TK Series

High function/High performance PID control

Features

- **Upgrade functions (★)**
  - Convenient parameter setting (by DAQMaster)
    - Parameter mask
      Hides unnecessary and seldom used parameters
    - User parameter group
      Groups usually used parameters to set parameters fast and conveniently
  - Line-up Alarm output (heating&cooling OUT2 Relay output model), transmission output 2 (transmission output model)
    - Super high-speed sampling cycle (10 times faster compared to previous models)
      : 50ms sampling cycle and ±0.3% display-accuracy.
    - Improved visibility with wide display part and high luminance LED
    - High performance controlling with heating/cooling control and automatic/manual control modes.
    - Communication function supported: RS485 (Modbus RTU)
      - Allows parameter setting by USB port of PC.
        : Free download the integrated device management program (DAQMaster)
          ※ Communication converter, sold separately.
        : SCM-WF48 (Wi-Fi to RS485/USB communication converter, available soon), SCM-US (USB to Serial converter), SCM-38i (RS-232C to RS485 converter), SCM-US48i (USB to RS485 converter)
      - SSR drive voltage output / Current output selectable.
      - SSRP output (standard/phase/cycle control selectable)
      - Heater burn-out alarm (CT input) (except TK4SP) (※CT, sold separately: CSTC-E80LN, CSTC-E200LN)
      - Multi SV setting function (Max. 4) - selectable via digital input terminals.
      - Mounting space saving with compact design.
        : downsized by approx. 38% (60mm) in depth compared to previous models.
          ※ Terminal cover, sold separately: R"A-COVER (except TK4N, TK4SP)
      - Multi input / Multi range

Manual

- Visit our website (www.autonics.com) to download user manual and communication manual.
  - User manual describes for specifications and function, and communication manual describes for RS485 communication (Modbus RTU protocol) and parameter address map data.

Integrated device management program (DAQMaster)

- DAQMaster is a integrated device management program. It is available for parameter setting, monitoring, and user parameter group setting, parameter mask setting for only TK4 Series.
- Visit our website (www.autonics.com) to download user manual and integrated device management program.

<table>
<thead>
<tr>
<th>Item</th>
<th>Minimum requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>System</td>
<td>IBM PC compatible computer with Intel Pentium III or above</td>
</tr>
<tr>
<td>Operating system</td>
<td>Microsoft Windows 98/NT/XP/Vista/7</td>
</tr>
<tr>
<td>Memory</td>
<td>256MB or more</td>
</tr>
<tr>
<td>Hard disk</td>
<td>More than 1GB of free hard disk space</td>
</tr>
<tr>
<td>VGA</td>
<td>1024×768 or higher resolution display</td>
</tr>
<tr>
<td>Others</td>
<td>RS-232 serial port(9-pin), USB port</td>
</tr>
</tbody>
</table>
### Ordering information

**TK 4 S - 1 4 R R**

<table>
<thead>
<tr>
<th>Item</th>
<th>Digit</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digit</td>
<td>4</td>
<td>100-240VAC 50/60Hz</td>
</tr>
<tr>
<td>Size</td>
<td>DIN W48×H24mm</td>
<td>DIN W48×H48mm(11pin plug type)</td>
</tr>
<tr>
<td></td>
<td>DIN W72×H72mm</td>
<td>DIN W96×H48mm</td>
</tr>
<tr>
<td></td>
<td>DIN W48×H96mm</td>
<td>DIN W96×H96mm</td>
</tr>
<tr>
<td></td>
<td>9999(4digit)</td>
<td></td>
</tr>
</tbody>
</table>

**TK Temperature / Process Controller**

#### Standard
- N: None
- R: Relay output
- C: Current output+SSR drive voltage output

#### Option/input/output
- OUT2 control output
- OUT1 control output

#### Power supply

#### Option input/output

#### OUT1 control output
- R: Relay output
- S: SSRP output
- C: Current output+SSR drive voltage output

#### OUT2 control output
- Standard: Alarm output1+CT input
- R: Heating&Cooling Alarm output2
- D: Heating&Cooling Digital input(DI-1, DI-2)
- R: Heating&Cooling Transmission output
- T: Heating&Cooling RS485 communication output

#### Option input/output

#### Size

#### Digit

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**※1:** In case of TK4N, TK4SP, option output may be limited due to number of terminals.

**※2:** In case of OUT1 control output, “S” is able to SSR standard/cycle/phase control by SSRP voltage output as the voltage output model. “C” is able to select one between current output or SSR drive(standard) voltage output.

**※3:** Select “R” or “C” type which has OUT2 control output to use heating&cooling control. Select “N” type which does not have OUT2 control output to use standard control.

**※4:** (★) CT input of TK4N is available only for the standard model which has alarm output1.

**※5:** (★) The heating&cooling model of TK4N-1[ ] has only alarm output 2.

**※6:** Sockets for TK4SP (PG-11, PS-11) are sold separately.
## Specifications

<table>
<thead>
<tr>
<th>Series</th>
<th>TK4N(★)</th>
<th>TK4SP</th>
<th>TK4S</th>
<th>TK4M</th>
<th>TK4W</th>
<th>TK4H</th>
<th>TK4L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>100-240VAC 50/60Hz</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allowable voltage range</td>
<td>90 to 110% of rated voltage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power consumption</td>
<td>Max. 6VA</td>
<td>Max. 8VA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Display method</td>
<td>7 Segment (PV: red, SV: green), Other display part (green, yellow, red) LED method</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Character size</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PV(W×H)</td>
<td>4.5×7.2mm</td>
<td>7.0×14.0mm</td>
<td>9.5×20.0mm</td>
<td>8.5×17.0mm</td>
<td>7.0×14.6mm</td>
<td>11.0×22.0mm</td>
<td>7.0×14.0mm</td>
</tr>
<tr>
<td>SV(W×H)</td>
<td>3.5×5.8mm</td>
<td>5.0×10.0mm</td>
<td>7.5×15.0mm</td>
<td>6.0×12.0mm</td>
<td>6.0×12.0mm</td>
<td>7.0×14.0mm</td>
<td>7.0×14.0mm</td>
</tr>
</tbody>
</table>

### Input type

- **RTD**: JPt100Ω, DPt100Ω, DPt50Ω, Cu100Ω, Cu50Ω, Nikel 120Ω (6 types)

### Display accuracy

- **RTD**
  - At room temperature (23°C±5°C): (PV ±0.3% or ±1°C, select the higher one) ±1digit
  - Out of room temperature range: (PV ±0.5% or ±2°C, select the higher one) ±1digit
- **Thermocouple**
  - K, J, E, T, L, N, U, R, S, B, C, G, PLII (13 types): (PV ±0.3% or ±1°C, select the higher one) ±1digit
  - C, G, R, S type, below 200°C: (PV ±0.3% or ±3°C, select the higher one) ±1digit
  - B type, below 400°C: There is no accuracy standards.

### Control output

- **Relay OUT1, OUT2**: 250VAC 3A 1a
- **SSR**: DC4-20mA or DC0-20mA selectable (load 500Ω Max.)

### Alarm output

- **Relay AL1, AL2**: 250VAC 0.5a Max. 125VA, TK4SP has only AL1.

