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ADD FURNACE CO.,LTD.
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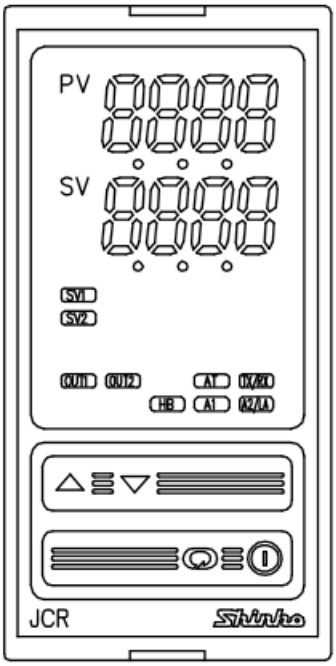
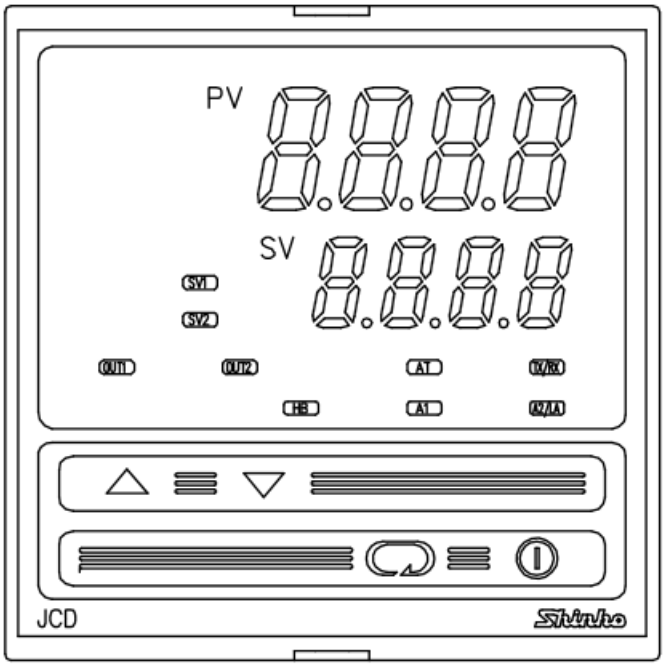
DIGITAL INDICATING CONTROLLER

JCR-33A, JCD-33A

INSTRUCTION MANUAL





Shinko

Preface

Thank you for purchasing our Digital Indicating Controller JCR-33A or JCD-33A.This manual contains instructions for the mounting, functions, operations and notes when operating the JCR-33A and JCD-33A. To prevent accidents arising from the misuse of this controller, please ensure the operator receives this manual.

Abbreviations used in this manual

Symbol	Term
PV	Process variable
SV	Desired value
MV	Output manipulated variable
OUT1	Control output 1
OUT2	Control output 2 (optional)
AT	Auto-tuning

Characters used in this manual

Indication	-1	0	1	2	3	4	5	6	7	8	9	℃	℉	
Number, ℃/℉														
Indication	A		b	c	d	E	F	G	H	I	J	K	L	M
Alphabet	A		B	C	D	E	F	G	H	I	J	K	L	M
Indication	n	o	P	q	r	S	T	U	V	W	X	Y	Z	
Alphabet	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	

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Notes

- This instrument should be used in accordance with the specifications described in the manual. If it is not used according to the specifications, it may malfunction or cause a fire.
- Be sure to follow the warnings, cautions and notices. If they are not observed, serious injury or malfunction may occur.
- Specifications, external appearance of the JCR-33A and JCD-33A and the contents of this instruction manual are subject to change without notice.
- Care has been taken to assure that the contents of this instruction manual are correct, but if there are any doubts, mistakes or questions, please inform our sales department.
- Measures must be taken to ensure that the operator cannot touch power terminals or other high voltage sections.
- Any unauthorized transfer or copying of this document, in part or in whole, is prohibited.
- Shinko Technos CO., LTD. is not liable for any damage or secondary damage(s) incurred as are result of using this product, including any indirect damage.

SAFETY PRECAUTIONS(Be sure to read these precautions before using our products.)
The safety precautions are classified into categories: “Warning” and “Caution”.
Depending on the circumstances, procedures indicated by Caution may be linked to serious results, so be sure to follow the directions for usage

Warning Procedures which may lead to dangerous conditions and cause death or serious injury, if not carried out properly.

Caution Procedures which may lead to dangerous conditions and cause superficial to medium injury or physical damage or may degrade or damage the product, if not carried out properly.

Warning

- To prevent an electric shock or fire, only Shinko or other qualified service personnel may handle the inner assembly.
- To prevent an electric shock, fire or damage to the instrument, parts replacement may only be undertaken by Shinko or other qualified service personnel.

