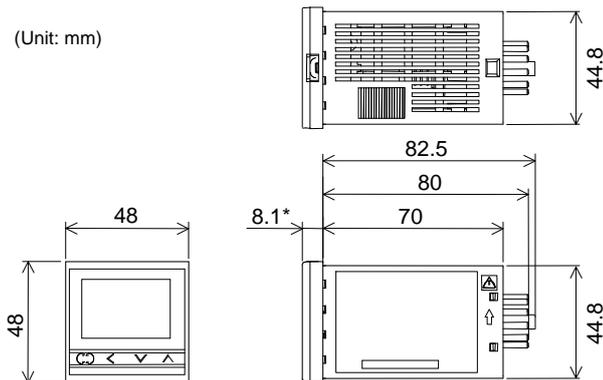


- (4) Mount this instrument in the panel considering the following conditions:
- Provide adequate ventilation space so that heat does not build up.
 - Do not mount this instrument directly above equipment that generates large amount of heat (heaters, transformers, semi-conductor functional devices, large-wattage 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.
- (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

External dimension

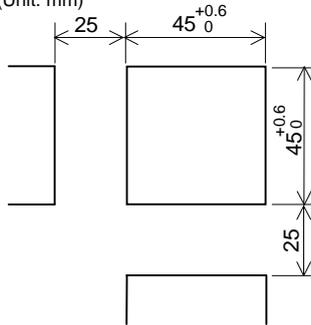
(Unit: mm)



* Waterproof/Dustproof (IP66) type: 9.1 mm

Panel cutout

(Unit: mm)



Installation Conditions:
The display cannot be seen from the outside of the visual field range. The visual field range of SA100L is 40° to the upper side, and 30° to the lower side from the center of the display vertically.

For mounting of the SA100L, panel thickness must be between 1 to 10 mm.

2.3 Mounting Procedures

DIN rail mounting

1. Mounting the socket to the DIN rail. (Fig. 1)
2. Wiring to the socket. Then, mounting the instrument to the socket.
3. Secure the instrument by locking it with the hooks at the top and bottom of the socket. (Fig. 2)

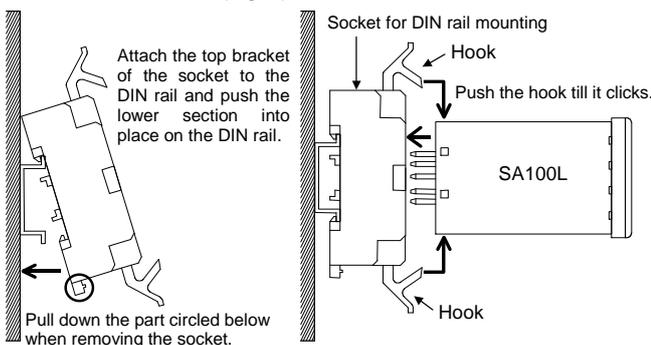


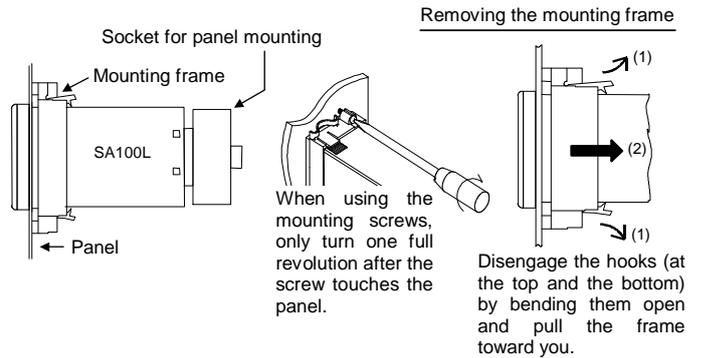
Fig. 1

Fig. 2

The socket must be provided by the customer.
Recommended socket for DIN rail mounting:
ATC180041 (Panasonic product)

Panel mounting

1. Prepare the panel cutout as specified in 2.2 Dimensions.
2. Insert the instrument through the panel cutout.
3. Put the mounting frame onto the instrument from the rear.
4. Push the mounting frame forward until the frame is firmly secured to the panel.
5. Mount the socket to the instrument.



The mounting frame and the socket must be provided by the customer.

Mounting frame type:
KCA100-526 (RKC product, Sold separately)
Recommended socket for panel mounting:
AT78051 (Panasonic product)

The waterproof/dustproof option on the front of the instrument conforms to **IP66** when mounted on the panel. For effective waterproof/dustproof, the gasket must be securely placed between the instrument and the panel without any gap. If the gasket is damaged, please contact RKC sales office or the agent.

3. WIRING



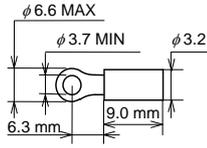
WARNING

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

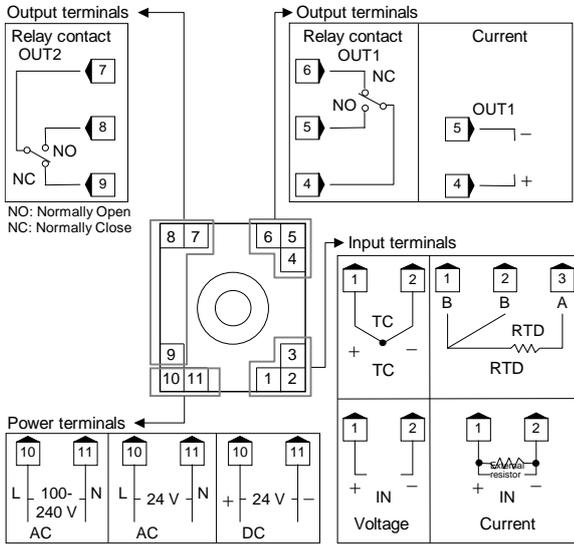
- For thermocouple input, use the appropriate compensation wire.
 - For RTD input, use low resistance lead wire with no difference in resistance between the three lead wires.
 - To avoid noise induction, keep input signal wire away from instrument power line, load lines and power lines of other electric equipment.
 - Signal connected to Voltage input and Current input shall be low voltage defined as "SELV" circuit per IEC 60950-1.
 - 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 supply terminals to achieve the most effective noise reduction.
 - Do not connect fuses or switches to the noise filter output wiring as this will reduce the effectiveness of the noise filter.
-
- The instrument has a basic Insulation between the power supply and inputs/outputs. Additional Supplementary insulation is required between the mains supply and the mains connections on the SA100L (mains input and relay outputs) by adding a separating safety transformer, providing at least a supplementary insulation for 240 V AC in accordance with IEC/UL/CSA 61010-1.
 - 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 interlock circuit.
 - Power supply wiring must be twisted and have a low voltage drop.