### Option input

- **Transmission**: DC4-20mA (load 500Ω Max., Accuracy: ±0.3% F.S.)
- **Communication**: RS485 communication output (Modbus RTU)

### Display method

- **CT input**: 0-50.0mA (primary heater current value measuring range) ※ PT input = 1/1000 (except TK4SP)
- **Digital input**
  - Contact Input: ON: Max. 2kΩ, OFF: Min. 90kΩ
  - Non-contact Input: ON: Residual voltage max. 1.0V, OFF: Leakage current max. 0.1mA
  - Outflow current: Approx. 0.5mA

### Control type

- **Heating, cooling**: ON/OFF, P, PI, PD, PID control

### Hysteresis

- Thermocouples / RTD: 1 to 100°C/F (0.1 to 100.0°C/F) variable
- Analog: 1 to 100digit

### Proportional band (P)

- 0.1 to 999.9°C/F (0.1 to 999.9%)

### Integral time (I)

- 0 to 9999 sec.

### Derivative time (D)

- 0 to 9999 sec.

### Control period (T)

- 0.1 to 120.0 sec. ※ (relay output and SSR drive output only)

### Manual reset value

- 0 to 100.0%

### Sampling period

- 50ms

### Dielectric strength

- 2,000VAC 50/60Hz for 1min. (between power source terminal and input terminal)

### Vibration

- 0.75mm amplitude at frequency of 5 to 55Hz for 2 hours

### Relay life cycle

- **Mechanical**: OUT1/2: Over 5,000,000 times, AL1/2: Over 20,000,000 times (TK4H/W/L: Over 5,000,000 times)
- **Electrical**: OUT1/2: Over 200,000 times, AL1/2: Over 100,000 times (TK4H/W/L: Over 200,000 times)

### Insulation resistance

- Min. 100MΩ (at 500VDC megger)

### Noise resistance

- ±2kV R-phase, S-phase the square wave noise (pulse width: 1us) by the noise simulator

### Memory retention

- Approx. 10 years (when using non-volatile semiconductor memory type)

### Environment

- **Temperature**: -10 to 50°C, storage: -20 to 60°C
- **Humidity**: 35 to 85%RH, storage: 35 to 85%RH

### Protection

- **IP65 (Front panel)** ※ TK4SP: IP50 (Front panel)

### Insulation type

- Double insulation or reinforced insulation (Mark: , Dielectric strength between the measuring input part and the power part: 2kV)

### Approval

- UL

### Weight

| Option | Approx. 140g (Approx. 70g) | Approx. 130g (Approx. 85g) | Approx. 150g (Approx. 105g) | Approx. 210g (Approx. 140g) | Approx. 211g (Approx. 141g) | Approx. 294g (Approx. 198g) |

※1: At room temperature (23°C±5°C)  
  - Thermocouple K, J, T, N, E type, below -100°C / Thermocouple L, U, PLII type, RTD (★) Cu50Ω, DP50Ω  
  - Thermocouple C, G, R, S type, below 200°C: (PV ±0.3% or ±3°C, select the higher one) ±1digit  
  - Thermocouple B type, below 400°C: There is no accuracy standards.  
  - Out of room temperature range  
  - RTD Cu50Ω, DP50Ω: (PV ±0.5% or ±3°C, select the higher one) ±1digit  
  - Thermocouple R, S, B, C, G type: (PV ±0.5% or ±5°C, select the higher one) ±1digit  
  - Others, below -100°C: Within ±5°C  
  - In case of TK4S Series, ±1°C will be added to the degree standard.

※2: The weight is with packaging and the weight in parentheses is only unit weight.  
※Environment resistance is rated at ±0.5°C or ±2%.
Connections
※ Please check the polarity when connecting temperature sensor or analog input.
※ Standard model has shaded terminals only.
(★) Operation mode of heating & cooling OUT2 relay output model is heating or cooling, OUT2 is available as alarm output 3.
(★) Operation mode of heating & cooling OUT2 current output model is heating or cooling, OUT2 is available as transmission output 2.

TK4N

TK4S

TK4P

TK4M

High Accuracy Standard PID Control

Connections
※ Please check the polarity when connecting temperature sensor or analog input.
※ Standard model has shaded terminals only.
(★) Operation mode of heating & cooling OUT2 relay output model is heating or cooling, OUT2 is available as alarm output 3.
(★) Operation mode of heating & cooling OUT2 current output model is heating or cooling, OUT2 is available as transmission output 2.
**Connections**

※Please check the polarity when connecting temperature sensor or analog input.
※Standard model has shaded terminals only.
★★Operation mode of heating&cooling OUT2 relay output model is heating or cooling, OUT2 is available as alarm output 3. (except TK4N Series).
★★Operation mode of heating&cooling OUT2 current output model is heating or cooling, OUT2 is available as transmission output 2.

**TK4H / TK4W / TK4L**

![Connection Diagram]

- **Digital input** is not electrically insulated from internal circuits, so it should be insulated when connecting other circuits. (Photocoupler, Relay, Independent switch)

**Dimensions**

<table>
<thead>
<tr>
<th><strong>TK4N</strong></th>
<th><strong>Dimensions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Line-up</strong></td>
<td>Terminal cover</td>
</tr>
<tr>
<td></td>
<td><img src="image1.png" alt="Diagrams" /></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>TK4S</strong></th>
<th><strong>Dimensions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Line-up</strong></td>
<td>Terminal cover</td>
</tr>
<tr>
<td></td>
<td><img src="image2.png" alt="Diagrams" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>TK4SP</strong></th>
<th><strong>Dimensions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Line-up</strong></td>
<td>Terminal cover</td>
</tr>
<tr>
<td></td>
<td><img src="image3.png" alt="Diagrams" /></td>
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</tbody>
</table>
### Dimensions

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Panel cut-out</th>
<th>Terminal cover</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>TK4M</td>
<td></td>
<td>6 64.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TK4W</td>
<td></td>
<td>6 64.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TK4H</td>
<td></td>
<td>6 64.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TK4L</td>
<td></td>
<td>6 64.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TK4N cover** is provided as an accessory.

Unit: mm

- **TK4M**:
  - **Panel cut-out**: 6 90<br>  - **Terminal cover**: 6 90
  - **Dimensions**: TK4M (48×48mm)

- **TK4W**:
  - **Panel cut-out**: 6 115<br>  - **Terminal cover**: 6 65
  - **Dimensions**: TK4W (48×24mm)

- **TK4H**:
  - **Panel cut-out**: 6 115<br>  - **Terminal cover**: 6 65
  - **Dimensions**: TK4H (72×72mm)

- **TK4L**:
  - **Panel cut-out**: 6 115<br>  - **Terminal cover**: 6 65
  - **Dimensions**: TK4L (48×96mm, 96×48mm)

- **TK4N-COVER** (48×24mm) Line-up

- **RSA-COVER** (48×48mm) Line-up

- **RMA-COVER** (72×72mm) Line-up

- **RHA-COVER** (48×96mm, 96×48mm) Line-up

- **RLA-COVER** (96×96mm) Line-up

- **Software**

- **Other**
TK Series

Product mounting

- **TK4N(48×24mm) Series**
  - Insert the unit into a panel, fasten the bolt with a (+) driver.

- **TK4S/SP(48×48mm) Series**
  - Insert the unit into a panel, fasten the bracket by pushing with tools with a (-) driver.

- **Other Series**

Sold separately

Communication converter

- **SCM-WF48** (available soon)
  - (Wi-Fi to RS485/USB communication converter)

- **SCM-38I**
  - (RS232C to RS485 converter)

- **SCM-US48I**
  - (USB to RS485 converter)

- **SCM-US**
  - (USB to Serial converter)

Current transformer (CT)

- **CSTC-E80LN**
  - Max. load current: 80A (50/60Hz)
  - ※Max. load current for TK4 Series is 50A.
  - Current ratio: 1/1000
  - Wire wounded resistance: 31Ω±10%

- **CSTC-E200LN**
  - Max. load current: 200A (50/60Hz)
  - ※Max. load current for TK4 Series is 50A.
  - Current ratio: 1/1000
  - Wire wounded resistance: 20Ω±10%

Đo not supply primary current in case that CT output is open. High voltage will be generated in CT output.
※The current for above two CTs is 50A same but inner hole sizes are different. Please use this for your environment.
High Accuracy Standard PID Control

### Parts description

- **TK4 Series**
- **TK4N Series**
- **Other Series**

#### Input selection switch (TC, RTD/mV, V, mA)
- You can switch sensor (TC, RTD) input ↔ analog input (mV, V, mA) (only the previous model).

