IMR03F01-E1

Thank you for purchasing this RKC product. In order to achieve maximum performance and ensure proper operation of the instrument, carefully read all the instructions in this manual. Please place the manual in a convenient location for easy reference. This manual describes installation, wiring, parts description, and specification of the SA220.

For detailed handling procedures and key operations, refer to separat SA220 Instruction Manual. The manual can be downloaded from the official RKC website: https://www.rkcinst.co.jp/english/download-center/

## **WARNING**

- To prevent injury to persons, damage to the instrument and the equipment, a suitable external protection device shall be required.
   All wiring must be completed before power is turned on to preven
- electric shock, fire or damage to the instrument and the equipment This instrument must be used in accordance with the specifications to
- prevent fire or damage to the instrument and the equipment.
  This instrument is not intended for use in locations subject to
- In his 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 may 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 • This product is intend and nuclear energy plant.)
- 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.

Transmission output + PID action
[OUT1: Transmission output OUT2: Control output]
 Transmission output + ALM1, ALM2
[OUT1: Transmission output OUT2: OR output of ALM1 and ALM2 2]

14: Transmission output + ALM1, ALM2
[OUT1: Transmission output OUT2: OR output of ALM1 and ALM2 1]

15: Transmission output + ALM1, ALM2 [OUT1: Transmission output of OUT2: AND output of ALM1 and ALM2 <sup>2</sup>] 16: Transmission output + ALM1, ALM2 [OUT1: Transmission output OUT2: AND output of ALM1 and ALM2 1]

19: Heat/Cool PID action
[OUT1: Cool-side control output]
OUT2: Heat-side control output]

OUT2: ALM1 1]

Range

-199.9 to +300.0 °C

0 to 400 °C

0 to 800 °C

0 to 1200 °C

13 0 to 300 °C

A2 0 to 2502 °F

A4 20 to 70 °F

38 0 to 800 °F

0 to 500 °C

29 0.0 to 600.0 °C

0.0 to 800.0 °C

Code

17: Transmission output + ALM1

18: Transmission output + ALM1 [OUT1: Transmission output

<sup>1</sup> De-energized

Accessories

Input range table

0 to 200 °C

0 to 1000 °C

0 to 1372 °C

0 to 100 °C

0.0 to 400.0 °C

0.0 to 200.0 °C

0 to 1600 °F

0.0 to 800.0 °F

199.9 to +999

-199.9 to +800.0 °C

TC/RTD input

Type

[OUT1: Transmission output OUT2: ALM1 2]

<sup>2</sup> Energized

Mounting brackets
 Mounting screws
 Mounting screws
 SA220 Installation Manual (English: IMR03F01-E1)
 Manual (Japanese: IMR03F01-JI

Range

- 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 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 to operating personnel.

  All precautions described in this manual should be taken to avoid damage to the instrument or equipment.
- or equipment.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
- 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 a fuse, circuit breaker, etc.
- A malfunction in this product may occasionally make control operations impossible or prevent alarm outputs, resulting in a possible hazard. Take appropriate measures in the end use to prevent hazards in the event of malfunction.
- Prevent metal fragments or lead wire scraps from falling inside instrument case to avoid electric shock, fire or malfunction.
- For proper operation of this instrument, provide adequate ventilation for heat dissipation.
   Do not connect wires to unused terminals as this will interfere with proper operation of the

TC/RTD input

to 200 °C

to 600 °C

0 to 1000 °C

0.0 to 800.0 °C

0.0 to 200.0 °C

0 to 1600 °F

0.0 to 800.0 °F

0 to 1600 °C

0 to 3216 °F

0 to 3200 °F

400 to 1800 °C

800 to 3200 °F

0 to 800 °C

to 1600 °F

0.0 to 800.0 °C

-199.9 to +400.0 °C

100.0 to +200.0 °C

199.9 to +752.0 °F 2

100.0 to +400.0 °F

0 to 752.0 °F

0 to 2000 °C

to 4000 °F

to 1300 °C

0 to 1200 °C

to 2534 °F

0.0 to 400.0 °C

-199.9 to +600.0 °C

-100.0 to +200.0 °

to 2372 °F

to 1350 °C 1

199.9 to +300.0 °C

199.9 to +600.0 °C

Туре

В

/5Re

26Re

- 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 may occur. Use a soft, dry cloth to remove stains from the instrument.
- To avoid damage to the instrument display, do not rub with an abrasive material or push the front panel with a hard object.