Safety precautions

- To ensure safe and correct use, thoroughly read and understand this manual before using this instrument.
- This instrument is intended to be used for industrial machinery, machine tools and measuring equipment. Verify correct usage after purpose-of-use consultation with our agency or main office. (Never use this instrument for medical purposes with which human lives are involved.)
- External protection devices such as protective equipment against excessive temperature rise, etc. must be installed, as malfunction of this product could result in serious damage to the system or injury to personnel. Also proper periodic maintenance is required.
- This instrument must be used under the conditions and environment described in this manual. Shinko Technos Co., Ltd. does not accept liability for any injury, loss of life or damage occurring due to the instrument being used under conditions not otherwise stated in this manual

Caution with respect to Export Trade Control Ordinance
To avoid this instrument from being used as a component in, or as being utilized in the manufacture of weapons of mass destruction (i.e. military applications, military equipment, etc.), please investigate the end users and the final use of this instrument.
In the case of resale, ensure that this instrument is not illegally exported.

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1.Installation precautions

⚠ Caution

This instrument is intended to be used under the following environmental conditions (IEC61010-1): Overvoltage category, Pollution degree 2Ensure the mounting location corresponds to the following conditions:

- A minimum of dust, and an absence of corrosive gases
- No flammable, explosive gases
- No mechanical vibrations or shocks
- No exposure to direct sunlight, an ambient temperature of 0 to 50(32 to 122) that does not change rapidly, and no icing
- An ambient non-condensing humidity of 35 to 85%RH
- No large capacity electromagnetic switches or cables through which large current is flowing
- No water, oil or chemicals or where the vapors of these substances can come into direct contact with the unit
- If JCD-33A or JCR-33A is mounted through the face of a control panel, the ambient temperature of the unit - not the ambient temperature of the control panel - must be kept to under 50, otherwise the life of electronic parts (especially electrolytic capacitors) of the unit will be shortened.

Note •Do not install this instrument on or near flammable material even though the case of this instrument is made of flame-resistant resin.

2.Wiring precautions

⚠ Caution

- Do not leave wire remnants in the instrument, because they could cause a fire and/or a malfunction.
- Use a solderless terminal with an insulation sleeve in which an M3 screw fits when wiring the JCD-33A or JCR-33A.
- The terminal block of this instrument is designed to be wired from the left side.

The lead wire must be inserted from the left side of the terminal, and fastened with the terminal screw.

- Tighten the terminal screw using the specified torque.

If excessive force is applied to the screw when tightening, the screw or case may be damaged.

- Do not apply a commercial power source to the sensor connected to the input terminal or allow the power source to come into contact with the sensor, as the input circuit may be burnt out.
- This controller has no built-in power switch, circuit breaker or fuse. It is necessary to install a power switch, circuit breaker or fuse near the controller.

(Recommended fuse: Time-lag fuse, rated voltage 250V AC, rated current 2A)

- For a 24V AC/DC of power source, do not confuse polarity when using a direct current (DC).

3.Operation and maintenance precautions

⚠ Caution

- It is recommended that AT be performed during the trial run.
- Do not touch live terminals. This may cause electric shock or problems in operation.
- Turn the power supply to the instrument OFF before retightening the terminal and cleaning. Working on or touching the terminal with the power switched ON may result in severe injury or death due to electric shock.
- Use a soft, dry cloth when cleaning the instrument.(Alcohol based substances may tarnish or deface the unit.)
- As the display section is vulnerable, do not strike or scratch it with a hard object or press hard on it.

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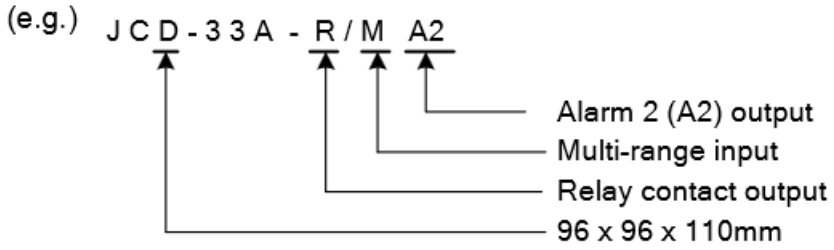
1. Model

1.1 Model

Series name, Control output (OUT1), input and option code, etc are entered where underlined.



Standard specifications

J C☐-3 3 A -☐/☐ ☐						
Series name	R					JCR-33A: W48 x H96 x D110mm
	D					JCD-33A: W96 x H96 x D110mm
Alarm 1 (A1)		A				Alarm type can be selected by keypad. *1
Control output (OUT1)			R			Relay contact
			S			Non-contact voltage (for SSR drive)
			A			DC current
Input				M		Multi-range *2
Supply voltage						100 to 240V AC (standard)
					1	24V AC/DC *3

*1: 9 types of alarm action, No alarm action and Energized/De-energized can be selected by keypad.
*2: Input types (10 thermocouple, 2 RTD, 2 DC current and 4 DC voltage types) can be selected by keypad.
*3: 100 to 240V AC is standard specification for the supply voltage. However, when ordering 24V AC/DC, enter “1” after the input code.

