Digital Indicator with Alarm function

AE500

Instruction Manual

IMAE01-E8

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

![WARNING]

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

![CAUTION]

- This product is intended for use with industrial machines, test and measuring equipment. (It is not designed for use with medical equipment and nuclear energy.)
- This is a Class A instrument. In a domestic environment, this instrument may cause radio interference, in which case the user may be required to take additional measures.
- This instrument is protected from electric shock by reinforced insulation. Provide reinforced insulation between the wire for the input signal and the wires for instrument power supply, source of power and loads.
- Be sure to provide an appropriate surge control circuit respectively for the following:
  - If input/output or signal lines within the building are longer than 30 meters.
  - If input/output or signal lines leave the building, regardless of the length.
- This instrument is designed for installation in an enclosed instrumentation panel. All high-voltage connections such as power supply terminals must be enclosed in the instrumentation panel to avoid electric shock by operating personnel.
- All precautions described in this manual should be taken to avoid damage to the instrument or equipment.
- All wiring must be in accordance with local codes and regulations.
- All wiring must be completed before power is turned on to prevent electric shock, instrument failure, or incorrect action. The power must be turned off before repairing work for input break and output failure including replacement of sensor, contactor or SSR, and all wiring must be completed before power is turned on again.
- To prevent instrument damage as a result of failure, protect the power line and the input/output lines from high currents with a suitable overcurrent protection device with adequate breaking capacity such as fuse, circuit breaker, etc.

- Prevent metal fragments or lead wire scraps from falling inside instrument case to avoid electric shock, fire or malfunction.
- Tighten each terminal screw to the specified torque found in the manual to avoid electric shock, fire or malfunction.
- For proper operation of this instrument, provide adequate ventilation for heat dispensation.
- Do not connect wires to unused terminals as this will interfere with proper operation of the instrument.
- Turn off the power supply before cleaning the instrument.
- Do not use a volatile solvent such as paint thinner to clean the instrument. Deformation or discoloration will occur. Use a soft, dry cloth to remove stains from the instrument.
- To avoid damage to instrument display, do not rub with an abrasive material or push front panel with a hard object.

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

1. PRODUCTS CHECK

Before using the product, check each of the following. If any of the products are missing, damaged, or if your manual is incomplete, please contact RKC sales office or the agent.

- Model code
- Check that all of the items delivered are complete.
- Check that there are no scratch or breakage in external appearance (case, front panel, or terminal, etc)

AE500 [ALM1] [ALM2] [ALM3] [ALM4] [Output] [Input]/Y

(1) Input type: Refer to 9. INPUT RANGE TABLE.
(2) Range code: Refer to 9. INPUT RANGE TABLE.
(3) Power supply voltage
  3: 24 V AC/DC
  4: 100 to 240 V AC
(4) Alarm 1 [ALM1], (5) Alarm 2 [ALM2]
  N: No alarm
  H: Process high alarm
  L: Process low alarm
  K: Process high alarm with hold action
  J: Process low alarm
(6) Alarm 3 [ALM3] or Analog output
  N: No function
  H: Process high alarm
  J: Process low alarm
  K: Process high alarm with hold action
  L: Process low alarm with hold action
  7: Analog output (0 to 20 mA DC)
  8: Analog output (4 to 20 mA DC)
(7) Alarm 4 [ALM4] or Power supply for LED drive
  N: No alarm
  H: Process high alarm
  J: Process low alarm
  K: Process high alarm with hold action
  L: Process low alarm with hold action
  P: LED drive power supply for SP400/SP500

* This power supply is used to light the LED of the SP400/SP500.
2. MOUNTING

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

2.1 Mounting Cautions

(1) This instrument is intended to be used under the following environmental conditions: (IEC61010-1)

[OVERVOLTAGE CATEGORY II, POLLUTION DEGREE 2]

(2) Use this instrument within the following environment conditions:

- Allowable ambient temperature: 0 to 50 °C
- Allowable ambient humidity: 5 to 95 %RH
  (Absolute humidity: MAX. W. C 29.3 g/m² dry air at 101.3 kPa)
- Installation environment conditions: Indoor use, Altitude up to 2000 m

(3) Avoid the following conditions when selecting the mounting location:

- Rapid changes in ambient temperature which may cause condensation.
- Corrosive or inflammable gases.
- Direct vibration or shock to the mainframe.
- Water, oil, chemicals, vapor or steam splashes.
- Excessive dust, salt or iron particles.
- Excessive induction noise, static electricity, magnetic fields or noise.
- Direct air flow from an air conditioner.
- Exposure to direct sunlight.
- Excessive heat accumulation.