#### NOTICE

- 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 explanation
- 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.

22

0 to 400 °C

to 800 °C

0 to 1200 °C

0 to 450 °C

to 800 °F

0 to 2192 °F

0 to 1769 °C

to 3200 °F

0 to 1769 °C

0 to 1820 °C

0 to 3308 °F

0 to 1000 °C

0 to 1832 °F

0 to 2300 °F

0.0 to 999.9

0.0 to 350.0 °C

0.0 to 450.0 °F

0 to 2320 °C

to 1390 °C

A2 0.0 to 999.9 °F

to 2400 °F

-199.9 to +100.0 °C

-199.9 to +999.9 °F 2

-199.9 to +100.0 °C

A1 0 to 3216 °F

.0 to 400.0 °C

0.0 to 600.0 °C

199.9 to +999.9 °F

TC/RTD input

Type

Pt100

JPt100

0 to 5 V DC

0 to 10 V D

to 5 V DC

R 02

N: No alarm A: Deviation high alarm

V: Voltage pulse output

N: No output

1: Safety precaution

1. MODEL CODE

B: Deviation low alarm C: Deviation high/low alarm

1 to 400 °C

to 800 °F

-100.0 to +50.0 °C

0.0 to 100.0 °C

0.0 to 300.0 °C

0.0 to 200.0 °F

0.0 to 500.0 °F

100.0 to +200.0 °C

-199.9 to +999.9 °F

199.9 to +200.0 °F

-199.9 to +300.0 °F

-100.0 to +50.0 °C

0.0 to 100.0 °C

Voltage/Current inputs

Type

-100.0 to +200.0 °C

- D: Band alarm

(5) Power supply voltage 5: 24 V AC/DC (without built-in varistor)

(6) Alarm 1 [ALM1] and (7) Alarm 2 [ALM2]

Band alarm
 E: Deviation high alarm with hold action
 F: Deviation low alarm with hold action
 G: Deviation high/low alarm with hold action

Rang

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

(3) Output 1 [OUT1] (Control output, Alarm output or Transmission output)

M: Relay contact output

(2) Input type/Range code: Refer to "■ Input range table."

(4) Output 2 [OUT2] (Control output or Alarm output)

0 to 800 °C

0 to 1600 °F

0.0 to 50.0 °C

0.0 to 200.0 °C

0.0 to 500.0 °C

0.0 to 100.0 °F

0.0 to 400.0 °F

0.0 to 50.0 °C

Range

0.0 to 100.0

0.0 to 100.0

-100.0 to +100.0 °C

-199.9 to +400.0 °F

-199.9 to +100.0 °F

-100.0 to +100.0 °C

Code

\* LBA can be selected for only ALM1

#### R: Control loop break alarm (LBA)

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.

Safety precatuor. This symbol is used where the instruction manual needs to be consulted for the safety of both the operator and the equipment. Carefully read the cautions in this manual before using the instrument.