Optional specifications

Code	Name	
A2	Alarm 2 (A2) *1, *2	
W	Heater burnout Alarm *2, *3	
DR	Heating/Cooling control output (OUT2)	Relay contact output *2
DS		Non-contact voltage output *2
DA		DC current output *2
C5	Serial communication (RS-485) *4	
LA	Loop break alarm *1	
P24	Insulated power output *5	
BK	Color: Black	
TC	Terminal cover	

*1: When A2 and LA output are added together, they utilize common output terminals.
*2: Only 2 options can be added from A2 output, Heater burnout alarm output and Heating/Cooling control output.
*3: For DC current output type, Heater burnout alarm output cannot be added.
*4: If Serial communication is added, the SV1/SV2 external selection (standard function)will be disabled.
*5: If the Insulated power output is added, Heating/Cooling control output and Heater burnout alarm output cannot be added.

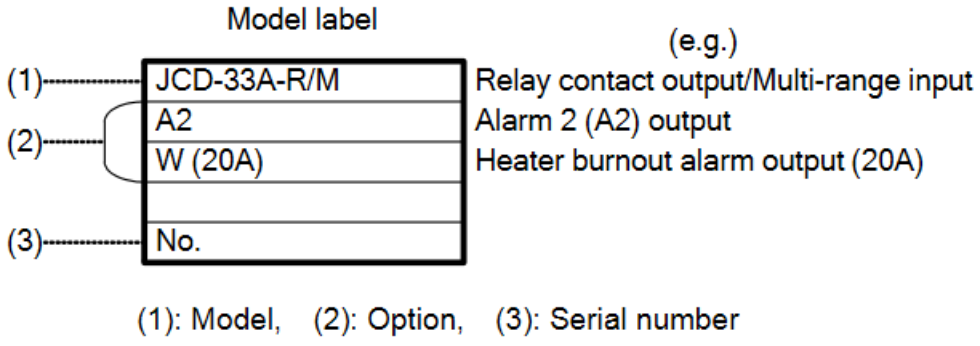
1.2 Rated input

Input type	Input range		Resolution
K	–200 to 1370℃	–320 to 2500℉	1℃(℉)
	–199.9 to 400.0 ℃	–199.9 to 750.0 ℉	0.1℃(℉)
J	–200 to 1000 ℃	–320 to 1800 ℉	1℃(℉)
R	0 to 1760 ℃	0 to 3200 ℉	1℃(℉)
S	0 to 1760 ℃	0 to 3200 ℉	1℃(℉)
B	0 to 1820 ℃	0 to 3300 ℉	1℃(℉)
E	–200 to 800 ℃	–320 to 1500 ℉	1℃(℉)
T	–199.9 to 400.0 ℃	–199.9 to 750.0 ℉	0.1℃(℉)
N	–200 to 1300 ℃	–320 to 2300 ℉	1℃(℉)
PL-Ⅱ	0 to 1390 ℃	0 to 2500 ℉	1℃(℉)
C(W/Re5-26)	0 to 2315 ℃	0 to 4200 ℉	1℃(℉)
Pt100	–199.9 to 850.0 ℃	–199.9 to 999.9 ℉	0.1℃(℉)
JPt100	–199.9 to 500.0 ℃	–199.9 to 900.0 ℉	0.1℃(℉)
Pt100	–200 to 850 ℃	–300 to 1500 ℉	1℃(℉)
JPt100	–200 to 500 ℃	–300 to 900 ℉	1℃(℉)
4 to 20mA DC	–1999 to 9999 *1, *2		1
0 to 20mA DC	–1999 to 9999 *1, *2		1
0 to 1V DC	–1999 to 9999 *1		1
0 to 5V DC	–1999 to 9999 *1		1
1 to 5V DC	–1999 to 9999 *1		1
0 to 10V DC	–1999 to 9999 *1		1

*1: For DC input, input range and decimal point place can be changed.
*2: Connect 50Ω shunt resistor (sold separately) between input terminals.