(4) Mount this instrument in the panel considering the following conditions:

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

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

2.2 Dimensions

(Unit: mm)

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Close vertical mounting</th>
<th>Individual mounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>96</td>
<td>92</td>
</tr>
<tr>
<td>H1</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

*Rubber (Optional)

- For mounting of the instrument, panel thickness must be between 1 to 10 mm. (When mounting multiple instruments close together, the panel strength should be checked to ensure proper support.)
- Waterproof and Dustproof are not effective when instruments are closely spaced.

2.3 Mounting Procedures

<Mounting Procedures>

1. Prepare the panel cutout as specified in 2.2 Dimensions.
2. Insert the instrument through the panel cutout.
3. Insert the mounting bracket into the mounting groove of the instrument. Do not push the mounting bracket forward. (Fig. 1)
4. Secure the bracket to the instrument by tightening the screw. Take care to refrain from moving the bracket forward.
5. Only turn about one full revolution after the screw touches the panel. (Fig. 2)
6. The other mounting bracket should be installed in the same way as described in 3. to 5.

The optional waterproof/dustproof on the front of the instrument conforms to IP65 when mounted on the panel. For effective waterproof/dustproof, the gasket must be securely placed between instrument and panel without any gap. If gasket is damaged, please contact RKC sales office or the agent.

<Removal Procedures>

1. Turn the power OFF.
2. Remove the wiring.
3. Loosen the screw of the mounting bracket.
4. Hold the mounting bracket by the edge (☐) and tilt it (☐) to remove from the case. (Fig. 3)
5. The other mounting bracket should be removed in the same way as described in 3. and 4.
6. Pull out the instrument from the mounting cutout while holding the front panel frame of this instrument. (Fig. 4)
3. WIRING

![WARNING]

To prevent electric shock or instrument failure, do not turn on the power until all wiring is completed. Make sure that the wiring is correct before applying power to the instrument.

3.1 Wiring Cautions

- For thermocouple input, use the appropriate compensation wire.
- For RTD input, use low resistance lead wire with no difference in resistance between the three lead wires.
- To avoid noise induction, keep input signal wire away from instrument power line, load lines and power lines of other electric equipment.
- For current input specifications, an external resistor (250 Ω ±0.02 %, 0.25 W or more, ±10 ppm/°C) must be connected between the input terminals. For external resistor (shunt resistor), use the KD100-55: sold separately (RKC product). If this resistor is installed, close horizontal mounting is not possible.
- Power supply wiring must be twisted and have a low voltage drop.
- This instrument with 24 V power supply is not provided with an overcurrent protection device. For safety install an overcurrent protection device (such as fuse) with adequate breaking capacity close to the instrument.
  - Fuse type: Time-lag fuse (Approved fuse according IEC60127-2 and/or UL248-14)
  - Fuse rating: Rated current: 0.5 A
- For an instrument with 24 V power supply input, supply power from “SELV” circuit defined as IEC 60950-1.
- A suitable power supply should be considered in end-use equipment. The power supply must be in compliance with a limited-energy circuits (maximum available current of 8 A).
- Use the solderless terminal appropriate to the screw size.
  - Screw size: M3 x 6
  - Recommended tightening torque: 0.4 N-m [4 kgf-cm]
  - Specified solderless terminals: With isolation
  - Applicable wire: Solid/twisted wire of 0.25 to 1.65 mm²
- Make sure that during field wiring parts of conductors cannot come into contact with adjacent conductive parts.

3.2 Terminal Configuration

![Diagram of terminal configuration]

- Communication terminals
- Power terminals
- Input terminals
- Output terminals
- LED drive terminals

[Table of terminal configuration details]
### Specifications

#### Power consumption
- 7 VA max. (at 100 V AC)
- 10 VA max. (at 240 V AC)
- 5 VA max. (at 24 V AC)
- 160 mA max. (at 24 V DC)

#### Analog output (Optional) 1
- Number of output points: 1 point
- Output resolution: 10 bits or more
- Output rating: 0 to 20 mA DC
- 4 to 20 mA DC
- Load resistor: Less than 600 Ω

#### Power supply for LED drive (Optional) 2
- Output voltage: 12 V DC +1 V
- -2 V

#### Alarm output (Optional)
- Alarm 1/Alarm 2: Relay contact output 250 V AC, 1 A (Resistive load), 1a contact
- Alarm 3/Alarm 4: Relay contact output 250 V AC, 3 A (Resistive load), 1a contact

#### Power supply voltage
- 85 to 264 V AC (Power supply voltage range) 50/60 Hz Rating: 100 to 240 V AC
- 21.6 to 26.4 V AC (Power supply voltage range) 50/60 Hz Rating: 24 V AC
- 21.6 to 26.4 V DC (Power supply voltage range) Rating: 24 V DC

### Weight
- Approx. 250 g

### 3.3 Wiring Example

![Wiring Diagram](image)

### 4. PARTS DESCRIPTION

#### (1) Measured value (PV) display unit
- Displays measured value (PV).
- Displays various characters depending on the instrument.