- This instrument is not provided with an overcurrent protection device. For safety install an overcurrent protection device (such as a fuse) with adequate breaking capacity close to the instrument.
 - Fuse type: Time-lag fuse
(Approved fuse according IEC 60127-2 and/or UL 248-14)
 - Fuse rating: Rated current 0.4 A
- For an instrument with 24 V power supply input, supply power from "SELV" circuit defined as IEC 60950-1.
- For the current input specification, a resistor of $250 \Omega \pm 0.02 \%$ (Temperature characteristics: $\pm 10 \text{ ppm}/^\circ\text{C}$, Rated power: 0.25 W or more) must be connected between the input terminals. This resistor must be provided by the customer.
- 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.
- Use the solderless terminal appropriate to the screw size.
 - Screw size: M3.5 \times 7 (with 7.4 \times 7.4 square washer)
 - Recommended tightening torque: 0.8 N·m [8 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.

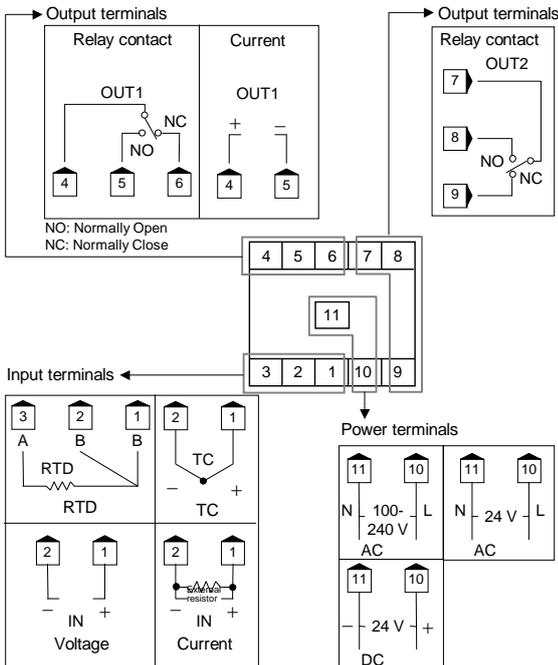


3.2 Terminal Configuration

■ Socket for DIN rail mounting (ATC180041)



■ Socket for panel mounting (AT78051)

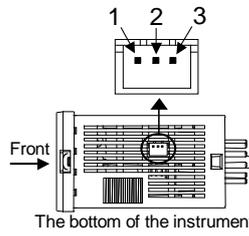


■ Option

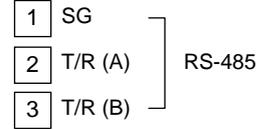
Communication function and contact input are optional. Connect the connector to the bottom of instrument. The connector and the connector cable for connecting the input block are necessary to be prepared by the customer.

Housing: XHP-3 (J.S.T. Mfg. Co., Ltd. product)
Recommended cable size: AWG30 to 22