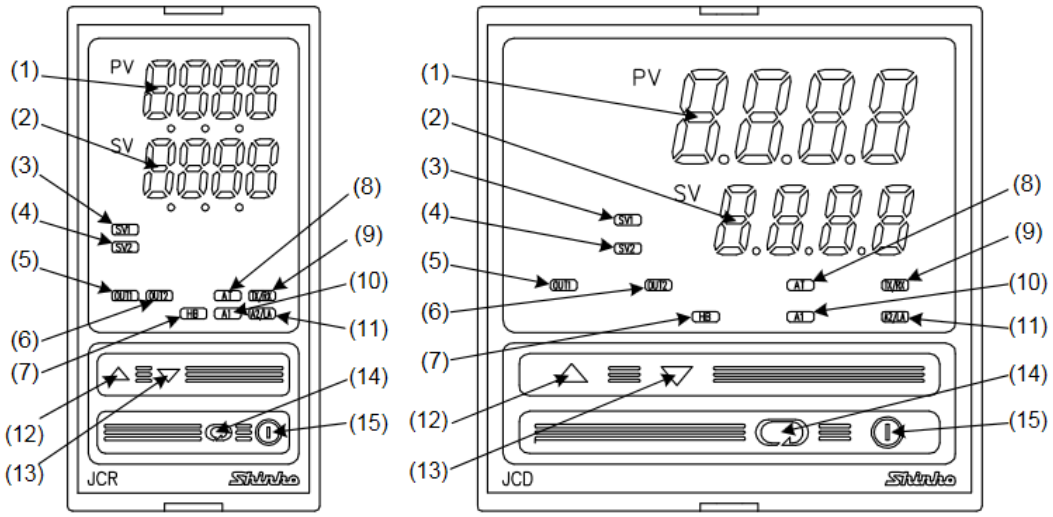
1.3 How to read the model label

Model labels are attached to the case and the inner assembly.
When the supply voltage is 24V AC/DC, “1” is entered before the option code.



(1): Model, (2): Option, (3): Serial number

2. Name and functions of sections



(Fig. 2-1)

(1) PV display
Indicates the PV or setting characters in the setting mode with the red LED.
(2) SV display
Indicates the SV, the MV or each set value in the setting mode with the green LED.
During manual control, the MV flashes in the SV Display.
While the MV is indicated, the last point on the right flashes.
(3) SV1 indicator
When SV1 is selected, the green LED lights.
(4) SV2 indicator
When SV2 is selected, the yellow LED lights.
(5) OUT1 indicator
When OUT1 is ON, the green LED lights.(In the case of DC current output type, it flashes in 250ms cycles corresponding to the MV.)
(6) OUT2 indicator
When OUT2 is ON, the yellow LED lights.(In the case of DC current output type, it flashes in 250ms cycles corresponding to the MV.)
(7) HB indicator
When Heater burnout alarm output or Sensor burnout alarm output is ON, the red LED lights.(When Heater burnout Alarm is added, the red LED also lights when indication is overscale or underscale.)
(8) AT indicator
When AT or Auto-reset is active, the yellow LED flashes.
(9) TX/RX indicator
The yellow LED lights during Serial communication TX (transmitting).
(10) A1 indicator
When A1 output is ON, the red LED lights.

(11) A2/LA indicator

When A2 output or LA output is ON, the red LED lights.

(12) Increase Key (△)

Increases numeric values**.**

(13) Decrease Key (▽)

Decreases numeric values.

(14) Mode Key ( )

Switches the setting mode and registers the set (or selected) value.
[Set (or selected) value are registered by pressing the Mode Key.]

(15) OUT/OFF Key ( )

Switches Control output OFF or Auto/Manual control.
To release the Control output OFF function, press this key for approx. 1 sec.

•If Control output OFF function is selected during OUT/OFF Key function selection mode, the control output can be turned on or off.
Once the Control output OFF function is enabled, the function cannot be released even if the power to the instrument is turned OFF and turned ON again.
To cancel the function, press the key again for approx. 1 second.

•If Auto/Manual control function is selected during OUT/OFF Key function selection, automatic control is performed when the power to the controller is turned on. In this status, if the key is pressed, the automatic control is switched to manual control and vice versa.
Auto/Manual control can be switched only in the PV/SV display mode.

Notice

When setting the specifications and functions of this controller, connect terminals 2and 3 for power source first, then set them referring to “5. Setup” before performing “3.Mounting to the control panel” and “4. Wiring”.