#### (2) Alarm output indication lamps (ALM1 to ALM4) [Red]
- ALM1: Lights when alarm 1 output is turned on.
- ALM2: Lights when alarm 2 output is turned on.
- ALM3: Lights when alarm 3 output is turned on.
- ALM4: Lights when alarm 4 output is turned on.

#### (3) SET (Set key)
- Used for parameter calling up and set value registration.

#### (4) < (Shift key)
- Shift digits when settings are changed.
- Used when the character display in each mode is changed to the set value display.

#### (5) ▼ (Down key)
- Decrease numerals.

#### (6) ▲ (Up key)
- Increase numerals.

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To avoid damage to the instrument, never use a sharp object to press keys.
5. SETTING

5.1 Calling-up Procedure of Each Mode

- **Power on**
  - **Input type display**
    - Automatically (in 4 seconds.)
  - **PV display**
    - Press the set key.
    - Press and hold the set key for 2 seconds.
    - Press the set key while pressing the shift key.
  - Displays returns to the PV display mode if no key operation is performed within 1 minute.
- **Communication setting mode**
  - Displayed when the instrument has the communication function.
- **Parameter setting mode**
  - For details the protocol, identifiers and communication setting mode, refer to the separate AE500 Communication Instruction Manual (IMAE02-E).
### Parameter setting mode

This is the mode used to set the various parameters such as alarm differential gap, PV bias etc. The following parameter symbols are displayed one by one every time the set key is pressed. (Press and hold the set key for 2 seconds when enter parameter setting mode from PV display.)

For details, refer to the 5.3 Parameter Setting Procedure (P. 7).

![Diagram of parameter setting mode]

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Name</th>
<th>Setting (display) range</th>
<th>Description</th>
<th>Factory set value</th>
</tr>
</thead>
<tbody>
<tr>
<td>AH 1</td>
<td>Alarm 1 differential gap setting</td>
<td>TC/RTD inputs: 0 to 100 °C [°F] or 0.0 to 100.0 °C [°F]</td>
<td>Set the alarm 1 differential gap.</td>
<td>TC/RTD inputs: 2 or 2.0 Voltage/Current inputs: 0.2</td>
</tr>
<tr>
<td>AH2</td>
<td>Alarm 2 differential gap setting</td>
<td>Voltage/Current inputs: 0.0 to 10.0 %</td>
<td>Set the alarm 2 differential gap.</td>
<td></td>
</tr>
<tr>
<td>AH3</td>
<td>Alarm 3 differential gap setting</td>
<td></td>
<td>Set the alarm 3 differential gap.</td>
<td></td>
</tr>
<tr>
<td>AH4</td>
<td>Alarm 4 differential gap setting</td>
<td></td>
<td>Set the alarm 4 differential gap.</td>
<td></td>
</tr>
<tr>
<td>Pb</td>
<td>PV bias</td>
<td>TC/RTD inputs: –1999 to +9999 °C [°F] or –199.9 to +999.9 °C [°F] Voltage/Current inputs: –1999 to +9999</td>
<td>Sensor correction is made by adding bias value to measured value (PV).</td>
<td>TC/RTD inputs: 0 or 0.0 Voltage/Current inputs: 0.0</td>
</tr>
<tr>
<td>Pb</td>
<td>Analog output scale high</td>
<td>ALS to SLH (Setting limiter high)</td>
<td>Sets high limit of the analog output range. Not displayed when there is no analog output.</td>
<td>SLH</td>
</tr>
<tr>
<td>AHS</td>
<td>Analog output scale low</td>
<td>SLL (Setting limiter low) to AHS</td>
<td>Sets low limit of the analog output range. Not displayed when there is no analog output.</td>
<td>SLL</td>
</tr>
<tr>
<td>ALS</td>
<td>Set data lock function</td>
<td>0000: Can be changed 0001: Cannot be changed</td>
<td>Selects the set data can be changed or cannot be changed.</td>
<td>0000</td>
</tr>
</tbody>
</table>
5.3 Parameter Setting Procedure
- When the displayed value is changed, it is not stored. To store it, press the set key.
- After a new value has been displayed by using the up and down keys, the set key must be pressed within 1 minute, or the new value is not stored and the display will return to the PV display.