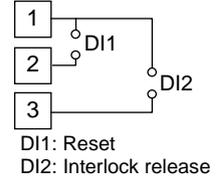
<Connector position>



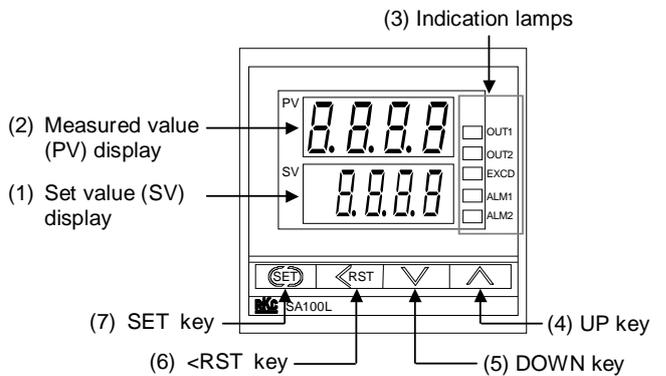
Communication



Contact input



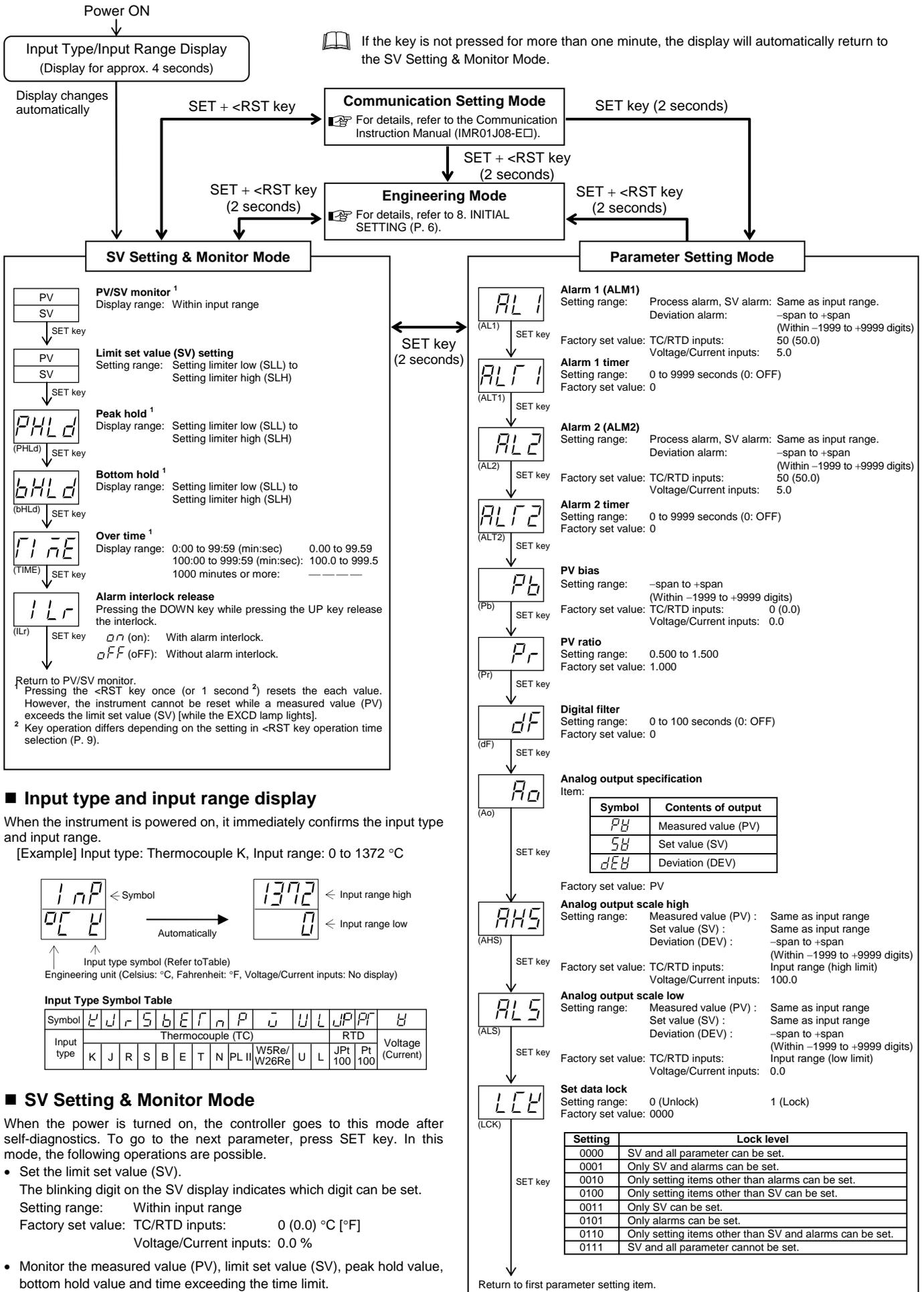
4. PARTS DESCRIPTION



- Set value (SV) display [Red]**
Displays limit set value (SV) or various parameter set values.
- Measured value (PV) display [Green]**
Displays PV or various parameter symbols.
- Indication lamps**
Output lamps (OUT1, OUT2) [Green]
 OUT1: Lights when output 1 is turned on.
 OUT2: Lights when output 2 is turned on.
EXCD lamp [Red]
 Lights while a measured value (PV) exceeds the limit set value (SV).
Alarm lamps (ALM1, ALM2) [Red]
 ALM1: Lights when alarm 1 is turned on.
 ALM2: Lights when alarm 2 is turned on.
- UP key**
Increases numerals.
- DOWN key**
Decreases numerals.
- Shift & Reset key (<: Shift key, RST: Reset key)**
Shifts digits when settings are changed.
The limit output is released (reset).
- SET key**
Used for calling up parameters and set value registration.

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

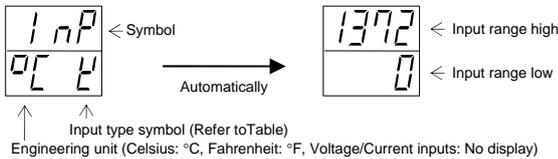
5. SETTING



Input type and input range display

When the instrument is powered on, it immediately confirms the input type and input range.

[Example] Input type: Thermocouple K, Input range: 0 to 1372 °C



Input Type Symbol Table

| Symbol | K | J | R | S | B | E | T | N | PLI | W5Re/W26Re | U | L | JPt 100 | Pt 100 | Voltage (Current) |
|------------|-------------------|---|---|---|---|---|---|---|-----|------------|---|-------------------|---------|--------|-------------------|
| Input type | Thermocouple (TC) | | | | | | | | | RTD | | Voltage (Current) | | | |

SV Setting & Monitor Mode

When the power is turned on, the controller goes to this mode after self-diagnostics. To go to the next parameter, press SET key. In this mode, the following operations are possible.

- Set the limit set value (SV).
The blinking digit on the SV display indicates which digit can be set.
Setting range: Within input range
Factory set value: TC/RTD inputs: 0 (0.0) °C [°F]
Voltage/Current inputs: 0.0 %
- Monitor the measured value (PV), limit set value (SV), peak hold value, bottom hold value and time exceeding the time limit.

■ Changing Parameter Settings

Procedures to change parameter settings are shown below.

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 SV setting & Monitor mode.

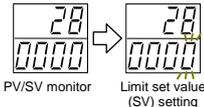


When the set data is locked, the digits on the SV display are brightly lit and the set value cannot be changed.

● Change the limit set value (SV)

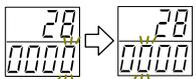
Change the limit set value (SV) from 0 °C to 200 °C

1. Select the limit set value (SV) setting



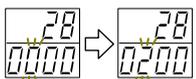
Press the SET key at SV setting & Monitor mode until Limit set value (SV) setting screen is displayed.

2. Shift the blinking digit



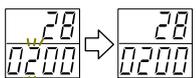
Press the <RST key to blink the hundreds digit. The blinking digit indicates which digit can be set.

3. Change the limit set value



Press the UP key to change the number to 2.

4. Store the limit set value



Press the SET key to store the new set value. The display returns to the PV/SV monitor screen.

● Change parameters other than the limit set value (SV)

The changing procedures are the same as those of example 2. to 4. in the above ● **Change the limit 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 SV setting & Monitor mode.

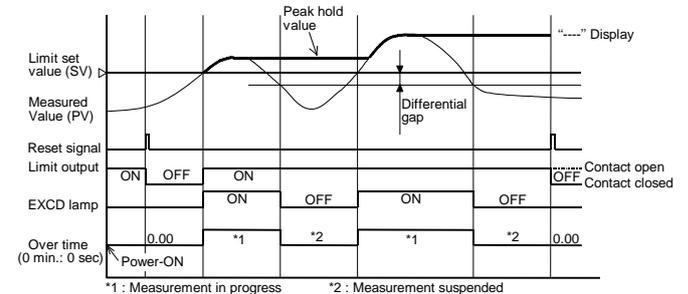
6. OPERATION

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 (specify when ordering), RTD input (when input break)
 - Downscale: Thermocouple input (specify when ordering), RTD input (when short-circuited), Voltage input *, Current input *
 - *SLH < SLL: Upscale
- Outputs:
 - Limit output: OFF
 - Alarm action: Both of the Alarm 1 and Alarm 2 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.), set "0000" to the process abnormality action selection (AEo1, AEo2) of **8.7 Function Block 41 (F41), 42 (F42)**.
- 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 not only the power is turned on, but also the SV is changed.

6.1 Operation Procedures

1. Prior to starting operation, check that the mounting and wiring have been finished, and that the limit set value (SV) and various parameters have been set.
2. This instrument does not have a power supply switch.
3. If the power is turned ON, the limit signal continues to be output until the <RST key is pressed regardless of a measured value. First, press the <RST key briefly for one (or more seconds*), then start operation.
 - * Key operation differs depending on the setting in <RST key operation time selection. (P. 9)



The "peak hold value" and "over time" are reset even when the power is turned OFF.

7. FUNCTIONS

7.1 PV Bias

The value set in the PV bias is added to the input value (actual measured value) to correct the input value. The PV bias is used to correct the individual variations in the sensors or when there is difference between the measured values (PV) of other instruments.

7.2 Digital Filter

This is a software filter which reduces input value variations caused by noise. If the time constant of this filter is set appropriately to match the characteristics of the controlled object and the noise level, the effects of input noise can be suppressed. However, if the time constant is too small, the filter may not be effective, while if the time constant is too large, then the input response may actually deteriorate.

7.3 Set Data Lock (LCK)

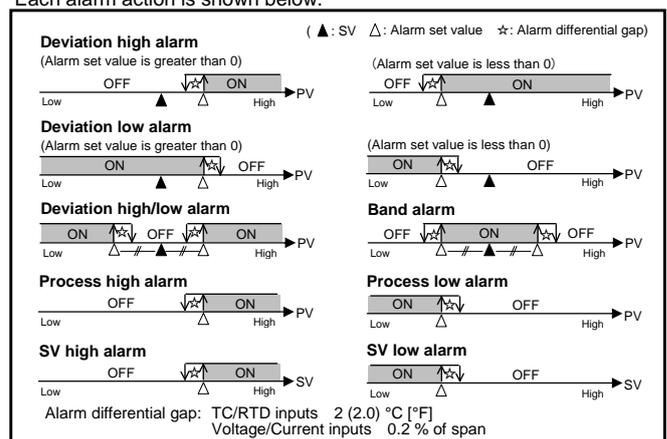
The set data lock function permits locking of critical parameters and prevents unauthorized personnel from changing parameters.