#### SV setting

**You can set the temperature to control with the keys.**
- **Set range:** Within SV low-limit value \([L - 5U]\) to SV high-limit value \([H - 5U]\).

**Ex:** In case of changing set temperature from 210°C to 250°C

1. Press any key among \([K, S, Z]\) key in RUN mode, the right digit at SV display flashes and it enters to SV setting.
2. Press \([K]\) key to move the desired digit.
   - \((10^0 \rightarrow 10^1 \rightarrow 10^2 \rightarrow 10^3 \rightarrow 10^0)\)
3. Press \([S]\) or \([Z]\) key to move the desired number \((1 \rightarrow 5)\).
4. Press \([K]\) key to save the value and it controls with this set value.
   - (even though there is no key input for over 3 sec., it saves automatically.)
**Parameter group**

Press any key among [PASS], [PASS] once.

When PW is valid

Set the setting value

SV will be automatically saved after 5 sec.

### Run mode

- **Pass**
  - Press any key among [PASS] once.

- **PR 1**
  - Control output RUN/STOP[ \( r \cdash S \)]

- **PR 2**
  - Auto-tuning RUN/STOP[ \( r \) _L_]

- **Multi SV Number**
  - [SV-0]
  - [SV-1]
  - [SV-2]
  - [SV-3]

- **Heater current monitoring**
  - [H-P]

- **Alarm output1 low-limit set value**
  - [AL!L]

- **Alarm output1 high-limit set value**
  - [AL!H]

- **Alarm output2 low-limit set value**
  - [AL@L]

- **Alarm output2 high-limit set value**
  - [AL@H]

- **Alarm output3 low-limit set value**
  - [AL#L]

- **Alarm output3 high-limit set value**
  - [AL#H]

- **Heating proportional band**
  - [hP]

- **Cooling proportional band**
  - [cP]

- **Heating integral time**
  - [hI]

- **Cooling integral time**
  - [cI]

- **Heating derivative time**
  - [hD]

- **Cooling derivative time**
  - [cD]

- **Dead overlap band**
  - [dB]

- **Manual reset**
  - [RST]

- **Heating hysteresis**
  - [hYS]

- **Heating OFF offset**
  - [hOST]

- **Cooling hysteresis**
  - [cYS]

- **Cooling OFF offset**
  - [cOST]

- **MV low-limit**
  - [L-MV]

- **MV high-limit**
  - [H-MV]

- **RAMP-up change rate**
  - [RAMU]

- **RAMP-down change rate**
  - [RAMD]

- **RAMP time unit**
  - [rUNT]

- **Setting value(SV)-0**
  - [SV-0]

- **Setting value(SV)-1**
  - [SV-1]

- **Setting value(SV)-2**
  - [SV-2]

- **Setting value(SV)-3**
  - [SV-3]

1. **PASS** parameter will be displayed only when password is set. It is not displayed when purchasing the unit since default password is set to 0000.

2. If password is not valid, the screen will be shifted to password code required window.

3. Press any key among [PASS], [PASS] to return to password entering window.

4. Press [MODE] key to return to RUN mode.

5. In case you forget password, contact Autonics A/S center after checking password code.

6. **PASS** replaces [AM] key.

7. It is displayed when setting user parameter group in the integrated device management program (DAQMaster).

8. **Pass** key over 2 sec in RUN mode to enter into setting mode.

9. **Press** [MODE] key for 1.5 sec while in setting mode to move to other parameter group.

10. **Press** [MODE] key over 3 sec while in setting mode to return to RUN mode.

11. **Press** [MODE] key at the last parameter of each parameter, it moves to that parameter name. You can move to other groups.

12. If there is no additional key operation within 30 sec after entering into setting mode, it will be automatically returned to RUN mode and previous setting value will be remained.

(★) The shaded parameters are displayed in common.

The others may not be displayed by the specifications of the product, other parameter’s setting, or parameter mask setting.
Parameter 1 group

- Press any key among \[A\], \[B\], \[C\] anytime for 3 sec. to return to Run mode.
- After entering setting mode, press \[C\] key anytime for 1.5 sec. to go to the concerned group name.
- If you press the \[MODE\] key after changing the setting value of the parameter the setting value will be stored.
- Shaded parameters are for standard-level users, the others are for high-level users. (You can set the user level in parameter 5 group)
- This parameter might not be displayed depending on other parameter settings.

Set range: Deviation alarm (-F.S. to F.S.), Absolute alarm (within display range), Unit (℃/℉)

※ Display \(S_0\) through \(S_3\), depending on the preset number of multi SVs [\(\tilde{n} \leq 5\)]
- Set range: 0.0 to 50.0A
- Displayed only with current transformer (CT) input models (Expect for TK4SP)

※ Displayed only with current transformer (CT) input models (Expect for TK4SP)
- Absolute alarm (within display range), Unit (℃/℉)
- Set range: Deviation alarm (-F.S. to F.S.), Absolute alarm (within display range), Unit (℃/℉)
- Displayed only with option output models that support alarm output 2.

※ Displayed only with option output models that support alarm output 2.
- Absolute alarm (within display range), Unit (℃/℉)
- Displayed only with option output models that support alarm output 3.

※ Displayed only with option output models that support alarm output 3.
- Absolute alarm (within display range), Unit (℃/℉)
- Displayed only with option output models that support alarm output 3.

Set range: Deviation alarm (-F.S. to F.S.), Absolute alarm (within display range), Unit (℃/℉)
- Displayed only with option output models that support alarm output 3.

※ Displayed only with option output models that support alarm output 3.
- Absolute alarm (within display range), Unit (℃/℉)
- Displayed only with option output models that support alarm output 3.

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- Absolute alarm (within display range), Unit (℃/℉)
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- Absolute alarm (within display range), Unit (℃/℉)
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※ Displayed only with option output models that support alarm output 3.
- Absolute alarm (within display range), Unit (℃/℉)
- Displayed only with option output models that support alarm output 3.