<table>
<thead>
<tr>
<th>Change the Alarm set value</th>
<th>Example: Change the Alarm 1 set value from 0 °C to 200 °C.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Alarm 1 setting</td>
<td>Press the set key to change to Alarm 1 setting (AL1) display.</td>
</tr>
<tr>
<td>(2) Set value</td>
<td>Press the shift key to Alarm 1 set value display.</td>
</tr>
<tr>
<td>(3) Shift the highlighted digit</td>
<td>Press the shift key to high-light the hundreds digit. The high-lighted digit indicates which digit can be set.</td>
</tr>
<tr>
<td>(4) Change the set value</td>
<td>Press the up key to change the number 2.</td>
</tr>
<tr>
<td>(5) Store the set value</td>
<td>Press the set key to store the new set value. The display returns to the next parameter.</td>
</tr>
</tbody>
</table>

6. OPERATIONS

CAUTIONS
- All mounting and wiring must be completed before the power is turned on. If the input signal wiring is disconnected or short-circuited (RTD input only), the instrument determines that burnout has occurred.
  - Displays:
    - Upscale: Thermocouple input, RTD input (when input break)
    - Downscale: Thermocouple input (specify when ordering), RTD input (when short-circuited), Voltage input (1 to 5 V DC), Current input (4 to 20 mA DC)
    - For the voltage (0 to 5 V DC, 0 to 10 V DC*) or current (0 to 20 mA DC) input, the display becomes indefinite (display of about zero value).
    - * Z-1010 specification
  - Alarm action:
    The Alarm 1, Alarm 2, Alarm 3 and Alarm 4 actions of this instrument are turned on when burnout occurs regardless of any of the following actions taken (High alarm, low alarm, etc.). In addition, when used for any purposes other than these alarms (event, etc.), specify the Z-124 specification (not to be forcibly turned on).
- A power failure of 20 ms or less will not affect the control action. When a power failure of more than 20 ms occurs, the instrument assumes that the power has been turned off. When power returns, the controller will retain the conditions that existed prior to shut down.
- The alarm hold action is activated when only the power is turned on.

6.1 Operating Procedures
1. Prior to starting operation, check that the mounting and wiring have been finished, and that the alarm setting value and various parameters have been set.
2. A power supply switch is not furnished with this instrument. It is ready to measure as soon as the power is turned on.

6.2 Set Data Lock (LCK) Function
The set data lock restricts parameter setting changes by key operation. This function prevents the operator from making errors during operation. Parameters protected by Set Data Lock function are still displayed for monitoring.

6.3 Alarm (ALM) Function
Each alarm action is as follows.

<table>
<thead>
<tr>
<th>Process high alarm (△: Alarm setting)</th>
<th>Differential gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>ON</td>
</tr>
<tr>
<td>High</td>
<td>OFF</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Process low alarm (△: Alarm setting)</th>
<th>Differential gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>OFF</td>
</tr>
<tr>
<td>High</td>
<td>ON</td>
</tr>
</tbody>
</table>

6.4 Alarm Differential Gap
If measured value (PV) is close to the alarm set value, the alarm relay contact may repeatedly turn ON and OFF due to input fluctuations. If the differential gap is set, repeated turning ON and OFF of the relay contact can be prevented.

6.5 Alarm Hold Action
In the alarm hold action, the alarm function is kept invalid even if the measured value (PV) is in the alarm range when the power is on. The alarm function is held until the measured value (PV) goes out of the alarm state once.

With alarm hold action
- Measured value (PV)
- Alarm set value
- Alarm hold zone
- Time
- Alarm status
- With alarm hold action
- Without alarm hold action
7. INITIAL SETTING

7.1 Go to Initialization Mode
1. Turn on the power to this controller. The instrument goes to the PV display after confirming input type symbol and input range.
2. Press and hold the set key for 2 seconds to go to the Parameter Setting Mode from the PV display.
3. Press the set key until “LCK” (Set Data Lock display) will be displayed.
4. Press the shift key to change the display from character to set value. (The section in each image of the controller shows the digits which are not high-lighted.)
5. Press the shift key to light the thousands digit.
6. Press the up key to change “0” to “1” in the thousands digit.
7. Press the set key to change to the next parameter. Thus, the data in initialization mode is unlocked.
8. Press the set key while pressing the shift key for 2 seconds. To change the instrument to initialization mode. Thus, the symbol (Cod) for selecting the initialize code is displayed first.

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

7.3 Initial Setting Menu
The “Cod” display will be displayed when the controller goes to the Initialization Mode. Do not change to any parameter in the Initialization Mode which is not described in the initial setting menu above. It may result in malfunction or failure of the instrument.

Initialize code: SL1 (Input type selection) Refer to P. 9
Cod 0000
SL2 (Temperature unit selection) Refer to P. 9
SL3 (Alarm 1 type selection) Refer to P. 9
SL4 (Alarm 2 type selection) Refer to P. 9
SL5 (Alarm 3 type selection) Refer to P. 9
SL6 (Alarm 4 type selection) Refer to P. 9

Initialize code: SL1 (Setting limiter [high limit]) Refer to P. 10
Cod 0001
SL2 (Setting limiter [low limit]) Refer to P. 10
PGdP (Setting the position of decimal point) Refer to P. 11
dF (Digital filter setting) Refer to P. 11
7.4 Input Type Selection (SL1)

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

Factory set value varies depending on the input type.

