: 96 x 96 x 63mm

**Communications**
- Communication method: RS-485
- Communication speed: 2400, 4800, 9600, 19200, BPS
- Protocol: ANSI X3.28(1976) 2.5 A4
- MODBUS-RTU

**Event (Alarm) Output**
- Number of Event: Up to 4 points (Event 1 to 4)
- (RB100: Up to 3 points, Heat/Cool type: Up to 2 points)

**Heater Break Alarm**
- Number of CT Input: 2 points
- CT Input type: CTL-6-P-N (30A), CTL-12-S56-10L-N (100A)
- Accuracy: ±5% of input value ±1 digit or 2A (whichever is larger)
- Display range: 0 to 100.0A
- Delay times: 0 to 255 times

**Waterproof/Dustproof**
- NEMA4X, IP66
- Waterproof/Dustproof protection only effective from the front in panel mounted installation.

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### Analog Retransmission Output

**Number of Outputs**
- 1 point

**Output types**
- Measured value (PV), Set value (SV), Manipulated output value (MV)

**Output Signal**
- Current output: 4 to 20mA DC, 0 to 20mA DC
  - (Load resistance: Less than 600Ω)
- Continuous voltage output: 0 to 1V DC, 0 to 5V DC, 1 to 5V DC, 0 to 10V DC
  - (Load resistance: More than 1kΩ)

**Output Resolution**
- Approx. more than 1/2000

### Digital Input

**Number of Sub Output**
- 2 points (DI1, DI2)

**Input method**
- Non-voltage contact output

**Function**
- SV selection, STOP/RUN, Auto/Manual, Alarm interlock reset,
  - Selectable

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### Event (Alarm) Output (Optional)

**Number of Event**
- Up to 4 points (Event 1 to 4)
- (RB100: Up to 3 points, Heat/Cool type: Up to 2 points)

**Event**
- Type: Deviation High, Low, High/Low^1, Band, Process High, Low
- Set value High, Low
- Control Loop Break Alarm (LBA)
- Heater break alarm (HBA)
- Output of the communication monitoring result,
  - RUN status monitor
  - Two types of alarm settings are field-selectable.
  - 1. Independent high and low settings.
  - 2. Common high/low setting
    - (Factory setting, unless specified in alarm code when ordering)

**Setting range**
- Deviation: - (Input span) to + (input span)
- Process, Set value: Same as input range
- Differential gap: 0 to input span

**MV value, FBR valued:**
- -5.0 to +105.0%

**Control loop break alarm (LBA)**
- LBA time: 0 to 7200 sec. (OFF by setting zero)
- LBA deadband: 0 to input span

**Other Functions**
- a) Hold/Re-hold action
  - Hold action is activated at power-on and stop-to-run.
  - Re-hold action is activated at power-on, stop-to-run, and the control set value change.
- b) Alarm output ON/OFF at stop mode is selectable.
- c) Energized/de-energized action is configurable.
- d) Differential gap: 0 (0.0) to span
- e) Delay timer: 0 to 600 sec
- f) Interlock (latch) function is configurable.

**Heater Break Alarm**
- Number of CT Input: 2 points
- CT Input type: CTL-6-P-N (30A), CTL-12-S56-10L-N (100A)
- Selectable
- Accuracy: ±5% of input value ±1 digit or 2A (whichever is larger)
- Display range: 0 to 100.0A
- Delay times: 0 to 255 times

**Output**
- Relay contact output, Form a contact, 250V AC 1A (Resistive load)

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### Communications (Optional)

- Communication method: RS-485
- Communication speed: 2400, 4800, 9600, 19200, BPS
- Protocol: ANSI X3.28(1976) 2.5 A4
- MODBUS-RTU

**bit format**
- Start bit: 1
- Data bit: 7 or 8
- Parity bit: Without, Odd or Even
- Stop bit: 1 or 2

**Maximum connection:**
- 31 units

**Terminating resistor**
- External installation is necessary (120Ω 1/2W)

**Buffer mode**
- Correspond (Mode in which writing to EEPROM is not performed for setting changes)

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### Waterproof/Dustproof (Standard)

- NEMA4X, IP66

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### Analog Retransmission Output (Optional)