7.4 Alarms



Both of the Alarm 1 and Alarm 2 outputs 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.), set "0000" to the process abnormality action selection (AEo1, AEo2) of "8.7 Function Block 41 (F41), 42 (F42)."

Each alarm action is shown below.



8. INITIAL SETTING



WARNING

Parameters in the Engineering mode should be set according to the application before setting any parameter related to operation. Once the Parameters in the Engineering mode are set correctly, no further changes need to be made to parameters for the same application under normal conditions. If they are changed unnecessarily, it may result in malfunction or failure of the instrument. RKC will not bear any responsibility for malfunction or failure as a result of improper changes in the Engineering mode.

8.1 Go to Engineering Mode

- Turn on the power to this controller. The instrument goes to the PV/SV monitor after confirming input type symbol and input range.
- Press and hold the SET key for 2 seconds with the SV setting & Monitor mode change the instrument to Parameter setting mode.
- Press the SET key until "LCK" (Set Data Lock display) will be displayed.
- The blinking digit indicates which digit can be set. Press <RST key to move to the thousands digit.
- Press the UP key to change 0 to 1.
0000: Engineering Mode locked
1000: Engineering Mode unlocked
- Press the SET key to store the new set value. The display goes to the first parameter in Parameter setting mode, and the Engineering mode is unlocked.
- Press the <RST key for 2 seconds while pressing the SET key to go to the Engineering mode. Thus, the symbol "F10" for function block is displayed first.



Set data lock function display



Alarm 1 setting display

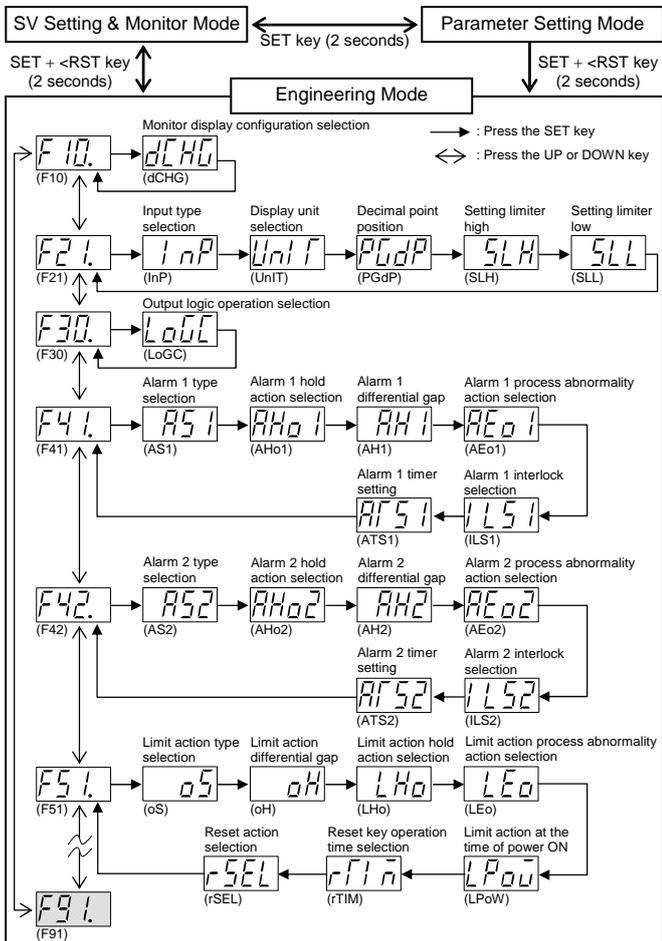


Function block F10 displays Engineering mode

8.2 Engineering Menu

Display flowcharts in engineering mode are shown in the following.

Do not change to the section parameters and any parameter in the Engineering mode which is not described in the engineering menu below. It may result in malfunction or failure of the instrument.



8.3 Attention Items in Setting

If any of the following parameter is changed, the relevant set value is initialized or is automatically converted.



Before changing the set values, always record all of them (SV setting & Monitor mode, Parameter setting mode and Engineering mode).



After changing the set values, always check all of them (SV setting & Monitor mode, Parameter setting mode and Engineering mode).

When Input type or Engineering unit is changed

The set value is initialized.

| Mode | Description | Default value | |
|---------------------------|------------------------------------|--|------------------------|
| | | TC/RTD inputs | Voltage/Current inputs |
| Engineering mode | Decimal point position | 0 (Without decimal point) | 1 |
| | Setting limiter high | Maximum settable value | 100.0 |
| | Setting limiter low | Minimum settable value | 0.0 |
| | Alarm 1 hold action selection | 0 (Without alarm hold action) | |
| | Alarm 1 differential gap | 2 (2.0) °C [°F] | 0.2 % of span |
| | Alarm 1 process abnormality action | Alarm 1 not provided: 0 (Normal) Alarm 1 provided: 1 (Forcibly turned on) | |
| | Limit action differential gap | 2 (2.0) °C [°F] | 0.2 % of span |
| | Alarm 2 hold action selection | 0 (Without alarm hold action) | |
| | Alarm 2 differential gap | 2 (2.0) °C [°F] | 0.2 % of span |
| | Alarm 2 process abnormality action | Alarm 2 not provided: 0 (Normal) Alarm 2 provided: 1 (Forcibly turned on) | |
| Parameter setting mode | Alarm 1 set value | 50 (50.0) °C [°F] | 5.0 % of span |
| | Alarm 2 set value | | |
| | PV bias | 0 (0.0) °C [°F] | 0.0 |
| | PV ratio | 1.000 | |
| | Digital filter | 0 second (OFF) | |
| | Analog output scale high | Maximum settable value | 100.0 |
| SV setting & Monitor mode | Analog output scale low | Minimum settable value | 0.0 |
| | Limit set value | 0 (0.0) | 0.0 |

When Decimal point position is changed

When a Decimal point position is changed, it is converted into about set value of the list shown below automatically. Set it to the value to use once again.

| Mode | Description |
|---------------------------|-------------------------------|
| Engineering mode | Setting limiter high |
| | Setting limiter low |
| | Alarm 1 differential gap |
| | Alarm 2 differential gap |
| | Limit action differential gap |
| Parameter setting mode | Alarm 1 set value |
| | Alarm 2 set value |
| | PV bias |
| | Analog output scale high |
| SV setting & Monitor mode | Analog output scale low |
| | Limit set value (SV) |



Example and caution of automatic conversion.

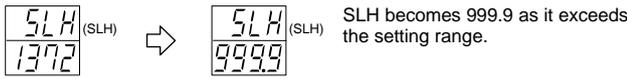
- Decimal point location moves in accordance with it when increases decimal point location.