<table>
<thead>
<tr>
<th>Set value</th>
<th>Input type</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000</td>
<td>K</td>
</tr>
<tr>
<td>0001</td>
<td>J</td>
</tr>
<tr>
<td>0010</td>
<td>L</td>
</tr>
<tr>
<td>0011</td>
<td>E</td>
</tr>
<tr>
<td>0100</td>
<td>N</td>
</tr>
<tr>
<td>0111</td>
<td>R</td>
</tr>
<tr>
<td>1000</td>
<td>S</td>
</tr>
<tr>
<td>1001</td>
<td>B</td>
</tr>
<tr>
<td>1010</td>
<td>W5Re/W26Re</td>
</tr>
<tr>
<td>1011</td>
<td>PL II</td>
</tr>
<tr>
<td>0101</td>
<td>T</td>
</tr>
<tr>
<td>0110</td>
<td>U</td>
</tr>
<tr>
<td>1100</td>
<td>Pt100 Ω (JIS/IEC)</td>
</tr>
<tr>
<td>1101</td>
<td>JPI100 Ω (JIS)</td>
</tr>
<tr>
<td>1110</td>
<td>0 to 5 V DC</td>
</tr>
<tr>
<td>1111</td>
<td>0 to 10 V DC</td>
</tr>
<tr>
<td></td>
<td>0 to 5 V DC</td>
</tr>
<tr>
<td></td>
<td>0 to 20 mA DC</td>
</tr>
<tr>
<td></td>
<td>4 to 20 mA DC</td>
</tr>
</tbody>
</table>

1. Any input change in TC&RTD group is possible. Any input change in Voltage & Current group except for 0 to 10 V DC input is possible. No input change between TC&RTD group and Voltage & Current group is possible. The input type of Z-1010 specification is fixed to 0 to 10 V DC due to the hardware difference.

2. For the current input specification, a resistor of 250 Ω must be connected between the input terminals.

3. For the current input specification, a resistor of 250 Ω must be connected between the input terminals.

Example: Change the input type from “K” to “J”

1. Change the instrument to the initialize code selection (Cod) display.

2. Press the shift key to change the display from character to set value.

3. Set “Cod” to 0000, and press the set key to change to the input type selection (SL1) display.

4. Press the set key to change the display from character to set value.

5. Press the up key to change "0" to "1" in the units digit.

6. Press the set key to change to the next parameter. Thus, the set value is registered.

7.5 Temperature Unit Selection (SL2)

Inappropriate settings may result in malfunction.

Factory set value varies depending on the instrument specification.

<table>
<thead>
<tr>
<th>Set value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000</td>
<td>°C</td>
</tr>
<tr>
<td>0001</td>
<td>°F</td>
</tr>
</tbody>
</table>

Change Settings

Example: Change the temperature unit from “°C (0000)” to “°F (0001)”

1. Press the set key at the input type selection (SL1) until the temperature unit selection (SL2) is displayed.

2. Press the shift key to change the display from character to set value.

3. Press the up key to change "0" to "1" in the units digit.

4. Press the set key to change to the next parameter. Thus, the set value is registered.

7.6 Alarm 1 [ALM1] Type Selection (SL3)
Alarm 2 [ALM2] Type Selection (SL4)
Alarm 3 [ALM3] Type Selection (SL5)
Alarm 4 [ALM4] Type Selection (SL6)

The following instrument cannot be selected.

- When the instrument does not have the alarm 1 [ALM1].
- When the instrument does not have the alarm 2 [ALM2].
- When the instrument does not have the alarm 3 [ALM3].
- When the instrument does not have the alarm 4 [ALM4].
- When the analog output specified, cannot select alarm 3.
- When the power supply for LED drive specified, cannot select alarm 4.

Factory set value varies depending on the instrument specification.

<table>
<thead>
<tr>
<th>Set value</th>
<th>Details of setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000</td>
<td>No alarm</td>
</tr>
<tr>
<td>0001</td>
<td>Process high alarm (energized type)</td>
</tr>
<tr>
<td>0101</td>
<td>Process high alarm (de-energized type)</td>
</tr>
<tr>
<td>0011</td>
<td>Process low alarm (energized type)</td>
</tr>
<tr>
<td>0111</td>
<td>Process low alarm (de-energized type)</td>
</tr>
<tr>
<td>1001</td>
<td>Process high alarm with hold action (energized type)</td>
</tr>
<tr>
<td>1101</td>
<td>Process high alarm with hold action (de-energized type)</td>
</tr>
<tr>
<td>1011</td>
<td>Process low alarm with hold action (energized type)</td>
</tr>
<tr>
<td>1111</td>
<td>Process low alarm with hold action (de-energized type)</td>
</tr>
</tbody>
</table>

* Hold action:
In the alarm hold action, the alarm function is kept invalid even if the Measured value (PV) is in the alarm range when the power is on. The alarm function is held until the Measured value (PV) goes out of the alarm state once.