**Number of Outputs**
- 1 point

**Output types**
- Measured value (PV), Set value (SV), Manipulated output value (MV)

**Output Signal**
- Current output: 4 to 20mA DC, 0 to 20mA DC
  - (Load resistance: Less than 600Ω)
- Continuous voltage output: 0 to 1V DC, 0 to 5V DC, 1 to 5V DC, 0 to 10V DC
  - (Load resistance: More than 1kΩ)

**Output Resolution**
- Approx. more than 1/2000

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### Digital Input (Optional)

**Number of Sub Output**
- 2 points (DI1, DI2)

**Input method**
- Non-voltage contact output

**Function**
- SV selection, STOP/RUN, Auto/Manual, Alarm interlock reset,
  - Selectable
### Output signal code table

#### Output 1 Code Table

<table>
<thead>
<tr>
<th>Output Type</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relay contact output</td>
<td>Y</td>
</tr>
<tr>
<td>Voltage pulse output</td>
<td>V</td>
</tr>
<tr>
<td>0 to 5V DC</td>
<td>4</td>
</tr>
<tr>
<td>0 to 10V DC</td>
<td>8</td>
</tr>
<tr>
<td>1 to 5V DC</td>
<td>5</td>
</tr>
<tr>
<td>1 to 10V DC</td>
<td>9</td>
</tr>
<tr>
<td>4 to 20mA DC</td>
<td>3</td>
</tr>
<tr>
<td>4 to 20mA AC</td>
<td>7</td>
</tr>
<tr>
<td>Triac output</td>
<td>T</td>
</tr>
<tr>
<td>Open collector output</td>
<td>D</td>
</tr>
</tbody>
</table>

#### Output 2 Code Table

<table>
<thead>
<tr>
<th>Output Type</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relay contact output (Event 3 [DO3] output)</td>
<td>P</td>
</tr>
<tr>
<td>Voltage pulse output</td>
<td>V</td>
</tr>
<tr>
<td>0 to 5V DC</td>
<td>4</td>
</tr>
<tr>
<td>0 to 10V DC</td>
<td>8</td>
</tr>
<tr>
<td>1 to 5V DC</td>
<td>5</td>
</tr>
<tr>
<td>1 to 10V DC</td>
<td>9</td>
</tr>
<tr>
<td>4 to 20mA DC</td>
<td>3</td>
</tr>
<tr>
<td>4 to 20mA AC</td>
<td>7</td>
</tr>
<tr>
<td>Triac output</td>
<td>T</td>
</tr>
<tr>
<td>Open collector output (Cool side output)</td>
<td>D</td>
</tr>
</tbody>
</table>

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

### Thermocouple Input Group (Field-programmable)

<table>
<thead>
<tr>
<th>Thermocouple</th>
<th>Input</th>
<th>Code</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>J (JIS/IEC)</td>
<td>J-01</td>
<td>0 to 200°C</td>
<td></td>
</tr>
<tr>
<td>K (JIS/IEC)</td>
<td>K-02</td>
<td>0 to 400°C</td>
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<tr>
<td></td>
<td>K-03</td>
<td>0 to 600°C</td>
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<td></td>
<td>K-04</td>
<td>0 to 800°C</td>
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<td></td>
<td>K-05</td>
<td>0 to 1000°C</td>
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<td></td>
<td>K-06</td>
<td>0 to 1200°C</td>
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<td></td>
<td>K-07</td>
<td>0 to 1400°C</td>
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<td></td>
<td>K-08</td>
<td>0 to 1600°C</td>
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<td></td>
<td>K-09</td>
<td>0 to 1800°C</td>
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<td></td>
<td>K-10</td>
<td>0 to 2000°C</td>
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<td></td>
<td>K-11</td>
<td>0 to 2200°C</td>
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<td></td>
<td>K-12</td>
<td>0 to 2400°C</td>
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<td>K-13</td>
<td>0 to 2600°C</td>
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<td>K-14</td>
<td>0 to 2800°C</td>
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<td>K-15</td>
<td>0 to 3000°C</td>
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<td>K-16</td>
<td>0 to 3200°C</td>
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<td>K-17</td>
<td>0 to 3400°C</td>
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<td>K-18</td>
<td>0 to 3600°C</td>
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<td></td>
<td>K-19</td>
<td>0 to 3800°C</td>
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<td></td>
<td>K-20</td>
<td>0 to 4000°C</td>
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<td></td>
<td>K-21</td>
<td>0 to 4200°C</td>
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<td>K-22</td>
<td>0 to 4400°C</td>
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<td>K-23</td>
<td>0 to 4600°C</td>
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<td>K-24</td>
<td>0 to 4800°C</td>
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<td>K-25</td>
<td>0 to 5000°C</td>
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<td>K-26</td>
<td>0 to 5200°C</td>
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<td>K-27</td>
<td>0 to 5400°C</td>
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<td>K-28</td>
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<td>K-29</td>
<td>0 to 5800°C</td>
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<td>K-35</td>
<td>0 to 7000°C</td>
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<td>K-37</td>
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<td>K-38</td>
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<td>0 to 8600°C</td>
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<td>K-44</td>
<td>0 to 8800°C</td>
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</tr>
<tr>
<td></td>
<td>K-45</td>
<td>0 to 9000°C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>K-46</td>
<td>0 to 9200°C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>K-47</td>
<td>0 to 9400°C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>K-48</td>
<td>0 to 9600°C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>K-49</td>
<td>0 to 9800°C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>K-50</td>
<td>0 to 10000°C</td>
<td></td>
</tr>
</tbody>
</table>