Example: When the position of the decimal changed from 0 to 1 with SLH set to 800 °C.



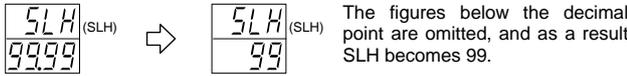
- If the setting range is not between -1999 and +9999 regardless of the position of the decimal point, it is limited by the range from -1999 to +9999.

Example: Suppose set SLH is 1372 °C, if change decimal point position from 0 to 1.



- If the number of digits below the decimal point is changed in the decreasing direction, the decreased number of digits is omitted.

Example: Suppose set SLH is 99.99, if change decimal point position from 0 to 2.



When Setting limiter is changed

When Setting limiter high (SLH) or Setting limiter low (SLL) is changed, all the set value of the list shown below is initialized. Set it to the value to use one again.

| Mode | Description |
|---------------------------|-------------------------------|
| Engineering mode | Alarm 1 differential gap |
| | Alarm 2 differential gap |
| | Limit action differential gap |
| Parameter setting mode | Alarm 1 set value |
| | Alarm 2 set value |
| | PV bias |
| | Analog output scale high |
| SV setting & Monitor mode | Analog output scale low |
| | Limit set value (SV) |

<Only for TC/RTD inputs>

- If SLH is set to SLH < SLL, it is changed to SLH = SLL.
Example: If SLL is set to 200 with SLH set to 100, SLH is changed to 200.
- If SLL is set to SLH < SLL, it is changed to SLH = SLL.
Example: If SLH is set to 100 with SLL set to 200, SLL is changed to 100.

<For TC/RTD inputs, Voltage/Current inputs>

If the setting is made so that the span becomes narrower, there may be a case where the related set value becomes smaller or 0.

When Alarm type is changed

When changing Alarm 1 type and Alarm 2 type, all the set value of the list shown below are initialized. Set a desired value one again.

| Mode | Description | Default value | |
|------------------------|------------------------------------|--|------------------------|
| | | TC/RTD inputs | Voltage/Current inputs |
| Engineering mode | Alarm 1 hold action selection | 0 (Without alarm hold action) | |
| | Alarm 1 differential gap | 2 (2.0) °C [°F] | 0.2 % of span |
| | Alarm 1 process abnormality action | Alarm 1 not provided: 0 (Normal) Alarm 1 provided: 1 (Forcibly turned on) | |
| | Alarm 2 hold action selection | 0 (Without alarm hold action) | |
| | Alarm 2 differential gap | 2 (2.0) °C [°F] | 0.2 % of span |
| | Alarm 2 process abnormality action | Alarm 2 not provided: 0 (Normal) Alarm 2 provided: 1 (Forcibly turned on) | |
| Parameter setting mode | Alarm 1 set value | 50 (50.0) °C [°F] | 5.0 % of span |
| | Alarm 2 set value | | |

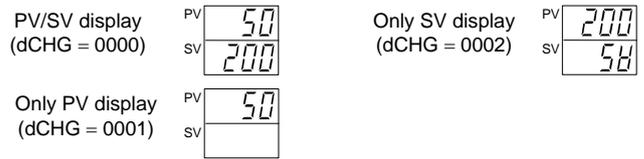
8.4 Function Block 10 (F10)

Monitor display configuration selection (dCHG)

Factory set value: 0000

| Set value | Description | Set value | Description |
|-----------|-----------------|-----------|-----------------|
| 0000 | PV/SV display | 0002 | Only SV display |
| 0001 | Only PV display | | — |

Displays becomes as follows.



Change settings

Example: Change the monitor display configuration selection from "PV/SV display" to "Only PV display."

- Change the instrument to the function block symbol display "F10."

Refer to 8.1 Go to Engineering Mode (P. 6).

- Press the SET key at "F10" until "dCHG (Monitor display configuration selection)" is displayed.
- Press the UP key to change the number to 1.
- Press the SET key to store the new set value. The display goes to the next parameter.

8.5 Function Block 21 (F21)

(1) Input type selection (InP)

Input type (TC/RTD inputs to Voltage/Current inputs or Voltage/Current inputs to TC/RTD inputs) cannot be changed because the hardware is different.

Factory set value varies depending on the instrument specification.

| Set value | Description | Set value | Description |
|-----------|-------------|-----------|---------------|
| 0000 | TC | 0010 | U |
| 0001 | | 0011 | L |
| 0002 | | 0012 | Pt100 |
| 0003 | | 0013 | JPt100 |
| 0004 | | 0014 | 0 to 5 V DC |
| 0005 | | 0015 | 1 to 5 V DC |
| 0006 | | 0016 | 0 to 10 V DC |
| 0007 | | 0014 | 0 to 20 mA DC |
| 0008 | | 0015 | 4 to 20 mA DC |
| 0009 | | PLII | |

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

Change settings

Example: Change the input type from "K" to "J"

- Change the instrument to the function block symbol display.

Refer to 8.1 Go to Engineering Mode (P. 6).

As "InP" belongs to the "F21," press the UP key to change the display from "F10" to "F21."

- Press the SET key to change to "InP." Then, press the UP key to enter 1 in the units digit of the set value (SV) display.
- Press the SET key to store the new set value. The display goes to the next parameter.

(2) Display unit selection (UnIT)

The invalidity in case of the voltage input.

Refer to 8.3 Attention Items in Setting (P. 6).

Factory set value varies depending on the instrument specification.

| Set value | Description | Set value | Description |
|-----------|-------------|-----------|-------------|
| 0000 | °C | 0001 | °F |

Change settings

Example: Change the temperature unit of the Heat only type from "°C (0000)" to "°F (0001)"

- Press the SET key several times at "F21" until "UnIT" is displayed.
- Press the UP key to change the number to 1.
- Press the SET key to store the new set value. The display goes to the next parameter.

(3) Decimal point position (PGdP)

Factory set value varies depending on the instrument specification.

| Set value | Description |
|-----------|------------------------------|
| 0000 | No decimal place (□□□□) |
| 0001 | One decimal place (□□□.□) |
| 0002 | Two decimal places (□□.□□) |
| 0003 | Three decimal places (□.□□□) |

● 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 "F21" until "PGdP" is displayed.
2. Press the DOWN key to change the number to 0.
3. Press the SET key to store the new set value. The display goes to the next parameter.

(4) Setting limiter high (SLH) Setting limiter low (SLL)

Set the setting limiter referring to the Input Range Table (P. 10).

Refer to 8.3 Attention Items in Setting (P. 6).