※ Displayed only with option output models that support alarm output 3.
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※ Displayed only with option output models that support alarm output 3.
- Absolute alarm (within display range), Unit (℃/℉)
- Displayed only with option output models that support alarm output 3.
High Accuracy Standard PID Control

Parameter 2 group

- **Parameter 2 group**
  - **Heating proportional band**
    - Set range: 000.1 to 999.9°C / °F, %
    - Displayed only when temperature control type [C - H - 2] is set to PID control.
  - **Cooling proportional band**
    - Set range: 000.1 to 999.9°C / °F, %
  - **Heating integral time**
    - Set range: 0001 to 9999 sec.
    - Displayed only when control output operation mode [O - F] is set to heating [H - C] or heating and cooling [H - C].
  - **Cooling integral time**
    - Set range: 0001 to 9999 sec.
    - Displayed only when control output operation mode [O - F] is set to cooling [C - D] or heating and cooling [H - C].
  - **Heating derivative time**
    - Set range: 0001 to 9999 sec.
    - Displayed only when control output operation mode [O - F] is set to heating [H - C] or heating and cooling [H - C].
  - **Cooling derivative time**
    - Set range: 0001 to 9999 sec.
    - Displayed only when control output operation mode [O - F] is set to cooling [C - D] or heating and cooling [H - C].
  - **Dead_overlap band**
    - Set range: 0001 to 9999 sec.
    - Displayed only when control output operation mode [O - F] is set to heating [H - C] or heating and cooling [H - C].
  - **Manual reset**
    - Set range: 0001 to 9999 sec.
    - Displayed only when control output operation mode [O - F] is set to heating [H - C] or heating and cooling [H - C].
  - **Heating hysteresis**
    - Set range: 000.1 to 100.0 digit (000.1 to 100.0)
    - Displayed only when control output operation mode [O - F] is set to heating [H - C] or heating and cooling [H - C].
  - **Cooling hysteresis**
    - Set range: 000.1 to 100.0 digit (000.1 to 100.0)
    - Displayed only when temperature control type [C - H - 2] is set to PID control.
  - **Heating OFF offset**
    - Set range: 000 to 1000 digit (000.0 to 100.0)
    - Displayed only when temperature control type [C - H - 2] is set to PID control.
  - **Cooling OFF offset**
    - Set range: 000 to 1000 digit (000.0 to 100.0)
    - Displayed only when temperature control type [C - H - 2] is set to PID control.
**Parameter 3 group**

- **MV low limit**
  - **L-MV**: Set range: 000.0 to (H-MV - 0.1%) (Standard control), -100.0 to 000.0% (Heating & cooling) [H-MV: heating & cooling temperature setting]

- **MV high limit**
  - **H-MV**: Set range: (L-MV + 0.1) to 100.0% (Standard control), 000.0 to 100.0% (Heating & cooling) [L-MV: low limit temperature setting]

- **RAMP-up change rate**
  - **RAMP**: Set range: 0000 to 9999 digit (000.0 to 999.9)

- **RAMP-down change rate**
  - **RAMP**: Set range: 0000 to 9999 digit (000.0 to 999.9)

- **RAMP unit**
  - **RAMP**: Set range: SEC / MIN / HOUR

- **Input type**
  - **IN-T**: Sensor temperature unit

- **Sensor temperature unit**
  - **UNIT**: C, F (Shaded parameters are for standard-level users, the others are for high-level users)

- **Analog low-limit input value**
  - **L-RG**: Set range: Min. Range to (H-RG - F.S. 10% digit)

- **Analog high-limit input value**
  - **H-RG**: Set range: (L-RG + F.S. 10% digit) to Max. Range

- **Decimal point**
  - **DOT**: Set range: 0 / 0.0 / 0.00 / 0.000

- **Low-limit scale value**
  - **L-SC**: Set range: -1999 to 9999

- **High-limit scale value**
  - **H-SC**: Set range: -1999 to 9999

- **Display unit**
  - **DUNIT**: S / P / OFF / B / C / F
High Accuracy Standard PID Control

- **Input correction**
  - Set range: -999 to 0999 digit (-199.9 to 999.9)

- **Input digital filter**
  - Set range: 000.1 to 120.0 sec.

- **SV low-limit**
  - Set range: Low limit input \[L \cdot S \cdot C\] to \[H \cdot S \cdot U\] digit °C / °F / %

- **SV high-limit**
  - Set range: \[L \cdot S \cdot U\] +1 digit to High limit input \[H \cdot S \cdot C\] °C / °F / %

- **Control output operation mode**
  - \[O \cdot F\]
  - \[H \cdot C\]
  - \[Cool\]
  - \[Cool\]
  - \(*\) Standard type
  - \(*\) Heating & cooling control model.

- **Control type**
  - \[P \cdot d\]
  - \[P \cdot P\]
  - \[Pan\]
  - \[Pan\]
  - \[Pan\]
  - \[Pan\]
  - \(*\) Standard control
  - \(*\) Heating & cooling control

- **Auto-tuning mode**
  - \[Tun\]
  - \[Tun\]
  - \[Tun\]
  - \[Tun\]
  - \[Tun\]
  - \[Tun\]
  - \[Tun\]
  - \[Tun\]
  - \(*\) Displayed only when temperature control type \[C \cdot N\] is set to PID control.

- **OUT1 control output selection**
  - \[C\cdot U\]
  - \[C\cdot S\]
  - \[C\cdot S\]
  - \[C\cdot U\]
  - \[C\cdot U\]
  - \[C\cdot U\]
  - \[C\cdot U\]
  - \[C\cdot U\]
  - \(*\) Displayed only when OUT1 control output of model is current output.

- **OUT1 SSR output type**
  - \[S\cdot T\]
  - \[S\cdot T\]
  - \[S\cdot T\]
  - \[S\cdot T\]
  - \[S\cdot T\]
  - \[S\cdot T\]
  - \[S\cdot T\]
  - \[S\cdot T\]
  - \(*\) Displayed only when OUT1 control output of model is SSRP.

- **OUT1 current output range**
  - \[4 \cdot 2\]
  - \[0 \cdot 2\]
  - \[4 \cdot 2\]
  - \[0 \cdot 2\]
  - \[4 \cdot 2\]
  - \[0 \cdot 2\]
  - \[4 \cdot 2\]
  - \[0 \cdot 2\]
  - \(*\) Displayed only when OUT1 control output of model is SSRP and is set to CUR in \[O \cdot F\] mode.

- **OUT2 control output selection**
  - \[C\cdot U\]
  - \[C\cdot S\]
  - \[C\cdot S\]
  - \[C\cdot U\]
  - \[C\cdot U\]
  - \[C\cdot U\]
  - \[C\cdot U\]
  - \[C\cdot U\]
  - \(*\) Displayed only when OUT2 control output of model is current output.

- **OUT2 current output range**
  - \[4 \cdot 2\]
  - \[0 \cdot 2\]
  - \[4 \cdot 2\]
  - \[0 \cdot 2\]
  - \[4 \cdot 2\]
  - \[0 \cdot 2\]
  - \[4 \cdot 2\]
  - \[0 \cdot 2\]
  - \(*\) Displayed only when OUT2 control output of model is current output and is set to CUR in \[O \cdot F\] mode.

- **Heating control time**
  - \[S\cdot H\]
  - \[S\cdot H\]
  - \[S\cdot H\]
  - \[S\cdot H\]
  - \[S\cdot H\]
  - \[S\cdot H\]
  - \[S\cdot H\]
  - \[S\cdot H\]
  - \(*\) Set range: 000.1 to 120.0 sec.
  - \(*\) Displayed only when temperature control method \[C \cdot N\] is set to PID control.
  - \(*\) Not displayed when output method is set to CYCL, PHAS.

- **Cooling control time**
  - \[S\cdot C\]
  - \[S\cdot C\]
  - \[S\cdot C\]
  - \[S\cdot C\]
  - \[S\cdot C\]
  - \[S\cdot C\]
  - \[S\cdot C\]
  - \[S\cdot C\]

※ OUT1, OUT2 output:
- In case that OUT1, OUT2 output is relay output type, \[O \cdot U \cdot B\], \[O \cdot i \cdot S\], \[O \cdot i \cdot R\], \[O \cdot U \cdot T\], \[O \cdot 25\], \[O \cdot 25\] parameter are not displayed.
- In case that OUT1, OUT2 output is CUR + SSR output type, when OUT1, OUT2 output is set to SSR.
  - Output method of \[O \cdot i \cdot S\], \[O \cdot 25\] is held in \[S\cdot T\] and parameter is not displayed.
- In case that OUT1, output is SSRP output type and OUT2 output is SSR + SSR
  - \[O \cdot U \cdot B\], \[O \cdot i \cdot R\] are not displayed.
  - \[O \cdot i \cdot S\] can set to \[S\cdot T\], \[C\cdot Y\], \[P\cdot H\]
  - When \[O \cdot 25\] is set to \[S\cdot S\] it is held in \[S\cdot T\] and parameter is not displayed.
### Parameter 4 group

- **Parameter 4 group**
  - **Alarm output 1 operation mode**
    - **Mode**: Press any key among [S, S, S] anytime for 3 sec. to return to Run mode.
    - **After entering setting mode, press MODE key anytime for 1.5 sec. to go to the concerned group name.
    - **If you press the MODE key after changing the setting value of the parameter the setting value will be stored.
    - **Shaded parameters are for standard-level users, the others are for high-level users.
    - (You can set the user level in parameter 5 group)
    - **This parameter might not be displayed depending on other parameter settings.