Continued on the next page.
7.7 Setting Limiter High (SLH) Setting Limiter Low (SLL)

For voltage or current input, set scaling within the input range.

Refer to 9. INPUT RANGE TABLE (P. 12)

Factory set value varies depending on the instrument specification.

<table>
<thead>
<tr>
<th>Input type</th>
<th>Setting limiter high</th>
<th>Setting limiter low</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>SLL to 1372 °C</td>
<td>0 to SLH °C</td>
</tr>
<tr>
<td></td>
<td>SLL to 2502 °F</td>
<td>0 to SLH °F</td>
</tr>
<tr>
<td>J</td>
<td>SLL to 1200 °C</td>
<td>0 to SLH °C</td>
</tr>
<tr>
<td></td>
<td>SLL to 2192 °F</td>
<td>0 to SLH °F</td>
</tr>
<tr>
<td>R</td>
<td>SLL to 1769 °C</td>
<td>0 to SLH °C</td>
</tr>
<tr>
<td>S</td>
<td>SLL to 3216 °C</td>
<td>0 to SLH °C</td>
</tr>
<tr>
<td>B</td>
<td>SLL to 1820 °C</td>
<td>0 to SLH °C</td>
</tr>
<tr>
<td></td>
<td>SLL to 3308 °F</td>
<td>0 to SLH °F</td>
</tr>
<tr>
<td>E</td>
<td>SLL to 1000 °C</td>
<td>0 to SLH °C</td>
</tr>
<tr>
<td></td>
<td>SLL to 1832 °F</td>
<td>0 to SLH °F</td>
</tr>
<tr>
<td>N</td>
<td>SLL to 1300 °C</td>
<td>0 to SLH °C</td>
</tr>
<tr>
<td></td>
<td>SLL to 2372 °F</td>
<td>0 to SLH °F</td>
</tr>
<tr>
<td>T</td>
<td>SLL to 400.0 °C</td>
<td>–199.9 to SLL °C</td>
</tr>
<tr>
<td></td>
<td>SLL to 752.0 °F</td>
<td>–199.9 to SLL °F</td>
</tr>
<tr>
<td>W5Re/W26Re</td>
<td>SLL to 2320 °C</td>
<td>0 to SLH °C</td>
</tr>
<tr>
<td></td>
<td>SLL to 4208 °F</td>
<td>0 to SLH °F</td>
</tr>
<tr>
<td>PLII</td>
<td>SLL to 1390 °C</td>
<td>0 to SLH °C</td>
</tr>
<tr>
<td></td>
<td>SLL to 2534 °F</td>
<td>0 to SLH °F</td>
</tr>
<tr>
<td>U</td>
<td>SLL to 600.0 °C</td>
<td>–199.9 to SLL °C</td>
</tr>
<tr>
<td></td>
<td>SLL to 999.9 °C</td>
<td>–199.9 to SLL °C</td>
</tr>
<tr>
<td>L</td>
<td>SLL to 900 °C</td>
<td>0 to SLH °C</td>
</tr>
<tr>
<td></td>
<td>SLL to 1652 °F</td>
<td>0 to SLH °C</td>
</tr>
<tr>
<td>RTD Pt100</td>
<td>SLL to 590.0 °C</td>
<td>–199.9 to SLL °C</td>
</tr>
<tr>
<td></td>
<td>SLL to 1000 °C</td>
<td>–199.9 to SLL °C</td>
</tr>
<tr>
<td></td>
<td>SLL to 1832 °C</td>
<td>–199.9 to SLL °C</td>
</tr>
<tr>
<td></td>
<td>SLL to 3216 °C</td>
<td>–199.9 to SLL °C</td>
</tr>
<tr>
<td></td>
<td>SLL to 752.0 °F</td>
<td>–199.9 to SLL °F</td>
</tr>
<tr>
<td></td>
<td>SLL to 2320 °C</td>
<td>–199.9 to SLL °C</td>
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<tr>
<td></td>
<td>SLL to 4208 °F</td>
<td>–199.9 to SLL °C</td>
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<tr>
<td></td>
<td>SLL to 1390 °C</td>
<td>–199.9 to SLL °C</td>
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<td></td>
<td>SLL to 2534 °F</td>
<td>–199.9 to SLL °C</td>
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<td>SLL to 900 °C</td>
<td>–199.9 to SLL °C</td>
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<td></td>
<td>SLL to 1652 °F</td>
<td>–199.9 to SLL °C</td>
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<tr>
<td></td>
<td>SLL to 590.0 °C</td>
<td>–199.9 to SLL °C</td>
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<td></td>
<td>SLL to 1000 °C</td>
<td>–199.9 to SLL °C</td>
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<td></td>
<td>SLL to 1832 °C</td>
<td>–199.9 to SLL °C</td>
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<td>SLL to 3216 °C</td>
<td>–199.9 to SLL °C</td>
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<td>SLL to 752.0 °F</td>
<td>–199.9 to SLL °F</td>
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<td>SLL to 4208 °F</td>