Factory set value varies depending on the instrument specification.

| Set value | Description | |
|------------------------|---|---|
| TC | K | -199 to +1372 °C (-326 to +2502 °F) |
| | | -199.9 to +999.9 °C (-199.9 to +999.9 °F) |
| | J | -199 to +1200 °C (-326 to +2192 °F) |
| | | -199.9 to +999.9 °C (-199.9 to +999.9 °F) |
| | R | 0 to 1769 °C (0 to 3216 °F) |
| | S | 0 to 1769 °C (0 to 3216 °F) |
| | B | 0 to 1820 °C (0 to 3308 °F) |
| | E | 0 to 1000 °C (0 to 1832 °F) |
| | N | 0 to 1300 °C (0 to 2372 °F) |
| | | 0.0 to 999.9 °C (0 to 999.9 °F) |
| | T | -199 to +400 °C (-326 to +752 °F) |
| | | -199.9 to +400.0 °C (-199.9 to +752.0 °F) |
| | W5Re/W26Re | 0 to 2320 °C (0 to 4208 °F) |
| | PL II | 0 to 1390 °C (0 to 2534 °F) |
| U | -199 to +600 °C (-326 to +1112 °F) | |
| | -199.9 to +600.0 °C (-199.9 to +999.9 °F) | |
| L | 0 to 900 °C (0 to 1652 °F) | |
| RTD | Pt100 (JIS/IEC) ¹ | -199.9 to +649.0 °C (-199.9 to +999.9 °F) |
| | JPt100 (JIS) | |
| Voltage ² | 0 to 5 V DC | -1999 to +9999 (programmable scale) |
| | 1 to 5 V DC | |
| | 0 to 10 V DC | |
| Current ^{2,3} | 0 to 20 mA DC | -1999 to +9999 (programmable scale) |
| | 4 to 20 mA DC | |

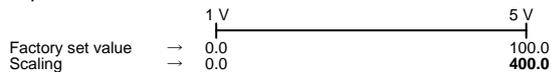
¹ IEC (International Electrotechnical Commission) is equivalent to JIS, DIN and ANSI.

² In case of Voltage/Current inputs, SLH can be set below SLL.

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

● 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.



1. Set "F21," and press the SET key. The display will go to SLH.
2. The blinking digit indicates which digit can be set. Press the <RST key to move to the thousands digit.
3. Press the UP key to change the number to 4.
4. Press the SET key to store the new set value. The display goes to SLL. For the "SLL (Setting limiter low)," check that the display is set to "0.0."

8.6 Function Block 30 (F30)

■ Output logic operation selection (LoGC)



Match the setting with the instrument specification. Otherwise malfunction may result.

Factory set value varies depending on the instrument specification.

| Set value | OUT1 | OUT2 |
|-----------|-------------------------------|--|
| 0001 | Limit output (De-energized) * | OR output of alarm 1 and alarm 2 (Energized) * |
| 0002 | Limit output (De-energized) | AND output of alarm 1 and alarm 2 (Energized) |
| 0003 | Limit output (De-energized) | Alarm 1 output (Energized) |
| 0004 | Limit output (De-energized) | OR output of alarm 1 and alarm 2 (De-energized) |
| 0005 | Limit output (De-energized) | AND output of alarm 1 and alarm 2 (De-energized) |



| Set value | OUT1 | OUT2 |
|-----------|-----------------------------|--|
| 0006 | Limit output (De-energized) | Alarm 1 output (De-energized) |
| 0007 | Limit output (De-energized) | No output |
| 0008 | Limit output (Energized) | OR output of alarm 1 and alarm 2 (Energized) |
| 0009 | Limit output (Energized) | AND output of alarm 1 and alarm 2 (Energized) |
| 0010 | Limit output (Energized) | Alarm 1 output (Energized) |
| 0011 | Limit output (Energized) | OR output of alarm 1 and alarm 2 (De-energized) |
| 0012 | Limit output (Energized) | AND output of alarm 1 and alarm 2 (De-energized) |
| 0013 | Limit output (Energized) | Alarm 1 output (De-energized) |
| 0014 | Limit output (Energized) | No output |
| 0015 | Transmission output * | Limit output (De-energized) * |
| 0016 | Transmission output | Limit output (Energized) |

* Standard output when no output code is specified.

When the OUT1 is relay contact output: 0001

When the OUT1 is current output: 0015

8.7 Function Block 41 (F41), 42 (F42)

(1) Alarm 1 type selection (AS1) Alarm 2 type selection (AS2)



Refer to 8.3 Attention Items in Setting (P. 6).

Factory set value varies depending on the instrument specification.

| Set value | Description | Set value | Description |
|-----------|--------------------|-----------|--------------------------|
| 0000 | Alarm not provided | 0005 | Deviation high alarm |
| 0001 | SV high alarm | 0006 | Deviation low alarm |
| 0002 | SV low alarm | 0007 | Deviation high/low alarm |
| 0003 | Process high alarm | 0008 | Band alarm |
| 0004 | Process low alarm | | |

● Change settings

Example: Change the Alarm 1 type from "Deviation high alarm (0005)" to "Deviation low alarm (0006)"

1. Press the SET key at "F41" until "AS1" is displayed.
2. Press the UP key to change the number to 4.
3. Press the SET key to store the new set value. The display goes to the next parameter.

(2) Alarm 1 hold action selection (AHO1) Alarm 2 hold action selection (AHO2)



The alarm hold action function cannot be added to the SV alarm.

Refer to 8.3 Attention Items in Setting (P. 6).

Factory set value varies depending on the instrument specification.

| Set value | Description |
|-----------|---|
| 0000 | Without alarm hold action |
| 0001 | Effective when the power is turned on. |
| 0002 | Effective when the power is turned on or the SV is changed. |

● Change settings

Example: Change the Alarm 1 hold action selection from "Without alarm hold action (0000)" to "Effective when the power is turned on (0001)"

1. Press the SET key at "F41" until "AHO1" is displayed.
2. Press the UP key to change the number to 1.
3. Press the SET key to store the new set value. The display goes to the next parameter.

(3) Alarm 1 differential gap (AH1) Alarm 2 differential gap (AH2)

Setting range: 0 (0.0) to span

Factory set value: TC/RTD inputs: 2 (2.0) °C [°F]

Voltage/Current inputs: 0.2 % of span

● Change settings

Example: Change the Alarm 1 differential gap from "2 °C" to "4 °C"

1. Press the SET key at "F41" until "AH1" is displayed.
2. Press the UP key to change the number to 4.
3. Press the SET key to store the new set value. The display goes to the next parameter.

**(4) Alarm 1 process abnormality action selection (AEo1)
Alarm 2 process abnormality action selection (AEo2)**

 It is judged that the input is abnormal when over-scale or underscale occurs.

 For a voltage input of 0 to 5 V DC or 0 to 10 V DC, as over-scale or underscale does not occur when the input breaks, no alarm is turned on.

| Set value | Description |
|-----------|---|
| 0000 | Normal processing: The alarm action set by alarm type selection (AS1/AS2) is taken even if the input is abnormal. |
| 0001 | Forcibly turned on when abnormal: The alarm is forcibly turned on regardless of the alarm action set by alarm type selection (AS1/AS2) when the input is abnormal. |

Factory set value:
Alarm 1 not provided: 0000, Alarm 1 provided: 0001
Alarm 2 not provided: 0000, Alarm 2 provided: 0001

● Change settings

Example: Change the Alarm 1 process abnormality action selection from "Normal processing (0000)" to "Forcibly turned on when abnormal (0001)"

1. Press the SET key at "F41" until "AEo1" is displayed.
2. Press the UP key to change the number to 1.
3. Press the SET key to store the new set value. The display goes to the next parameter.