- **Alarm output 1 option**
  - **Set range**: 0000 to 3600 sec.
  - **Set range**: 001 to 100 (000.1 to 100.0)

- **Alarm output 1 hysteresis**
  - **Set range**: 001 to 100 (000.1 to 100.0)

- **Alarm 1 N.O./N.C.**
  - **Set range**: 0000 to 3600 sec.

- **Alarm 1 ON delay time**
  - **Set range**: 0000 to 3600 sec.

- **Alarm 1 OFF delay time**
  - **Set range**: 0000 to 3600 sec.

- **Alarm output 2 operation mode**
  - **Mode**: Press any key among [S, S, S, S, S, S, S] anytime for 3 sec. to return to Run mode.
  - **After entering setting mode, press MODE key anytime for 1.5 sec. to go to the concerned group name.
  - **Set range**: 0000 to 3600 sec.

- **Alarm output 2 option**
  - **Display only if alarm output 1's operating mode[AL-1] is not set to OFF**.
  - **Display only if alarm output 1's operating mode[AL-1] is not set to OFF**.
  - **Display only if alarm output 2's operating mode[AL-2] is not set to OFF**.
  - **Display only if alarm output 2's operating mode[AL-2] is set to high-limit, low-limit, high/low-limit or reverse alarm for offset/absolute value**.

- **Alarm output 2 hysteresis**
  - **Set range**: 001 to 100 (000.1 to 100.0)
  - **Display only if alarm output 2's operating mode[AL-2] is set to high-limit, low-limit, high/low-limit or reverse alarm for offset/absolute value**.

- **Alarm 2 N.O./N.C.**
  - **Set range**: 0000 to 3600 sec.

- **Alarm 2 ON delay time**
  - **Set range**: 0000 to 3600 sec.

- **Alarm 2 OFF delay time**
  - **Set range**: 0000 to 3600 sec.

- **Display only with option output models that support alarm output 2.**
High Accuracy Standard PID Control

Alarm output 3 operation mode

- AL-3
- AL-A
- AL-F
- OFF
- mode
- duLL
- HbA

Alarm output 3 option

- AL#T
- A#HY
- mode

Alarm output 3 hysteresis

- A#ON
- A#OF
- mode

Alarm 3 N.O./N.C.

- A#N
- mode

Alarm 3 ON delay time

- A#ON
- mode

Alarm 3 OFF delay time

- A#OF
- mode

LBA time

- LBA
- mode

LBA band

- bLb
- mode

Analog trans. output 1 mode

- RoM
- mode

Trans. output 1 low-limit value

- FS
- mode

Trans. output 1 high-limit value

- FsH
- mode

Analog trans. output 2 mode

- RoN
- mode

Trans. output 2 low-limit value

- FS
- mode

Trans. output 2 high-limit value

- FsH2
- mode

※ Displayed only with option output models that support alarm output 3.

※ Displayed only if alarm output 3’s operating mode[AL - 3] is not set to OFF.

※ Displayed only if alarm output 3’s operating mode[AL - 3] is set to high-limit, low-limit high/low-limit or reverse alarm for offset/absolute value.

※ Displayed only if alarm output 3’s operating mode[AL - 3] is not set to OFF.

※ Displayed only when alarm output 1 or 2 operation mode[AL - 1, AL - 2] is loop break alarm [LBA].

※ Previous models

※ Displayed only for transmission output model.

- R
- S
- Su
- C
- Su
- C
- Su
- C
- Su
- C
- Su
- C
- Su
- C
- Su
- C
TK Series

Parameter 5 group

- Comm. address: Set range: 01 to 99
- Comm. speed: Set range: 5 to 99ms
- Comm. parity bit: NONE, EVEN, ODD
- Comm. stop bit: 2, 1
- Comm. response waiting time: Set range: 5 to 99ms
- Comm. write

※ Previous models
※ Except for TK4N, TK4SP model.
※ Except for TK4N, TKSP, S, M model.

Multi SV

- Digital Input Key
- DI-1 input terminal function
- DI-2 input terminal function
- Manual control, initial MV
- Manual control, preset MV
- Sensor error, MV
- Control stop, MV

Set range: 000.0 to 100.0% (standard control), -100.0 to 100.0% (heating & cooling control)

Parameter 5 group Parameter 1 group Parameter 2 group

PAR5 PAR1 PAR2

DI-K STOP AlRE

Set range: 000.0 to 100.0% (standard control), -100.0 to 100.0% (heating & cooling control)

※ Previous models
※ Except for TK4N, TK4SP model.

※ Press any key among , , anytime for 3 sec. to return to Run mode.
※ After entering setting mode, press key anytime for 1.5 sec. to go to the concerned group name.
※ If you press the key after changing the setting value of the parameter the setting value will be stored.
※ Shaded parameters are for standard-level users, the others are for high-level users.

(You can set the user level in parameter 5 group)

※ If you press the key after changing the setting value of the parameter the setting value will be stored.

※ This parameter might not be displayed depending on other parameter settings.
**Parameter Initialization**

Press (1), (2), (3) to initialize all parameters in memory to default value.
Set INIT parameter to YES to initialize all parameters.
In case password function is on, it is required to enter valid password to initialize parameters.
Password is also initialized.

<table>
<thead>
<tr>
<th>Control stop, alarm output</th>
<th>Cont</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
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<td>User level</td>
<td>USER</td>
<td>HIGH</td>
</tr>
<tr>
<td>SV setting lock</td>
<td>LCSV</td>
<td>on</td>
</tr>
<tr>
<td>Parameter 1 group lock</td>
<td>LPC1</td>
<td>on</td>
</tr>
<tr>
<td>Parameter 2 group lock</td>
<td>LPC2</td>
<td>on</td>
</tr>
<tr>
<td>Parameter 3 group lock</td>
<td>LPC3</td>
<td>on</td>
</tr>
<tr>
<td>Parameter 4 group lock</td>
<td>LPC4</td>
<td>on</td>
</tr>
<tr>
<td>Parameter 5 group lock</td>
<td>LPC5</td>
<td>on</td>
</tr>
<tr>
<td>Password setting</td>
<td>PWD</td>
<td>0000</td>
</tr>
</tbody>
</table>

Set range: 0000 (Password function Off), 0002 to 9999

Press (4), (5), (6), (7), (8) to initialize all parameters.
## Input type and range