No portion of this document may be reprinted, modified, copied, trans

istored, processed or retrieved through any mechanical, electronic, optical means without prior written approval from RKC. Various symbols are used on the equipment, and they have the following mea 

: Both direct and alternating current

V: Voltage pulse output

6: 24 V AC/DC (with built-in varistor)

7: Current output (0 to 20 mA DC) 8: Current output (4 to 20 mA DC)

K: Process high alarm with hold action
L: Process low alarm with hold action

electronic, optical o

- V: SV high alarm W: SV low alarm

02

04

06

08

A2 A4

A6

A8

02 04

#### 2. MOUNTING

(9) Waterproof/Dustproof

(11) Output assignment code

(10) Case color

N: No Waterproof/Dustproo

No symbol: Standard output

05: PID action + ALM1, ALM2 [OUT1: Control output

08: PID action + ALM1, ALM2

09: ALM1 + ALM2 [OUT1: ALM1 output <sup>2</sup>

[OUT1: ALM1 output 2

<sup>1</sup> De-energized <sup>2</sup> Energized

10: ALM1 + ALM2

11: ALM1 + ALM2

PID action

OUT1: Control output

## / WARNING

i: No function 6: RS-485 (Modbus)
: RS-485 (RKC communication) D: Contact input (RUN/STOP, STEP)

1: Waterproof/Dustproof

OUT2: OR output of ALM1 and ALM2 1]

lamp lighting)]

lamp lighting)]

OUT2: ALM2 output 2]

OUT2: ALM2 output 1

OUT2: ALM1 output 2 (ALM2 can be

checked via communication or by

OUT2: "No alarm," "ALM1 (Energized)" or "OR output of ALM1 and ALM2 (Energized)

ALM1 and ALM2 (Energized)

• Heat/Cool PID action
OUT1: Heat-side control output
OUT2: Cool-side control output
03: PID action + ALM1
[OUT1: Control output OUT2: ALM1 output 1]
04: PID action + ALM1, ALM2
[OUT1: Control output OUT2: AND output of ALM1 and ALM2 2]

06: PID action + ALM1, ALM2 [OUT1: Control output OUT2: AND output of ALM1 and ALM2 1]

07: PID action + ALM1, ALM2 or ALM1 only
[OUT1: Control output OUT2: No output (The alarm state can be

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. (IEC 61010-1) [POLLUTION DEGREE 2]

[OUT1: ALM1 output <sup>1</sup> OUT2: ALM2 output <sup>1</sup>]

- [POLLUTION DEGREE 2]
  (2) Use this instrument within the following environment conditions:

   Allowable ambient temperature:

   Allowable ambient humidity:

  (Absolute humidity: 5 to 95 %RH
  (Absolute humidity: MAX. W. C 29.3 g/m³ 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 the equipment that generates large amount of heat (heaters, transformers, semi-conductor functional devices, large-wattage resistors).
   If the ambient temperature rises above 55 °C, cool this instrument with a forced air fan, cooler, etc. Cooled air should not blow directly on this instrument.
- instrument
- Insulament.

  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:
- Power lines: Rotating machinery: Separate at least 200 mm. Separate as far as possible
- (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

If there is electrical noise in the vicinity of the instrument that could affect operation, use a noise filter.
 Shorten the distance between the twisted power supply wire pitches to achieve the most effective noise reduction.

Always install the noise filter on a grounded panel. Minimize the wiring

distance between the noise filter output and the instrument power

Do not connect fuses or switches to the noise filter output wiring as this will reduce the effectiveness of the noise filter.

Allow approximately 4 seconds for contact output when the instrument is turned on. Use a delay relay when the output line is used for an external

wer supply wiring must be twisted and have a low voltage drop.

adequate breaking capacity close to the instrument.

· This instrument is not provided with an overcurrent protection device. For

safety install an overcurrent protection device (such as a fuse) with

Rated current 0.4 A

For an instrument with 24 V power supply input, supply power from a "SELV" circuit defined as IEC 60950-1.

· A suitable power supply should be considered in end-use equipment. The

The input and output terminals for the voltage pulse output are not isolated. Always use an isolating type SSR. If the grounded type sensor is used, do not ground output wiring. Do not connect any output wires to the terminals with any other output wires.

power supply must be in compliance with a limited-energy circuits

(Approved fuse according IEC 60127-2 and/or UL 248-14)

supply terminals to achieve the most effective noise reduction.