### Process/Temperature Controller RB100/400/900

- **PID control with AT (Reverse action)**
- **PID control with AT (Direct action)**
- **Heat/Cool PID control with AT**
- **Heat/Cool PID control with AT for extruder (Air cooling type)**
- **Heat/Cool PID control with AT for extruder (Water cooling type)**

### Input range code table

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

<table>
<thead>
<tr>
<th>Input</th>
<th>Code</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>S</td>
<td>5 to 275°C</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>0 to 1200°C</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>0 to 1200°C</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>0 to 1200°C</td>
</tr>
<tr>
<td></td>
<td>T</td>
<td>0 to 1200°C</td>
</tr>
</tbody>
</table>

#### DC Current • Voltage Group (Field-programmable)

<table>
<thead>
<tr>
<th>Input</th>
<th>Code</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>D</td>
<td>0 to 10V DC</td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>0 to 10V DC</td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>0 to 5V DC</td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>0 to 5V DC</td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>0 to 1V DC</td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>0 to 1V DC</td>
</tr>
</tbody>
</table>

### Output signal code table

#### Output 1 Code Table

<table>
<thead>
<tr>
<th>Output Type</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relay contact output</td>
<td>Y</td>
</tr>
<tr>
<td>Voltage pulse output</td>
<td>V</td>
</tr>
<tr>
<td>0 to 5V DC</td>
<td>4</td>
</tr>
<tr>
<td>0 to 10V DC</td>
<td>8</td>
</tr>
<tr>
<td>1 to 5V DC</td>
<td>5</td>
</tr>
<tr>
<td>1 to 10V DC</td>
<td>9</td>
</tr>
<tr>
<td>4 to 20mA DC</td>
<td>3</td>
</tr>
<tr>
<td>4 to 20mA AC</td>
<td>7</td>
</tr>
<tr>
<td>Triac output</td>
<td>T</td>
</tr>
<tr>
<td>Open collector output (Cool side output)</td>
<td>D</td>
</tr>
</tbody>
</table>

#### Output 2 Code Table

<table>
<thead>
<tr>
<th>Output Type</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relay contact output (Event 3 [DO3] output)</td>
<td>P</td>
</tr>
<tr>
<td>Voltage pulse output</td>
<td>V</td>
</tr>
<tr>
<td>0 to 5V DC</td>
<td>4</td>
</tr>
<tr>
<td>0 to 10V DC</td>
<td>8</td>
</tr>
<tr>
<td>1 to 5V DC</td>
<td>5</td>
</tr>
<tr>
<td>1 to 10V DC</td>
<td>9</td>
</tr>
<tr>
<td>4 to 20mA DC</td>
<td>3</td>
</tr>
<tr>
<td>4 to 20mA AC</td>
<td>7</td>
</tr>
<tr>
<td>Triac output</td>
<td>T</td>
</tr>
<tr>
<td>Open collector output (Cool side output)</td>
<td>D</td>
</tr>
</tbody>
</table>