<table>
<thead>
<tr>
<th>Input type</th>
<th>Decimal point</th>
<th>Display</th>
<th>Input range(°C)</th>
<th>Input range(°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Thermocouple</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K(CA)</td>
<td>1</td>
<td>KCRH</td>
<td>-200 to 1350</td>
<td>-328 to 2463</td>
</tr>
<tr>
<td></td>
<td>0.1</td>
<td>KCLR</td>
<td>-199.9 to 999.9</td>
<td>-199.9 to 999.9</td>
</tr>
<tr>
<td>J(IC)</td>
<td>1</td>
<td>JICH</td>
<td>-200 to 800</td>
<td>-328 to 1472</td>
</tr>
<tr>
<td></td>
<td>0.1</td>
<td>JICL</td>
<td>-199.9 to 800.0</td>
<td>-199.9 to 999.9</td>
</tr>
<tr>
<td>E(CR)</td>
<td>1</td>
<td>ECrH</td>
<td>-200 to 800</td>
<td>-328 to 1472</td>
</tr>
<tr>
<td></td>
<td>0.1</td>
<td>ECrL</td>
<td>-199.9 to 800.0</td>
<td>-199.9 to 999.9</td>
</tr>
<tr>
<td>T(CC)</td>
<td>1</td>
<td>TCCH</td>
<td>-200 to 400</td>
<td>-328 to 752</td>
</tr>
<tr>
<td></td>
<td>0.1</td>
<td>TCCL</td>
<td>-199.9 to 400.0</td>
<td>-199.9 to 752.0</td>
</tr>
<tr>
<td>B(PR)</td>
<td>1</td>
<td>bPr</td>
<td>0 to 1800</td>
<td>32 to 3272</td>
</tr>
<tr>
<td>R(PR)</td>
<td>1</td>
<td>rPr</td>
<td>0 to 1750</td>
<td>32 to 3182</td>
</tr>
<tr>
<td>S(PR)</td>
<td>1</td>
<td>sPr</td>
<td>0 to 1750</td>
<td>32 to 3182</td>
</tr>
<tr>
<td>N(NN)</td>
<td>1</td>
<td>nnn</td>
<td>-200 to 1300</td>
<td>-328 to 2372</td>
</tr>
<tr>
<td>C(TT)&lt;sup&gt;1&lt;/sup&gt;</td>
<td>1</td>
<td>CTT</td>
<td>0 to 2300</td>
<td>32 to 4172</td>
</tr>
<tr>
<td>G(TT)&lt;sup&gt;2&lt;/sup&gt;</td>
<td>1</td>
<td>GTT</td>
<td>0 to 2300</td>
<td>32 to 4172</td>
</tr>
<tr>
<td>L(IC)</td>
<td>1</td>
<td>LICH</td>
<td>-200 to 900</td>
<td>-328 to 1652</td>
</tr>
<tr>
<td></td>
<td>0.1</td>
<td>LICL</td>
<td>-199.9 to 900.0</td>
<td>-199.9 to 999.9</td>
</tr>
<tr>
<td>U(CC)</td>
<td>1</td>
<td>UCCH</td>
<td>-200 to 400</td>
<td>-328 to 752</td>
</tr>
<tr>
<td></td>
<td>0.1</td>
<td>UCCL</td>
<td>-199.9 to 400.0</td>
<td>-199.9 to 752.0</td>
</tr>
<tr>
<td>Platinel II</td>
<td>1</td>
<td>PLII</td>
<td>0 to 1390</td>
<td>32 to 2534</td>
</tr>
<tr>
<td><strong>RTD</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cu 50Ω</td>
<td>0.1</td>
<td>CU5</td>
<td>-199.9 to 200.0</td>
<td>-199.9 to 392.0</td>
</tr>
<tr>
<td>Cu 100Ω</td>
<td>0.1</td>
<td>CU10</td>
<td>-199.9 to 200.0</td>
<td>-199.9 to 392.0</td>
</tr>
<tr>
<td>JPt 100Ω</td>
<td>1</td>
<td>JPh</td>
<td>-200 to 650</td>
<td>-328 to 1202</td>
</tr>
<tr>
<td></td>
<td>0.1</td>
<td>JPlL</td>
<td>-199.9 to 650.0</td>
<td>-199.9 to 999.9</td>
</tr>
<tr>
<td>DPt 50Ω</td>
<td>0.1</td>
<td>DPh5</td>
<td>-199.9 to 600.0</td>
<td>-199.9 to 999.9</td>
</tr>
<tr>
<td>DPt 100Ω</td>
<td>1</td>
<td>DPtH</td>
<td>-200 to 650</td>
<td>-328 to 1202</td>
</tr>
<tr>
<td></td>
<td>0.1</td>
<td>DPtL</td>
<td>-199.9 to 650.0</td>
<td>-199.9 to 999.9</td>
</tr>
<tr>
<td>Nickel 120Ω</td>
<td>1</td>
<td>Ni12</td>
<td>-80 to 200</td>
<td>-112 to 392</td>
</tr>
<tr>
<td><strong>Analog</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage</td>
<td>0-10V</td>
<td>Ru1</td>
<td>-1999 to 9999 (Display point will be changed according to decimal point position)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0-5V</td>
<td>Ru2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1-5V</td>
<td>Ru3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>0-20mA</td>
<td>RAR1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4-20mA</td>
<td>RAR2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

※1: C(TT): Same as existing W5 (TT) type sensor
※2: G(TT): Same as existing W(TT) type sensor

## Front panel display when power is ON

When power is supplied, display will flash for 1 sec. Afterwards, model name and input sensor type will flash twice and then enter into RUN mode.

1. Whole display part
2. Model type display
3. Input sensor type display
4. Run mode
### Factory default

#### SV setting [SV]

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Factory default</th>
</tr>
</thead>
<tbody>
<tr>
<td>SU</td>
<td>0</td>
</tr>
</tbody>
</table>

#### Password input parameter

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Factory default</th>
</tr>
</thead>
<tbody>
<tr>
<td>PASS</td>
<td>000 1</td>
</tr>
</tbody>
</table>

#### Parameter 1 group [PAR1]

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Factory default</th>
<th>Parameter</th>
<th>Factory default</th>
<th>Parameter</th>
<th>Factory default</th>
<th>Parameter</th>
<th>Factory default</th>
</tr>
</thead>
<tbody>
<tr>
<td>r-S</td>
<td>r-Un</td>
<td>RL 1H</td>
<td>1550</td>
<td>RL 3H</td>
<td>1550</td>
<td>Su-3</td>
<td>0000</td>
</tr>
<tr>
<td>Su-n</td>
<td>Su-0</td>
<td>RL 2L</td>
<td>1550</td>
<td>Su-0</td>
<td>0000</td>
<td>Su-2</td>
<td>0000</td>
</tr>
<tr>
<td>Ct-R</td>
<td>000</td>
<td>RL 2H</td>
<td>1550</td>
<td>Su-1</td>
<td>0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AL IL</td>
<td>1550</td>
<td>RL 3L</td>
<td>1550</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Parameter 2 group [PAR2]

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Factory default</th>
<th>Parameter</th>
<th>Factory default</th>
<th>Parameter</th>
<th>Factory default</th>
<th>Parameter</th>
<th>Factory default</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1t</td>
<td>aFF</td>
<td>H-d</td>
<td>0000</td>
<td>HaSt</td>
<td>000</td>
<td>rRFu</td>
<td>000</td>
</tr>
<tr>
<td>H-P</td>
<td>0100</td>
<td>C-d</td>
<td>0000</td>
<td>CHYS</td>
<td>002</td>
<td>rRdd</td>
<td>000</td>
</tr>
<tr>
<td>C-P</td>
<td>0100</td>
<td>db</td>
<td>0000</td>
<td>CoSt</td>
<td>000</td>
<td>rUnb</td>
<td>011</td>
</tr>
<tr>
<td>H-1</td>
<td>0000</td>
<td>rE5t</td>
<td>0050</td>
<td>L-νa</td>
<td>4000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C-1</td>
<td>0000</td>
<td>WHYS</td>
<td>002</td>
<td>H-νa</td>
<td>1000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Parameter 3 group [PAR3]