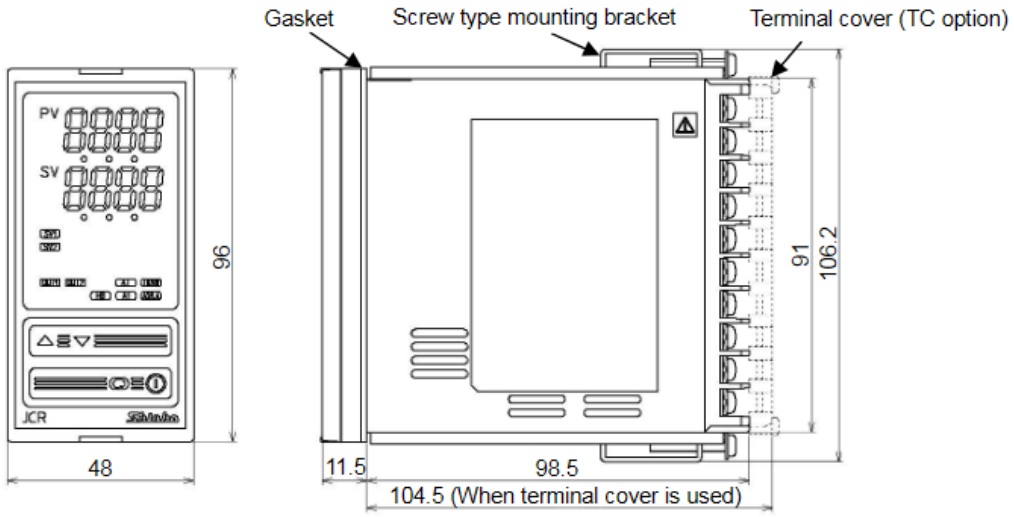
3. Mounting to the control panel

3.1 Site selection

This instrument is intended to be used under the following conditions (IEC61010-1):
Overvoltage Ⅱ category, Pollution degree 2Ensure the mounting location corresponds to the following conditions:
(1) A minimum of dust, and an absence of corrosive gases
(2) No flammable, explosive gases
(3) No mechanical vibrations or shocks
(4) No exposure to direct sunlight, an ambient temperature of 0 to 50(32 to 122) that does not change rapidly, and no icing
(5) An ambient non-condensing humidity of 35 to 85%RH
(6) No large capacity electromagnetic switches or cables through which large current is flowing
(7) No water, oil or chemicals or where the vapors of these substances can come into direct contact with the unit
(8) If JCD-33A or JCR-33A is mounted through the face of a control panel, the ambient temperature of the unit - not the ambient temperature of the control panel - must be kept to under 50 ℃, otherwise the life of electronic parts (especially electrolytic capacitors) of the unit will be shortened.

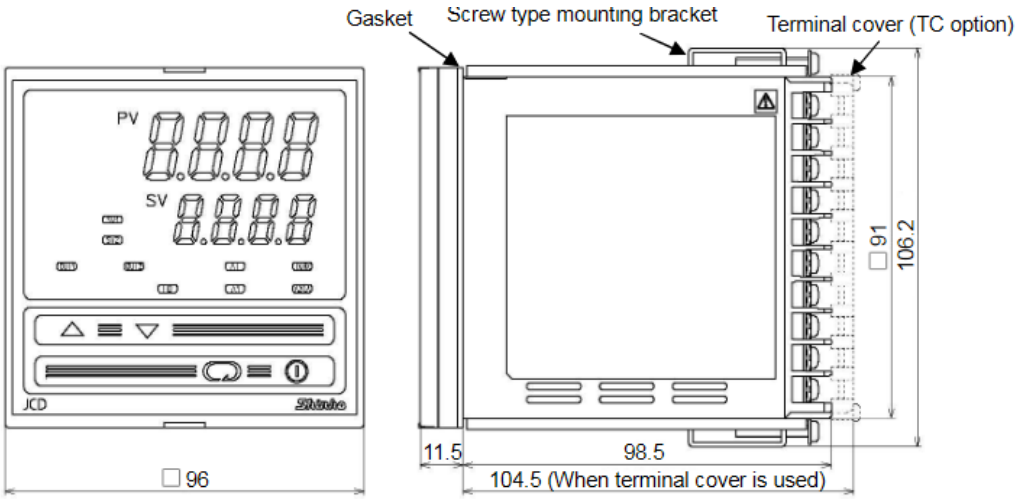
3.2 External dimensions (Scale: mm)

•**JCR-33A**



(Fig. 3.2-1)

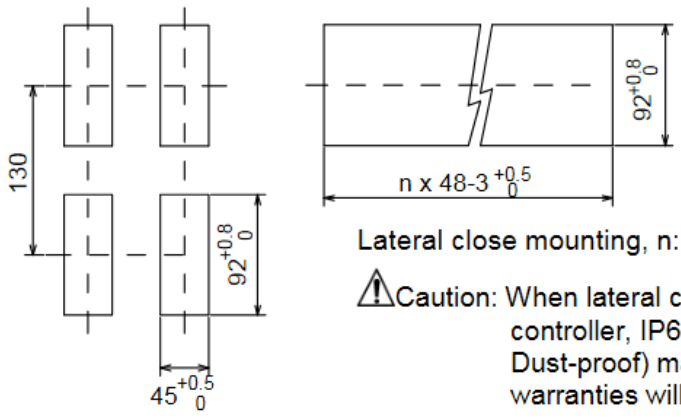
• **JCD-33A**



(Fig. 3.2-2)