Preparation time for contact output

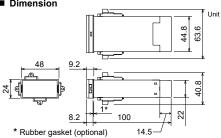
- Fuse type: Time-lag fuse

(maximum available current of 8 A).

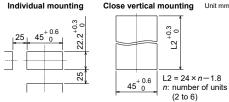
3.2 Connecting Precautions

interlock circuit

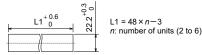
#### 2.2 Dimensions ■ ■ Dimension



### ■ Panel cutout dimensions



## Close horizontal mounting



3.3 Connector Configurations

NC

NC

CN3 connector

Input

RTD input

Description

Thermocouple (TC

For mounting of the SA220, panel thickness must be between 1 to 10 mm When mounting multiple SA220s close together, the panel strength should be checked to ensure proper support. Installation Conditions:

The display cannot be seen from the outside of the visual field range The visual field range of SA220 is 40 degrees to the upper side, and 30

Pin No

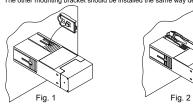
Unused

## 2.3 Mounting Procedures =

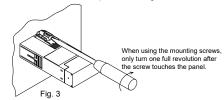
Prepare the panel cutout as specified in 1.2 Dimensions.

Accuracy is not guaranteed between 0 to 399 °C (0 to 751 °F) for type R. S. Accuracy is not guaranteed less than -100.0 °C (-148.0 °F) for type T and U

- Insert the instrument through the panel cutout.
  Insert the mounting bracket into the mounting groove of the instrument. (Fig.1) 4. Push the mounting bracket forward with a blade screwdriver until the bracket is firmly
- secured to the panel. (Fig.2) The other mounting bracket should be installed the same way described in 3. and 4



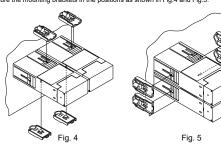
- When the instrument is individually mounted, always brackets either top and bottom or right and left.
- In addition, the mounting assembly also include two screws which can be used with the brackets to secure the instrument to the panel. Refer to Fig. 3.



The Waterproof/Dustproof optional on the front of the instrument conforms to IP66 (Checked and confirmed its compliance through the internal test at RKC) 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.

# ■ Close Mounting

in the positions as shown in Fig.4 and Fig.5.



- If the SA220s have waterproof/dustproof options, protection will be compromised and not meet IP66 by close mounting.
- $\square$  Two SA220s cannot be inserted into a panel cutout of 48  $\times$  48 mm

## 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.
- To prevent electric shock or instrument failure, turn off the power before connecting or disconnecting the instrument and peripheral equipment.

### 3.1 Wiring Cautions

- uple input, use the appropriate compensation wire
- For RTD input, use low resistance lead wire with no difference in resistance bet 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
- Signal connected to Voltage input and Current input shall be low voltage defined as "SELV" circuit per IEC 60950-1.

- Connect connectors correctly in the right position. If it is forcibly pushed in with pins in the wrong positions, the pins may be bent resulting in instrument failure
- When connecting or disconnecting the connectors, do not force it too far to right and left or up and down, but move it on the straight. Otherwise, the connector pins may be bent, causing instrument failure.

  When disconnecting a connector, hold it by the connector itself. Disconnecting connectors by yanking on their cables can cause breakdowse.
  - To prevent malfunction, never touch the contact section of a connector
  - with bare hands or with hands soiled with oil or the like

RTD:

0 to 5 V DC 1 to 5 V DC 0 to 10 V DC Voltage 0 to 20 mA DC, 4 to 20 mA DC Current: Sampling cycle 0.25 seconds or 0.5 seconds

Control method

PID control (ON/OFF, P, PI, or PD actions is available)

## Output 1 [OUT1] Relay contact out

Relay contact output: 30 V AC/DC, 2 A (Resistive load) 1a contact Electrical life: 100,000 times or more (Rated load)

Voltage pulse output: 0/12 V DC (Allowable load resistance: 600 Ω or more) Current output: 0 to 20 mA DC or 4 to 20 mA DC (Allowable load resistance: 400 Ω or less)