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Factory default</th>
<th>Parameter</th>
<th>Factory default</th>
<th>Parameter</th>
<th>Factory default</th>
<th>Parameter</th>
<th>Factory default</th>
</tr>
</thead>
<tbody>
<tr>
<td>L- νb</td>
<td>LCRA</td>
<td>H- νC</td>
<td>1000</td>
<td>α-Fβ</td>
<td>H- νC (standard)</td>
<td>aISr</td>
<td>Snd</td>
</tr>
<tr>
<td>Uni νb</td>
<td>0℃</td>
<td>aUnνt</td>
<td>0a</td>
<td>H- νr</td>
<td>0-20</td>
<td>aLA</td>
<td>4-20</td>
</tr>
<tr>
<td>L- νG</td>
<td>0000</td>
<td>L- ννb</td>
<td>0000</td>
<td>C-νd</td>
<td>L(νr (standard)</td>
<td>aνc2</td>
<td>Cur</td>
</tr>
<tr>
<td>H- νG</td>
<td>1000</td>
<td>RνF</td>
<td>0001</td>
<td>PP(νr (heating &amp; cooling)</td>
<td>aν2A</td>
<td>0-20</td>
<td></td>
</tr>
<tr>
<td>do νt</td>
<td>0000</td>
<td>L- νν = -200</td>
<td>Rνt</td>
<td>+Un 1</td>
<td>H- νt</td>
<td>0200         (relay)</td>
<td></td>
</tr>
<tr>
<td>L- νC</td>
<td>0000</td>
<td>H- νv</td>
<td>1350</td>
<td>ανt +1</td>
<td>C- νt</td>
<td>0000         (SSR drive)</td>
<td></td>
</tr>
</tbody>
</table>

#### Parameter 4 group [PAR4]

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Factory default</th>
<th>Parameter</th>
<th>Factory default</th>
<th>Parameter</th>
<th>Factory default</th>
<th>Parameter</th>
<th>Factory default</th>
</tr>
</thead>
<tbody>
<tr>
<td>RL-1</td>
<td>dUnc</td>
<td>Rνn</td>
<td>no</td>
<td>LbAb</td>
<td>0000</td>
<td>bP5</td>
<td>96</td>
</tr>
<tr>
<td>RL νb</td>
<td>RL- R</td>
<td>Rν2n</td>
<td>0000</td>
<td>LbAb</td>
<td>002(003νt)</td>
<td>Pνr Y</td>
<td>ννE</td>
</tr>
<tr>
<td>R HνY</td>
<td>00 1</td>
<td>Rν2F</td>
<td>0000</td>
<td>RνA (RνA-νAνt)</td>
<td>Pν</td>
<td>SνP</td>
<td>2</td>
</tr>
<tr>
<td>R νn</td>
<td>no</td>
<td>RL- ν3</td>
<td>aFF</td>
<td>FνL (Fν-νLνt)</td>
<td>-200</td>
<td>rν5t</td>
<td>20</td>
</tr>
<tr>
<td>RL νn</td>
<td>0000</td>
<td>RL 3νt</td>
<td>RL- R</td>
<td>FνH (Fν-νHνt)</td>
<td>1350</td>
<td>Cν-ν</td>
<td>EνR</td>
</tr>
<tr>
<td>R νω</td>
<td>0000</td>
<td>Rν3H</td>
<td>00 1</td>
<td>RνA2</td>
<td>2000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RL ν2</td>
<td>23νd</td>
<td>Rν3n</td>
<td>no</td>
<td>FνL2</td>
<td>-200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RL 2νt</td>
<td>RL- R</td>
<td>Rν3νn</td>
<td>0000</td>
<td>FνH2</td>
<td>1350</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R2HνY</td>
<td>00 1</td>
<td>Rν3F</td>
<td>0000</td>
<td>Rν-5</td>
<td>01</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Parameter 5 group [PAR5]

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Factory default</th>
<th>Parameter</th>
<th>Factory default</th>
<th>Parameter</th>
<th>Factory default</th>
</tr>
</thead>
<tbody>
<tr>
<td>AbSu</td>
<td>1</td>
<td>PrAνu</td>
<td>0000</td>
<td>LC5u</td>
<td>aFF</td>
</tr>
<tr>
<td>d1- νt</td>
<td>Stνp</td>
<td>ErAνu</td>
<td>0000</td>
<td>LCP 1</td>
<td>aFF</td>
</tr>
<tr>
<td>d1- ν1</td>
<td>aFF(Stνpνt)</td>
<td>StνAνu</td>
<td>0000</td>
<td>LCP2</td>
<td>aFF</td>
</tr>
<tr>
<td>d1- ν2</td>
<td>aFF(RLνEνt)</td>
<td>STLνt</td>
<td>Cont</td>
<td>LCP3</td>
<td>aFF</td>
</tr>
<tr>
<td>L- νt</td>
<td>Auto</td>
<td>USEr</td>
<td>Stνd</td>
<td>LCP4</td>
<td>aFF</td>
</tr>
</tbody>
</table>

※ shaded parameters are only for the new model.
※1: This parameter is for previous models.
### Alarm operation

<table>
<thead>
<tr>
<th>Mode</th>
<th>Name</th>
<th>Alarm operation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>—</td>
<td>—</td>
<td>No alarm output</td>
</tr>
<tr>
<td><strong>du</strong></td>
<td>Deviation high-limit alarm</td>
<td><img src="image" alt="diagram" /></td>
<td>If deviation between PV and SV as high-limit is higher than set value of deviation temperature, the alarm output will be ON.</td>
</tr>
<tr>
<td><strong>Jo</strong></td>
<td>Deviation low-limit alarm</td>
<td><img src="image" alt="diagram" /></td>
<td>If deviation between PV and SV as low-limit is higher than set value of deviation temperature, the alarm output will be ON.</td>
</tr>
<tr>
<td><strong>JoC</strong></td>
<td>Deviation low-limit reserve alarm</td>
<td><img src="image" alt="diagram" /></td>
<td>If deviation between PV and SV as low-limit is higher than set value of deviation temperature, the alarm output will be OFF.</td>
</tr>
<tr>
<td><strong>pu</strong></td>
<td>Absolute value high limit alarm</td>
<td><img src="image" alt="diagram" /></td>
<td>If PV is higher than the absolute value, the output will be ON.</td>
</tr>
<tr>
<td><strong>JPu</strong></td>
<td>Absolute value low limit alarm</td>
<td><img src="image" alt="diagram" /></td>
<td>If PV is lower than the absolute value, the output will be ON.</td>
</tr>
<tr>
<td><strong>LbR</strong></td>
<td>Loop break Alarm</td>
<td>—</td>
<td>It will be ON when it detects loop break.</td>
</tr>
<tr>
<td><strong>SbR</strong></td>
<td>Sensor break Alarm</td>
<td>—</td>
<td>It will be ON when it detects sensor disconnection.</td>
</tr>
<tr>
<td><strong>HbR</strong></td>
<td>Heater break alarm</td>
<td>—</td>
<td>It will be ON when CT detects heater break.</td>
</tr>
</tbody>
</table>

※ H: Alarm output hysteresis [RH]