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<td>SLL to 900 °C</td>
<td>–199.9 to SLL °C</td>
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<td>SLL to 1652 °F</td>
<td>–199.9 to SLL °C</td>
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<td>SLL to 590.0 °C</td>
<td>–199.9 to SLL °C</td>
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<td>SLL to 1832 °C</td>
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<td>SLL to 3216 °C</td>
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<td>SLL to 752.0 °F</td>
<td>–199.9 to SLL °F</td>
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<td>SLL to 2320 °C</td>
<td>–199.9 to SLL °C</td>
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<td></td>
<td>SLL to 4208 °F</td>
<td>–199.9 to SLL °C</td>
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<td>SLL to 1390 °C</td>
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<td>SLL to 2534 °F</td>
<td>–199.9 to SLL °C</td>
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<td>SLL to 900 °C</td>
<td>–199.9 to SLL °C</td>
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<td></td>
<td>SLL to 1652 °F</td>
<td>–199.9 to SLL °C</td>
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<tr>
<td></td>
<td>SLL to 590.0 °C</td>
<td>–199.9 to SLL °C</td>
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<tr>
<td></td>
<td>SLL to 1000 °C</td>
<td>–199.9 to SLL °C</td>
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<td></td>
<td>SLL to 1832 °C</td>
<td>–199.9 to SLL °C</td>
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<tr>
<td></td>
<td>SLL to 3216 °C</td>
<td>–199.9 to SLL °C</td>
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<tr>
<td></td>
<td>SLL to 752.0 °F</td>
<td>–199.9 to SLL °F</td>
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<td></td>
<td>SLL to 2320 °C</td>
<td>–199.9 to SLL °C</td>
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<td></td>
<td>SLL to 4208 °F</td>
<td>–199.9 to SLL °C</td>
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<td></td>
<td>SLL to 1390 °C</td>
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<td>SLL to 2534 °F</td>
<td>–199.9 to SLL °C</td>
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<td></td>
<td>SLL to 900 °C</td>
<td>–199.9 to SLL °C</td>
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<tr>
<td></td>
<td>SLL to 1652 °F</td>
<td>–199.9 to SLL °C</td>
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<td></td>
<td>SLL to 590.0 °C</td>
<td>–199.9 to SLL °C</td>
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<tr>
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<td>SLL to 1000 °C</td>
<td>–199.9 to SLL °C</td>
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<tr>
<td></td>
<td>SLL to 1832 °C</td>
<td>–199.9 to SLL °C</td>
</tr>
<tr>
<td></td>
<td>SLL to 3216 °C</td>
<td>–199.9 to SLL °C</td>
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<tr>
<td></td>
<td>SLL to 752.0 °F</td>
<td>–199.9 to SLL °F</td>
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<tr>
<td></td>
<td>SLL to 2320 °C</td>
<td>–199.9 to SLL °C</td>
</tr>
<tr>
<td></td>
<td>SLL to 4208 °F</td>
<td>–199.9 to SLL °C</td>
</tr>
<tr>
<td></td>
<td>SLL to 1390 °C</td>
<td>–199.9 to SLL °C</td>
</tr>
<tr>
<td></td>
<td>SLL to 2534 °F</td>
<td>–199.9 to SLL °C</td>
</tr>
<tr>
<td></td>
<td>SLL to 900 °C</td>
<td>–199.9 to SLL °C</td>
</tr>
<tr>
<td></td>
<td>SLL to 1652 °F</td>
<td>–199.9 to SLL °C</td>
</tr>
</tbody>
</table>