3.3 Panel cutout (Scale: mm)

• **JCR-33A**

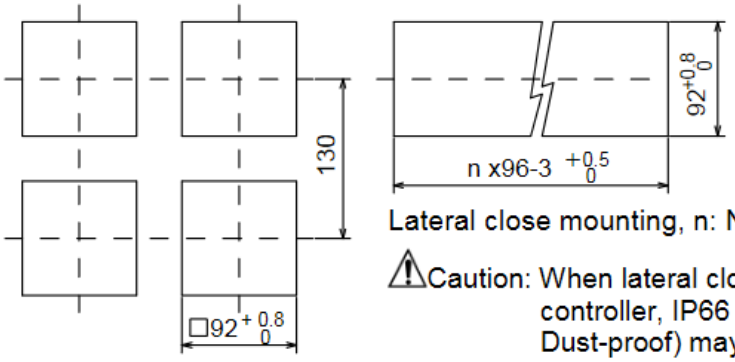


Lateral close mounting, n: Number of units mounted

⚠Caution: When lateral close mounting is used for the controller, IP66 specification (Drip-proof/ Dust-proof) may be compromised, and all warranties will be invalidated.

(Fig. 3.3-1)

• **JCD-33A**



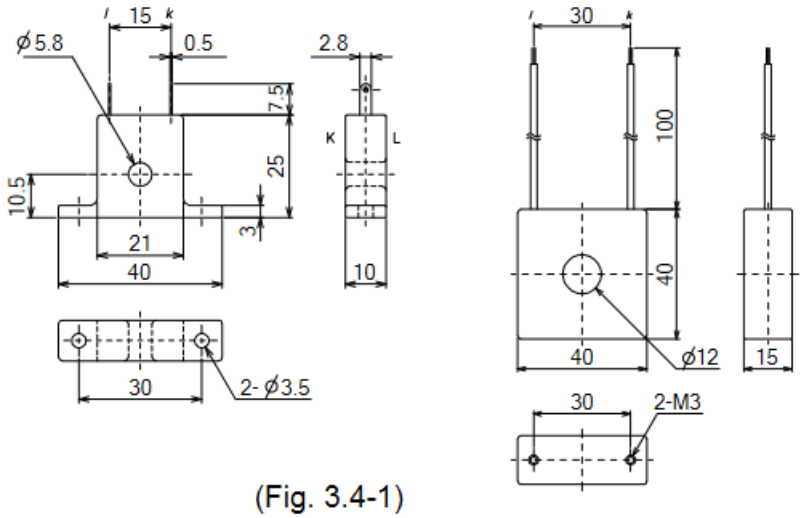
Lateral close mounting, n: Number of units mounted

Caution: When lateral close mounting is used for the controller, IP66 specification (Drip-proof/ Dust-proof) may be compromised, and all warranties will be invalidated.

(Fig. 3.3-2)

3.4 CT (Current transformer) external dimensions (Scale: mm)

CTL-6S (for 5A, 10A, 20A) CTL-12-S36-10L1U (for 50A)



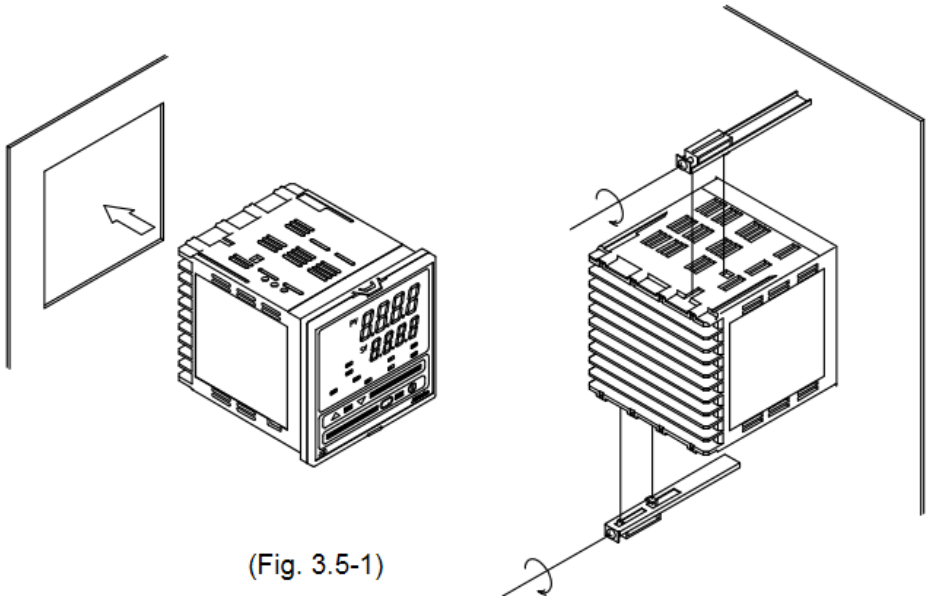
(Fig. 3.4-1)