### Output 2 [OUT2]

Relay contact output: 30 V AC/DC, 2 A (Resistive load) 1a contact Electrical life: 100,000 times or more (Rated load) Voltage pulse output: 0/12 V DC

Contact input (optional)

Dry contact input: At open 500 k $\Omega$  or more At close 10 Ω or less DI1 (STEP):

### Performance

e ambient temperature 23 °C ±2 °C):  $\pm (0.3 \% \text{ of display value} + 1 \text{ digit}) \text{ or } \pm 2 °C \text{ [4 °F]}$  R, S and B input. Accuracy is not guaranteed between 0 to 399 °C [0 to 751 °F]. T and U input: Accuracy is not guaranteed less than -100.0 °C [-148.0 °F].  $\pm (0.3 \% \text{ of display value} + 1 \text{ digit)} \text{ or } \pm 0.8 °\text{C} \text{ [1.6 °F]} \pm (0.3 \% \text{ of span} + 1 \text{ digit)}$ 

RTD Itage/Current:

# Memory backup

Number of write times: Approx. 100,000 times
Data storage period: Approx. 10 years Data storage period:

### Power supply voltage:

21.6 to 26.4 V AC [Including power supply voltage variation], (Rating: 24 V AC), 50/60 Hz 21.6 to 26.4 V DC [Including power supply voltage variation], (Rating: 24 V DC) 4 VA max. (at 24 V AC) Power consumption: 100 mA max (at 24 V DC)

## Weight

Approx. 110 g

(ANSI X3.28 subcategories 2.5 and A4)

2400 bps, 4800 bps, 9600 bps, 19200 bps 38400 bps, 57600 bps 31 instruments

Measured value (PV), Set value (SV), Deviation value, Manipulated output value (MV)

under 2 A or less. under 2 A or less.

The CN1 connector is half covered with a sticker to prevent misi Remove the sticker when connecting the plug for power supply.

A LVVBT Voltage/Current Unused -L J+ inputs Pin No. 1 Pin No. 1 www. Q000 Q000 **•** 1, 2, 3 CN1 connector

<u>\_</u>В

Pin No Description 2 4 Power supply NC (24 V AC/DC) AC/DC 24 V

Pin No. 3 and 4 are inte nally shorted. When connecting two or more controllers in parallel to supply power, connect the number needed to achieve operation with an allowable current of wire CN4 connector Description

(RS-485)

output

output

output

COM COM Contact input P Ŷ DI2 Ŷ DI1 DI2: RUN/STOP Pin No. 3 and 4 are internally shorted.

RS-485

T/R (B) T/R (A)

Pin No

SG

SG

The plug and cable must be provided by the customer. Recommended plug of the CN1 to CN4 connectors (e-CON Recommended plug):
Mini-Clamp Plug, Wiremount (Positions: 4) 3M product of [Cable size: AWG No. 20 to 22, AWG No. 24 to 26]

CN2 connector

Pin No 2 OUT1

4 Relay contact OUT2 NO NO Voltage pulse OUT1 OUT2 OUT1

#### **■ SPECIFICATIONS** Input

K, J, R, S, B, E, T, N, PLII, W5Re/W26Re, U, L Input impedance: Approx. 1  $M\Omega$ ole (TC) input: Pt100, JPt100