Current

0 to 20 mA DC
4 to 20 mA DC

* Z-1010 specification

## Change Settings

Example: When the display range is scaled to 0.0 to 400.0 for a voltage input of 1 to 5 V DC.

![Diagram](Diagram.png)

1. Change the instrument to the initialize code selection (Cod) display.

2. Press the shift key to change the display from character to set value.

3. Press the up key to change "0" to "1" in the units digit.

**Continued on the next page.**
Continued from the previous page.

4. Set “Cod” to 0001, and press the set key to change to the setting limiter high (SLH) display.

5. Press the shift key to change the display from character to set value.

6. Press the shift key several times to high-light the thousands digit.

7. Press the up key to change “1” to “4” in the thousands digit.

8. Press the set key to change to the next parameter. Thus, the set value is registered. Check that the display is “0.0” for the setting limiter low (SLL).

7.8 Decimal Point Position (PGdP)

Use to select a decimal point position of the input range (voltage input and current input). PGdP is displayed only for voltage or current input.

Inappropriate settings may result in malfunction.

<table>
<thead>
<tr>
<th>Set value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000</td>
<td>No decimal place</td>
</tr>
<tr>
<td>0001</td>
<td>One decimal place</td>
</tr>
<tr>
<td>0002</td>
<td>Two decimal places</td>
</tr>
<tr>
<td>0003</td>
<td>Three decimal places</td>
</tr>
</tbody>
</table>

Change Settings

Example: Change the decimal point position from “One decimal place (0001)” to “No decimal place (0000)”

1. Press the set key several times at the setting limiter high (SLH) until the decimal point position (PGdP) is displayed.

2. Press the shift key to change the display from character to set value.

3. Press the down key to change “1” to “0” in the units digit.

4. Press the set key to change to the next parameter. Thus, the set value is registered.

7.9 Digital Filter Setting (dF)

This item is the time of the first-order lag to eliminate noise against the measured input.

Setting range: 0 to 100 seconds (0: digital filter OFF)

Factory set value: 1

Change Settings

Example: Change the digital filter from “One seconds (0001)” to “Three seconds (0003)”

1. Press the set key several times at the setting limiter high (SLH) until the digital filter setting (dF) is displayed.

2. Press the shift key to change the display from character to set value.

3. Press the up key to change “1” to “3” in the units digit.

4. Press the set key to change to the next parameter. Thus, the set value is registered.
8. ERROR DISPLAYS

- **Error display**
  
  **Err**
  
  RAM failure (Incorrect set data write, etc.)
  
  Turn off the power at once. If an error occurs after the power is turned on again, please contact RKC sales office or the agent.

- **Over-scale and Underscale**

  **Measured value (PV)**
  
  [Flashing]
  
  PV is outside of input range.
  
  **Over-scale:** PV is above the high input display range limit.

  **Underscale:** PV is below the low input display range limit.

  ![Warning]

  **WARNING**

  To prevent electric shock, always turn off the power before replacing the sensor.

  Check input type, input range, and connecting state of sensor. Confirm that the sensor or wire is not broken.

9. INPUT RANGE TABLE

<table>
<thead>
<tr>
<th>Input type</th>
<th>Model code</th>
<th>Input type</th>
<th>Model code</th>
<th>Input type</th>
<th>Model code</th>
<th>Input type</th>
<th>Model code</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 200°C</td>
<td>K 01</td>
<td>0 to 800°F</td>
<td>A 08</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 to 400°C</td>
<td>K 02</td>
<td>0 to 1600°F</td>
<td>A 17</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 to 550°C</td>
<td>K 03</td>
<td>0 to 2192°F</td>
<td>A 27</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 to 800°C</td>
<td>K 04</td>
<td>0 to 400°F</td>
<td>J 03</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 to 1000°C</td>
<td>K 05</td>
<td>0 to 1200°F</td>
<td>J 06</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 to 1372°C</td>
<td>K 07</td>
<td>0 to 1521°F</td>
<td>J 08</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 to 1800°C</td>
<td>K 12</td>
<td>0 to 1350°F</td>
<td>J 04</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 to 300°C</td>
<td>K 14</td>
<td>0 to 320°F</td>
<td>R 03</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 to 450°C</td>
<td>K 17</td>
<td>0 to 621°F</td>
<td>S 12</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 to 500°C</td>
<td>K 13</td>
<td>0 to 1600°F</td>
<td>J 02</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 to 800°F</td>
<td>K 06</td>
<td>0 to 400°F</td>
<td>J 01</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 to 100°F</td>
<td>K 07</td>
<td>0 to 120°F</td>
<td>T 01</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- *1 0 to 399°C/0 to 799°F: Accuracy is not guaranteed.*
- **2 -199.9 to +100.0°C/-199.9 to +158.0°F: Accuracy is not guaranteed.**

---

10. REMOVING THE INTERNAL ASSEMBLY

Usually, this instrument is not necessary to remove the internal assembly from the case. When removing the internal assembly without disconnecting the external wiring, take the following steps.

**WARNING**

- To prevent electric shock or instrument failure, only qualified personnel should be allowed to pull out the internal assembly.
- To prevent electric shock or instrument failure, always turn off the power before pulling out the internal assembly.
- To prevent injury or instrument failure, do not touch the internal printed wiring board.

Apply pressure very carefully when removing internal assembly to avoid damage to the frame.

To conform to IEC61010-1 requirements for protection from electric shock, the internal assembly of this instrument can only be removed with an appropriate tool.

---

![Lock]

Unlock using such a screwdriver. Gently press outside on handle.

Recommended tool: Slotted screwdriver (Tip width: 6 mm or less)

The first edition: AUG. 1999

The eighth edition: MAY 2013 [IMQ00]