3.5 Mounting (Common to JCR-33A and JCD-33A)

Caution

As the case is made of resin, do not use excessive force while screwing in the mounting bracket, or the case could be damaged.
The torque should be 0.12N•m

Mount the controller vertically to the flat, rigid panel to ensure it adheres to the Drip-proof/Dust-proof specification (IP66).
Mounting panel thickness: 1 to 8mm
Insert this unit from the front side of the panel.
Attach the mounting brackets by the holes at the top and bottom of the case, and secure the controller in place with the screws.
Refer to (Fig. 3.5-1).



(Fig. 3.5-1)

4. Wiring

Warning

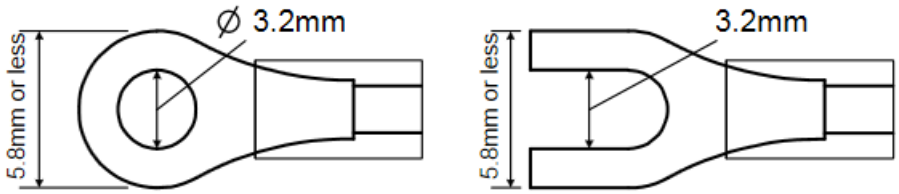
Turn the power supply to the instrument off before wiring or checking.
Working on or touching the terminal with the power switched on may result in severe injury or death due to electric shock.
Moreover, the instrument must be grounded before the power supply to the instrument is turned on.

Caution

• The terminal blocks of the JCR-33A and JCD-33A are designed to be wired from the left side. The lead wire must be inserted from the left side of the terminal, and fastened with the terminal screw.
• Dotted lines are optional. Option terminals are equipped only when the option is ordered.
• When A2 (option) and Heater burnout alarm (option) are added together, use terminals 12-13 for A2, and 9-10 for Heater burnout alarm.
• When Heating/Cooling control (option) and Heater burnout alarm (option) are added together, use terminals 9-10 for the Heating/Cooling control and 12-13 for the Heater burnout alarm.
• When only Heater burnout alarm option is added, use terminals 9 and 10.
• When A2 (option) and LA (option) are added, they utilize common output terminals.
• If the Insulated power output (option) is added, Heating/Cooling control (option) and Heater burnout alarm (option) cannot be added

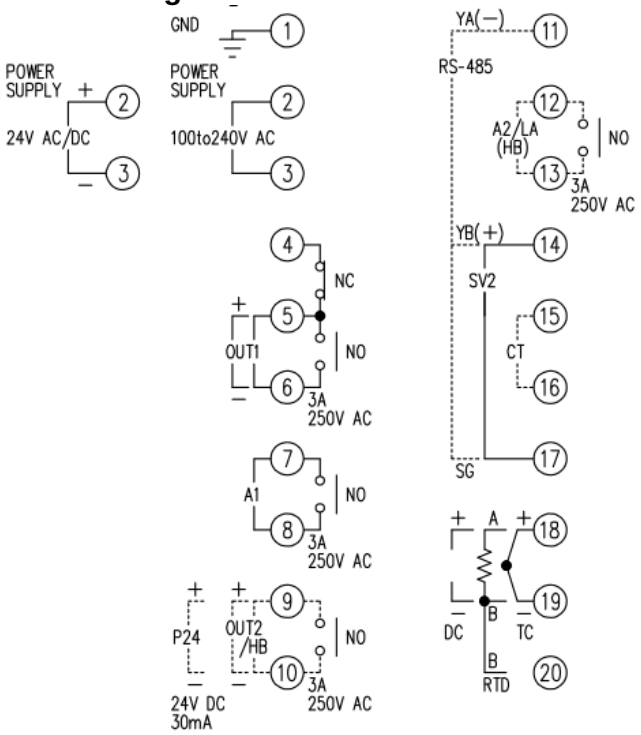
■ Lead wire solderless terminal Use a solderless terminal with an insulation sleeve in which an M3 screw fits as shown below. The torque should be 0.63N･m.

Solderless terminal	Manufacturer	Model	Tightening torque
Y type	Nichifu Terminal Industries CO.,LTD	TMEV1.25Y-3	0.63N•m
	Japan Solderless Terminal MFG CO.,LTD.	VD1.25-B3A	
Ring type	Nichifu Terminal Industries CO.,LTD.	TMEV1.25-3	
	Japan Solderless Terminal MFG CO.,LTD.	V1.25-3	



(Fig. 4-1)

4.1 Terminal arrangement



- OUT1: Control output 1
- OUT2: Control output 2
- A1 : Alarm 1 output
- A2 : Alarm 2 output
- LA : Loop break alarm output
- HB : Heater burnout alarm output
- P24 : Insulated power output 24V DC
- RS-485: Serial communication (RS-485)
- SV2 : SV1/SV2 external selection input
- CT : CT input
- TC : Thermocouple input
- RTD : Resistance temperature detector input
- DC : DC voltage, DC current input

For DC current input, connect 50Ω shunt resistor between input terminals.