Refer to Input range table

Outputs

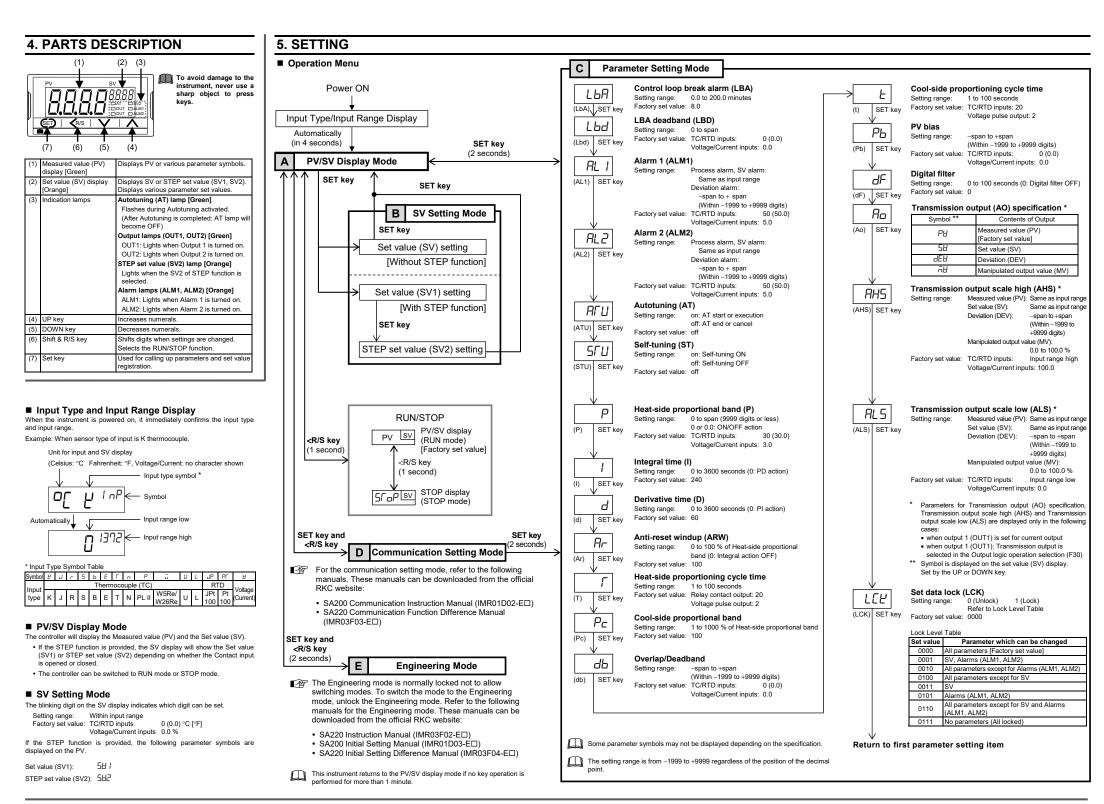
ole load resistance: 600 Ω or more

Input/output terminals are not isolated

At open: SV1 Function

DI2 (RUN/STOP): At open: STOP

 Transmission output (optional) Output type:



#### ■ Changing parameter settings ocedures to change parameter settings are sho

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

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

A new value will not be stored without pressing SET key after the new value is displayed on the display.

After a new value has been displayed by using the UP and DOWN keys, the SET key must be pressed within one minute, or the new value is not stored and the display will return to the PV/SV display mode.

When the set data is locked, the digits on the SV display are brightly lit and the set value cannot be changed. The locked parameters can be released at "Set data lock (LCK)" in the Parameter setting mode.

### • Change the Set value (SV)

Example: Change the Set value (SV) from 0 °C to 200 °C

Select the SV setting mode
 Press the SET key at PV/SV display mode until SV display mode is
 displayed.



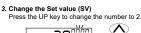






2. Shift the blinking digit
Press the <P\S key to blink the hundreds digit. The blinking digit indicates which digit can be set.













4. Store the Set value (SV) Press the SET key to store PV/SV display mode



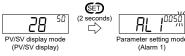




# • Change the Alarm set value

Example: Change the Alarm 1 (ALM1) from 50 °C to 200 °C

 Select the Parameter setting mode
 Press and hold the SET key for 2 seconds in the PV/SV display mode state to
 transfer to Parameter setting mode



The displayed parameter varies depending on the product specifications

2 Shift the blinking digit

ess the <R/S key to blink the tens digit. The blinking digit indicates which digit can

 $\Rightarrow$ 

3. Change the Alarm set value Press the UP key to change the number to 0. The digit is shifted to the higher digit and the number at the hundreds digit becomes "1."