Maximum number of digital outputs (DO) by combinations of output (OUT1 and OUT2)
Process/Temperature Controller RB100/400/900

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

<table>
<thead>
<tr>
<th>OUT2 (Including transmission output)</th>
<th>No OUT output</th>
<th>M. T. D</th>
<th>2 (10 mA)</th>
<th>V (20 mA)</th>
<th>Current output</th>
<th>Voltage output</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUT1 M. T. D</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>V (Load: 10 mA)</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Current output</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Voltage output</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 2 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.

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Quick start code</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital output 1 (DO1) (Event 1 type)</td>
<td>None</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digital output 2 (DO2) (Event 2 type)</td>
<td>None</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digital output 3 (DO3) (Event 3 type)</td>
<td>None</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digital output 4 (DO4) (Event 4 type)</td>
<td>None</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digital input (DI)</td>
<td>See event code table</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></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".

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>T</td>
<td>Deviation High/Low with Re-Hold (Common high/low setting)</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 Alarm 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>
<tr>
<td>1</td>
<td>Heater break alarm (HBA)</td>
</tr>
<tr>
<td>2</td>
<td>Loop break alarm</td>
</tr>
<tr>
<td>3</td>
<td>FAIL</td>
</tr>
<tr>
<td>4</td>
<td>RUN status</td>
</tr>
<tr>
<td>5</td>
<td>Output of the communication monitoring result</td>
</tr>
</tbody>
</table>

Example of Model Code and Quick start code

Input: Thermocouple K 0.0 to 400.0°C
Control: PID control for Heating, (Output: 4 to 20mA DC)
Analog retransmission output: 0 to 10V DC
Digital input: 2 point (STOP/RUN, MANUAL/AUTO)

Model Code

Quick start code

Digital output 1: Deviation High
Digital output 2: Deviation Low
Digital output 3: None
Digital output 4: None
Digital input: STOP/RUN + MANUAL/AUTO
External Dimensions

Unit : mm

RB100

Panel Cutout

(Close horizontal mounting)
* Up to 6 units

L=(48Xn-3)

n : Number of controllers
(2=<n=<6)

• Waterproof/dustproof is not available for close horizontal mounting.

**1 : Case rubber packing (optional) [Waterproof/dustproof]

RB400

The mounting brackets can be attached on the sides of the controller. However, to make the controller waterproof and dustproof, attach the mounting brackets to the top and bottom. (2 places).

Panel Cutout

(Close horizontal mounting)
* Up to 6 units

L=(48Xn-3)

n : Number of controllers
(2=<n=<6)

• Waterproof/dustproof is not available for close horizontal mounting.

**1 : Case rubber packing (optional) [Waterproof/dustproof]

RB900

The mounting brackets can be attached on the sides of the controller. However, to make the controller waterproof and dustproof, attach the mounting brackets to the top and bottom. (4 places).

Panel Cutout

(Close horizontal mounting)
* Up to 6 units

L=(96Xn-4)

n : Number of controllers
(2=<n=<6)

• Waterproof/dustproof is not available for close horizontal mounting.

**1 : Case rubber packing (optional) [Waterproof/dustproof]
### Rear Terminals

<table>
<thead>
<tr>
<th>No</th>
<th>Contents</th>
<th>RB100</th>
<th>Power supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>100 to 240V AC/DC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>100 to 240V DC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Input</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Input</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>No</th>
<th>Contents</th>
<th>RB400</th>
<th>Power supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>100 to 240V AC/DC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>100 to 240V DC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Input</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Input</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>No</th>
<th>Contents</th>
<th>RB900</th>
<th>Power supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>100 to 240V AC/DC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>100 to 240V DC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Input</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Input</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Accessory

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

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

- Unit: mm

**Terminal Cover**

- Model Code: KFB400-58 (RB900 uses 2 unit)

**Front Cover**

- Model Code: KFB900-36
- Model Code: KFB400-36
- Model Code: KFB100-36A

**250Ω shunt resistor for current input**

- Model code: KD100-55