### Alarm option

<table>
<thead>
<tr>
<th>Mode</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RL - R</strong></td>
<td>Standard alarm</td>
<td>If it is an alarm condition, alarm output is ON. If it is a clear alarm condition, alarm output is OFF.</td>
</tr>
<tr>
<td><strong>RL - b</strong></td>
<td>Alarm latch</td>
<td>If it is an alarm condition, alarm output is ON and maintains ON status.</td>
</tr>
<tr>
<td><strong>RL - C</strong></td>
<td>Standby sequence1</td>
<td>First alarm condition is ignored and from second alarm condition, standard alarm operates. When power is supplied and it is an alarm condition, this first alarm condition is ignored and from the second alarm condition, standard alarm operates.</td>
</tr>
<tr>
<td><strong>RL - d</strong></td>
<td>Alarm latch and standby sequence1</td>
<td>If it is an alarm condition, it operates both alarm latch and standby sequence. When power is supplied and it is an alarm condition, this first alarm condition is ignored and from the second alarm condition, alarm latch operates.</td>
</tr>
<tr>
<td><strong>RL - E</strong></td>
<td>Standby sequence2</td>
<td>First alarm condition is ignored and from second alarm condition, standard alarm operates. When re-applied standby sequence and if it is alarm condition, alarm output does not turn ON. After clearing alarm condition, standard alarm operates.</td>
</tr>
<tr>
<td><strong>RL - F</strong></td>
<td>Alarm latch and standby sequence2</td>
<td>Basic operation is same as alarm latch and standby sequence1. It operates not only by power ON/OFF, but also alarm setting value, or alarm option changing. When re-applied standby sequence and if it is alarm condition, alarm output does not turn ON. After clearing alarm condition, alarm latch operates.</td>
</tr>
</tbody>
</table>

※Condition of re-applied standby sequence for standby sequence 1, alarm latch and standby sequence 1: Power ON
Condition of re-applied standby sequence for standby sequence 2, alarm latch and standby sequence 2: Power ON, changing set temperature, alarm temperature[**RL - i, RL - j**] or alarm operation[**RL - i, RL - j**], switching STOP mode to RUN mode.
High Accuracy Standard PID Control

Functions

Parameter mask (★)
- This function is able to hide unnecessary parameters to user environment or less frequently used parameters in parameter setting group. You can set this in the integrated device management program (DAQMaster).

User parameter group (PRr U) setting (★)
- This function is able to set the frequently used parameters to the user parameter group. You can quickly and easily set parameter settings.

User parameter group can have up to 30 parameters in the integrated device management program (DAQMaster).

Auto tuning (AT)
In PID control, auto-tuning determines the control subject's thermal characteristics and thermal response rate, and then determines the necessary PID time constant. Application of the PID time constant realizes fast response and high precision temperature control.
- Auto-tuning automatically stores PID time constants upon termination. These PID time constants can then be modified by the user to suit their usage environment.
- When auto-tuning is in progress, the AT lamp located on the front of the controller flashes in 1 second intervals. When auto-tuning finishes, the AT lamp automatically goes off and the auto-tuning parameter will return to OFF.

User environment or less frequently used parameters in parameter setting group. You can set this in the integrated device management program (DAQMaster).

Before applying mask

After applying mask

User environment or less frequently used parameters in parameter setting group. You can set this in the integrated device management program (DAQMaster).

Manual interruption or a sensor disconnection error when auto-tuning is in progress restores the PID time constant to the value used prior to the auto-tuning session.

Auto-tuning continues to run even if the temperature reading exceeds or falls below the input range.

When auto-tuning is in progress, parameters can only be referenced and not altered.

Auto-tuning is not available in manual control.

Control output operation mode (α-Ft)
- Control output modes for general temperature control include heating, cooling, and heating and cooling.
- Heating control and cooling control are mutually opposing operations with inverse outputs.
- The PID time constant varies based on the controlled objects during PID control.

Setting group | Parameter | Set range | Factory default | Unit
--- | --- | --- | --- | ---
PRr 3 | α-Ft | Standard model HERc/Cool | HERc | –
Heating & Cooling model HERc/Cool/LH-C | –

Ex) The above is setting user parameter group in the integrated device management program (DAQMaster).

For more information, refer to the DAQMaster user manual.

Visit our website (www.autonics.com) to download the DAQMaster program and the user manual.

※Ex) The above is masking auto tuning (AT), cooling proportional band (C-P), cooling integral time (C-I), cooling derivative time (C-D) parameters in parameter 2 group.

Before applying mask

After applying mask

※This function is for new model.
© Heating control [HEAT]
Heating control mode: the output will be provided in order to supply power to the load (heater) if PV (Present Value) falls below SV (Setting Value).

© Cooling control [COOL]
Cooling control mode: the output will be provided in order to supply power to the load (cooler) if PV (Present Value) rises above SV (Setting Value).

© Heating and cooling control [H-SC]
Heating and cooling control mode: heating and cooling with a single temperature controller when it is difficult to control subject temperature with only heating or cooling.
Heating and cooling control mode controls the object using different PID time constants for each heating and cooling.
It is also possible to set heating and cooling control in both PID control or ON/OFF control mode.
Heating/cooling output can be selected among Relay output, SSR output and current output depending on model types chosen according to your application environment.
(Note that only standard SSR control is available for SSR output in OUT2.)

For heating and cooling control, OUT1 control output is dedicated to heating control and OUT2 control output to cooling control.

© Control output (OUT1/OUT2) selection [aOUT1 / aOUT2]
- In case of selecting the Models with current control output, both current and SSR outputs are available. You can therefore choose the right output type depending on application environments.
  - OUT1: Selects OUT1 control output.
  - OUT2: Selects OUT2 control output.

<table>
<thead>
<tr>
<th>Setting group</th>
<th>Parameter</th>
<th>Set range</th>
<th>Factory default</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>PR3</td>
<td>aOUT1 / aOUT2</td>
<td>SSR / CUR</td>
<td>55 / 55</td>
<td>—</td>
</tr>
</tbody>
</table>

※ For more information, refer to the user manual.

■ Proper usage

© Simple "Error" diagnosis

- When the load (Heater etc) is not operated
  Please check operation of the OUT lamp located in front panel of the unit.
  If the OUT lamp does not operate, please check the parameter of all programmed mode.
  If lamp is operating, please check the output(Relay, SSR drive voltage) after separating output line from the unit.

- When it displays aPEn during operation
  This is a warning that external sensor is open.
  Please turn off the power and check the wire state of the sensor. If sensor is not open disconnect sensor line from the unit and short the input +, - terminal. Turn on the power of the unit and check the controller displays room temperature.
  If this unit cannot display room temperature, this unit is broken. Please remove this unit and contact our service center. (When the input mode is thermocouple, it is available to display room temperature.)

- In case of indicating "Error" in display
  This Error message is indicated in case of damaging inner chip program data by outer strong noise.
  In this case, please send the unit to our after service center after removing the unit from system.
  Noise protection is designed in this unit, but it does not stand up strong noise continuously. If bigger noise than specified(Max. 2kV) flows in the unit, it can be damaged.

© Caution for using

- Please use separated line from high voltage line or power line in order to avoid inductive noise.
- Please install power switch or circuit-breaker in order to cut power supply off.
- The switch or circuit-breaker should be installed near by users.
- This unit is designed for temperature controlling only. Do not apply this unit as a voltage meter or a current meter.
- In case of using RTD sensor, 3-wire type must be used. If you need to extend the line, 3-wires must be used with the same thickness as the line. It might cause temperature difference if the resistance of line is different.
- In case of making power line and input signal line close, line filter for noise protection should be installed at power line and input signal line should be shielded.
- Keep away from the high frequency instruments.(High frequency welding machine & sewing machine, big capacitive SCR controller)
- Installation environment
  - It shall be used indoor.
  - Altitude Max. 2000m.
  - Pollution Degree 2
  - Installation Category II.