**(5) Alarm 1 interlock selection (ILS1)
Alarm 2 interlock selection (ILS2)**

Factory set value: 0000

| Set value | Description |
|-----------|-------------------------|
| 0000 | Without alarm interlock |
| 0001 | With alarm interlock |

● Change settings

Example: Change the Alarm 1 interlock selection from "Without alarm interlock (0000)" to "With alarm interlock (0001)"

1. Press the SET key at "F41" until "ILS1" is displayed.
2. Press the UP key to change the number to 1.
3. Press the SET key to store the new set value. The display goes to the next parameter.

**(6) Alarm 1 timer setting (ATS1)
Alarm 2 timer setting (ATS2)**

Setting range: 0 to 60 seconds
Factory set value: 0

● Change settings

Example: Change the Alarm 1 timer setting from "0 second" to "30 seconds"

1. Press the SET key at "F41" until "ATS1" is displayed.
2. The blinking digit indicates which digit can be set. Press the <RST key to move to the tens digit.
3. Press the UP key to change the number to 3.
4. Press the SET key to store the new set value. The display goes to the next parameter.

8.8 Function Block 51 (F51)

(1) Limit action type selection (oS)

Factory set value: 0000

| Set value | Description |
|-----------|---------------------------|
| 0000 | Limit action [high limit] |
| 0001 | Limit action [low limit] |

● Change settings

Example: Change the Limit action type from "Limit action [high limit] (0000)" to "Limit action [low limit] (0001)"

1. Press the SET key at "F51" until "oS" is displayed.
2. Press the UP key to change the number to 1.
3. Press the SET key to store the new set value. The display goes to the next parameter.

(2) Limit action differential gap (oH)

Setting range: 0 (0.0) to span
Factory set value: TC/RTD inputs: 2 (2.0) °C [°F]
Voltage/Current inputs: 0.2 % of span

 The setting procedure is the same as the Alarm differential gap. (P. 9)

(3) Limit action hold action selection (LHo)

Factory set value: 0000

| Set value | Description |
|-----------|--|
| 0000 | Without hold action |
| 0001 | Effective when the power is turned on. |

 The setting procedure is the same as the (1) Limit action type selection. (P. 9)

(4) Limit action process abnormality action selection (LEo)

Factory set value: 0000

| Set value | Description |
|-----------|----------------------------------|
| 0000 | Normal processing |
| 0001 | Forcibly turned on when abnormal |

 The setting procedure is the same as the (1) Limit action type selection. (P. 9)

(5) Limit action at the time of power ON (LPoW)

Factory set value: 0001

| Set value | Description |
|-----------|---|
| 0000 | Limit action output turned OFF at the time of power ON. |
| 0001 | Limit action output turned ON at the time of power ON. |

 The setting procedure is the same as the (1) Limit action type selection. (P. 9)

(6) <RST key operation time selection (rTIM)

Factory set value: 0001

| Set value | Description |
|-----------|-----------------------|
| 0000 | Press for one second. |
| 0001 | Press once. |

 The setting procedure is the same as the (1) Limit action type selection. (P. 9)

(7) Reset action selection (rSEL)

Factory set value: 0000

| Set value | Description |
|-----------|---|
| 0000 | All data is reset with each monitoring screen. |
| 0001 | Each data is reset with each monitoring screen. |

 The setting procedure is the same as the (1) Limit action type selection. (P. 9)

8.9 Exit Engineering Mode

1. Transfer to function block symbol display (F□□) after each parameter is set.
2. Press the <RST key while pressing the SET key for 2 seconds to change to the SV setting & Monitor mode from the Engineering mode.
3. Press and hold the SET key for 2 seconds with the SV setting & Monitor mode change the instrument to Parameter setting mode.
4. Press the SET key to change to the Set data lock function display (LCK).
5. Press the <RST key to flash the most significant digit on the set value (SV) display.
6. Press the DOWN key to change 1 to 0 in the most significant digit.
7. Press the SET key to lock the Engineering mode. The display changes to the first parameter in Parameter setting mode.
8. Press and hold the SET key for 2 seconds to change the Parameter setting mode to the SV setting & Monitor mode. Thus, the initialization ends.

9. ERROR DISPLAYS

Self-diagnostic error

| Upper display | Lower display | Description | Solution |
|---------------|---------------|----------------------|---|
| Err | 1 | Adjusted data error | Turn off the power once. If an error occurs after the power is turned on again, please contact RKC sales office or the agent. |
| | 2 | EEPROM error | |
| | 4 | A/D conversion error | |
| | 8 | RAM check error | |
| | 128 | Watchdog timer error | |
| | 2048 4096 | Program busy | |



When two or more errors occur simultaneously, the error code numbers are totaled and displayed as one number.

Over-scale and Underscale

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

10. SPECIFICATIONS

Input

Thermocouple (TC): K, J, R, S, B, E, T, N (JIS-C1602-1995)

PLII (NBS)
W5Re/W26Re (ASTM-E988-96)
U, L (DIN43710-1985)

RTD:

Pt100 (JIS-C1604-1997)
JPt100 (JIS-C1604-1997, JIS-C1604-1981 Pt100)

Voltage:

0 to 5 V DC, 1 to 5 V DC, 0 to 10 V DC

Current:

0 to 20 mA DC, 4 to 20 mA DC

Display accuracy

Thermocouple (TC): $\pm(1\% \text{ of displayed value} + 1 \text{ digit})$ or $\pm 2^\circ\text{C}$ [4 °F]

RTD:

$\pm(0.3\% \text{ of displayed value} + 1 \text{ digit})$ or $\pm 0.8^\circ\text{C}$ [1.6 °F]

Voltage/Current:

$\pm(0.3\% \text{ of span} + 1 \text{ digit})$

Output (OUT1, OUT2)

Relay contact: 240 V AC, 3 A (Resistive load) 1c contact, Electric life 300,000 times or more (Rated load)

Current:

0 to 20 mA DC, 4 to 20 mA DC

(OUT1 only)

(Load resistance: 400 Ω or less, Resolution: 10 bits or more)

Communication function (Optional)

Interface:

Based on RS-485, EIA standard

Protocol:

RKC communication, Modbus

Contact input (Optional)

Dry contact input: At open 500 k Ω or more, At close 10 Ω or less

Power supply voltage

100 to 240 V AC:

85 to 264 V AC [Including power supply voltage variation], (Rating: 100 to 240 V AC), 50/60 Hz

24 V AC: 21.6 to 26.4 V AC [Including power supply voltage variation], (Rating: 24 V AC), 50/60 Hz

24 V DC: 21.6 to 26.4 V AC [Including power supply voltage variation], (Rating: 24 V DC)

Power consumption

100 to 240 V AC: 4 VA max. (at 100 V AC), 7 VA max. (at 240 V AC)

24 V AC:

4 VA max.

24 V DC:

100 mA max.