4. Store the Alarm set value
Press the SET key to store







### Change parameters other than the Set value (SV) and Alarm set value

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

#### ■ RUN/STOP

RUN/STOP can be selected by contact input (optional) other than the key operation

Conditions when changed to STOP mode:

• Control, Alarm: Control OFF, Alarm OFF · Output: OUT1 output OFF (OPEN) OUT2 output OFF (OPEN)

 Autotuning (AT): The AT is canceled (The PID constants are not updated)

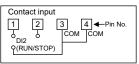
### • RUN/STOP transfer by key operation

second in the PV/SV display mode will allow switching Each press of the <R/S key for one between RUN and STOP.



### RUN/STOP transfer by contact input

RUN/STOP can be switched according to the open or closed state of the connector input DI2 (CN4 connector).



Contact open: STOP Contact closed: RUN

# ■ Autotuning (AT) start/stop

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

Caution for using the Autotuning (AT):
When a temperature change (UP and/or Down) is 1 °C or less per
minute during AT, AT may not be finished normally. In that case,
adjust the PID values manually. Manual setting of PID values may
also be necessary if the set value is around the ambient
temperature or is close to the maximum temperature achieved by
the load.

This instrument has one each of Integral time (I) and Derivative time (D). In the case of heat/cool PID control, these parameters are used on both heating and cooling sides.

### Requirements for AT start

Start the AT when all following conditions are satisfied:

Prior to starting the AT function, end all the parameter settings other than

Confirm the LCK function has not been engaged. (LCK must be 0000)

When the AT is finished, the controller will automatically returns to PID control.

#### • Requirements for AT cancellation The AT is canceled if any of the following conditions exist.

When the Set value (SV1, SV2) is changed.

When the power is turned off.

When the PV hias value is changed

When the RUN/STOP mode is changed to the STOP mode

When the PV becomes abnormal due to burnout.

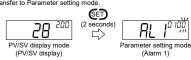
When the AT does not end in 9 hours after autotuning started. When power failure longer than 20 ms occurs.

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

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

### Autotuning (AT) start

Select the Parameter setting mode
 Press and hold the SET key for 2 seconds in the PV/SV display mode state to transfer to Parameter setting mode.



The displayed parameter varies depending on the product specifications.

Select the Autotuning (AT) display
 Press the SET key several times until Autotuning (AT) display will be displayed.















### 6. ERROR DISPLAYS

■ Self-diagnostic error

Error No.	Description	Operation at error	Solution
1	Adjustment data error	Display: Error display (Err)	Turn off the power once. If an error occurs after the
2	EEPROM error	Control output: All output is OFF Alarm output: All output is OFF	power is turned on again, please contact RKC sales office or the agent.
4	A/D conversion error		
8	RAM check error		
128	Watchdog timer error		

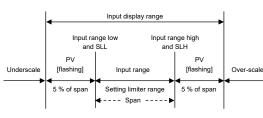
Example: When the adjustment data error ( i) and A/D conversion error (4) occurs



The error codes are shown in the SV display When two or more errors occur simultaneous the total summation of these error codes is

### ■ Over-scale and Underscale

Display	Description	Solution	
Measured value (PV) is flashing	PV is outside of input range.	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.	
0000 flashing	Over-scale: PV is above the high input display range limit.		
uuuu flashing	Underscale: PV is below the low input display range limit.		



SLH: Setting limiter [high limit] SLL: Setting limiter [low limit]

For the Setting limiter, refer to SA220 Instruction Manual (IMR03F02-ED)

7. 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 sonnel should be allowed to pull out the internal asse

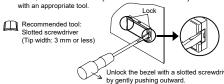
 To prevent electrical shock or instrument failure, always turn off the power before pulling out the internal assembly

To prevent injury or instrument failure, do not touch the interna

printed wiring board.

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

To conform to IFC 61010-1 requirements for shock, the internal assembly of this instrument can only be removed



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