Standards

Safety standards: UL: UL61010-1
cUL or CSA: CAN/CSA-C22.2 No.61010-1
FM: Class Number 3545
CE marking: LVD: EN61010-1
EMC: EN61326-1

Others

Dimension: 48 × 48 × 70 mm (W × H × D)
Weight: Approx. 120 g

11. INPUT RANGE TABLES

TC/RTD inputs

| Input type | Input range | Code | Input type | Input range | Code |
|---------------------------|---------------------|---|------------|----------------------------------|------|
| K | 0 to 200 °C | 01 | TC | -199.9 to +400.0 °C ² | 01 |
| | 0 to 400 °C | 02 | | -199.9 to +100.0 °C ² | 02 |
| | 0 to 600 °C | 03 | | -100.0 to +200.0 °C | 03 |
| | 0 to 800 °C | 04 | | 0.0 to 350.0 °C | 04 |
| | 0 to 1000 °C | 05 | | -199.9 to +752.0 °F ² | T |
| | 0 to 1200 °C | 06 | | -100.0 to +200.0 °F | A1 |
| | 0 to 1372 °C | 07 | | -100.0 to +400.0 °F | A3 |
| | -199.9 to +300.0 °C | 08 | | 0.0 to 450.0 °F | A4 |
| | 0.0 to 400.0 °C | 09 | | 0.0 to 752.0 °F | A5 |
| | 0.0 to 800.0 °C | 10 | | 0 to 2000 °C | 01 |
| | 0 to 100 °C | 13 | | 0 to 2320 °C | 02 |
| | 0 to 300 °C | 14 | | 0 to 4000 °F | W |
| | 0 to 450 °C | 17 | | 0 to 1300 °C | A1 |
| | 0 to 500 °C | 20 | | 0 to 1390 °C | 01 |
| | 0.0 to 200.0 °C | 29 | | 0 to 1200 °C | 02 |
| | 0.0 to 600.0 °C | 37 | | 0 to 2400 °F | A |
| | -199.9 to +800.0 °C | 38 | | 0 to 2534 °F | 03 |
| | 0 to 800 °F | A1 | | -199.9 to +600.0 °C ² | A2 |
| | 0 to 1600 °F | A2 | | -199.9 to +100.0 °C ² | 01 |
| | 0 to 2502 °F | A3 | | 0.0 to 400.0 °C | 02 |
| | 0.0 to 800.0 °F | A4 | | -199.9 to +999.9 °F ² | 03 |
| | 20 to 70 °F | A9 | | -100.0 to +200.0 °F | A1 |
| | -199.9 to +999.9 °F | B2 | | 0.0 to 999.9 °F | A2 |
| | 0 to 200 °C | 01 | | 0 to 400 °C | A3 |
| | 0 to 400 °C | 02 | | 0 to 800 °C | 01 |
| | 0 to 600 °C | 03 | | 0 to 800 °F | L |
| | 0 to 800 °C | 04 | | 0 to 1600 °F | 02 |
| | 0 to 1000 °C | 05 | | -199.9 to +649.0 °C | A1 |
| | 0 to 1200 °C | 06 | | -199.9 to +200.0 °C | A2 |
| | -199.9 to +300.0 °C | 07 | | -100.0 to +50.0 °C | 01 |
| | 0.0 to 400.0 °C | 08 | | -100.0 to +100.0 °C | 02 |
| | 0.0 to 800.0 °C | 09 | | -100.0 to +200.0 °C | 03 |
| | 0 to 450 °C | 10 | | 0.0 to 50.0 °C | 04 |
| | 0.0 to 200.0 °C | 22 | | 0.0 to 100.0 °C | 05 |
| | 0.0 to 600.0 °C | 23 | | 0.0 to 200.0 °C | 06 |
| | -199.9 to +600.0 °C | 30 | | 0.0 to 300.0 °C | 07 |
| | 0 to 800 °F | A1 | | 0.0 to 500.0 °C | 08 |
| | 0 to 1600 °F | A2 | | -199.9 to +999.9 °F | 09 |
| 0 to 2192 °F | A3 | -199.9 to +400.0 °F | 01 | | |
| 0 to 400 °F | A6 | -199.9 to +200.0 °F | A2 | | |
| -199.9 to +999.9 °F | A9 | -100.0 to +100.0 °F | A3 | | |
| 0.0 to 800.0 °F | B6 | -100.0 to +300.0 °F | A4 | | |
| 0 to 1600 °C ¹ | 01 | 0.0 to 100.0 °F | A5 | | |
| 0 to 1769 °C ¹ | 02 | 0.0 to 200.0 °F | A6 | | |
| 0 to 1350 °C ¹ | 04 | 0.0 to 400.0 °F | A7 | | |
| 0 to 3200 °F ¹ | A1 | 0.0 to 500.0 °F | A8 | | |
| 0 to 3216 °F ¹ | A2 | -199.9 to +649.0 °C | A9 | | |
| 0 to 1600 °C ¹ | 01 | -199.9 to +200.0 °C | 01 | | |
| 0 to 1769 °C ¹ | 02 | -100.0 to +50.0 °C | 02 | | |
| 0 to 3200 °F ¹ | A1 | -100.0 to +100.0 °C | 03 | | |
| 0 to 3216 °F ¹ | A2 | -100.0 to +200.0 °C | 04 | | |
| 400 to 1800 °C | 01 | 0.0 to 50.0 °C | 05 | | |
| 0 to 1820 °C ¹ | 02 | 0.0 to 100.0 °C | 06 | | |
| 800 to 3200 °F | A1 | 0.0 to 200.0 °C | 07 | | |
| 0 to 3308 °F ¹ | A2 | 0.0 to 300.0 °C | 08 | | |
| 0 to 800 °C | 01 | 0.0 to 500.0 °C | 09 | | |
| 0 to 1000 °C | 02 | 0.0 to 500.0 °C | 10 | | |
| 0 to 1600 °F | A1 | 1 Accuracy is not guaranteed between 0 to 399 °C (0 to 751 °F) for type R, S and B. | | | |
| 0 to 1832 °F | A2 | 2 Accuracy is not guaranteed less than -100.0 °C (-148.0 °F) for type T and U. | | | |
| 0 to 1200 °C | 01 | | | | |
| 0 to 1300 °C | 02 | | | | |
| 0.0 to 800.0 °C | 06 | | | | |
| 0 to 2300 °F | A1 | | | | |
| 0 to 2372 °F | A2 | | | | |
| 0.0 to 999.9 °F | A5 | | | | |

Voltage/Current inputs

| Input type | Input range | Code | Input type | Input range | Code |
|------------|--------------|------|------------|----------------|------|
| Voltage | 0 to 5 V DC | 4 | Current | 0 to 20 mA DC | 7 |
| | 0 to 10 V DC | 5 | | 4 to 20 mA DC | 8 |
| | 1 to 5 V DC | 6 | | 0.0 to 100.0 % | 01 |

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