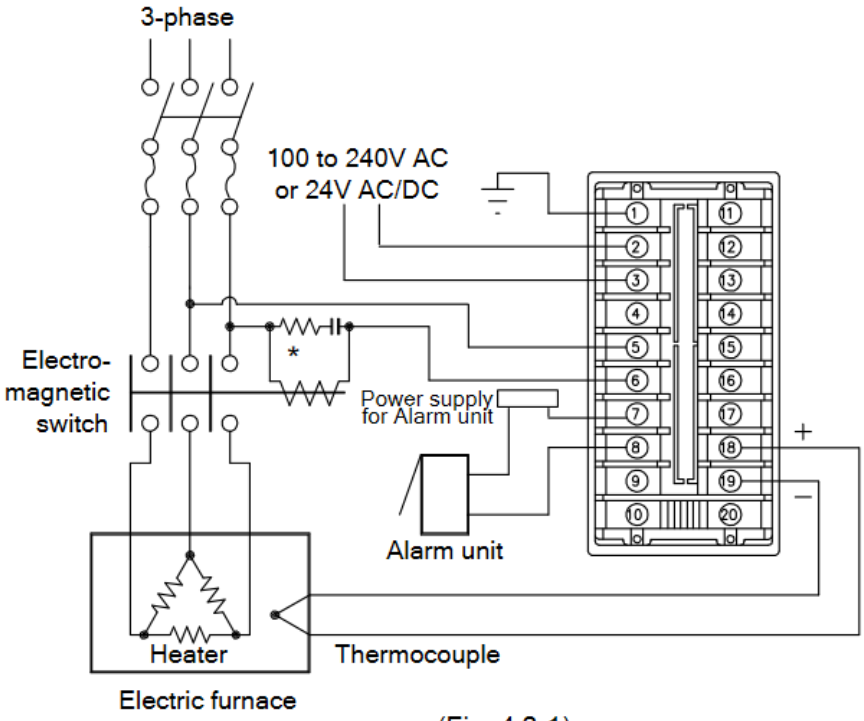
(Fig. 4.1-1)

4.2 Wiring example

⚠ Caution

- Use a thermocouple and compensating lead wire according to the sensor input specifications of this controller.
- Use the 3-wire RTD system according to the sensor input specifications of this controller.
- This controller has no built-in power switch circuit breaker or fuse. It is necessary to installa power switch, circuit breaker or fuse near the controller. (Recommended fuse: Time-lag fuse, rated voltage 250V AC, rated current 2A)
- For a 24V AC/DC of power source, do not confuse polarity when using a direct current(DC).
- When using a relay contact output type, externally use a relay according to the load capacity to protect the built-in relay contact.
- When wiring, keep input wires (thermocouple, RTD, etc.) away from AC sources or load wires.
- Use a thick wire (1.25 to 2.0mm$_2$) for grounding.

[JCR-33A-R/E]



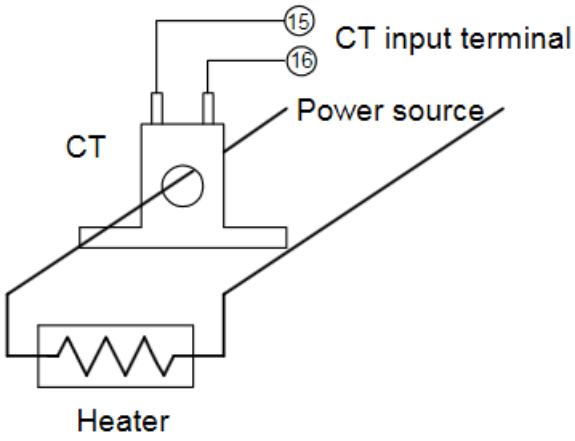
(Fig. 4.2-1)

*To prevent the unit being damaged by the harmful effects of unexpected high level noise, it is recommended that a surge absorber be installed between the electromagnetic switch coils.

• For a 24V AC/DC of power source, do not confuse polarity when using a direct current (DC).

• Number of connectable units in parallel when using Shinko SSR:
SA-400 series: 5 units
SA-500 series: 2 units

Heater burnout alarm output]
(1)This alarm is not usable for detecting heater current under phase control.
(2) Use current transformer (CT) provided, and pass one lead wire of heater circuit into the hole of the CT.
(3) When wiring, keep CT wire away from any AC sources and load wires to avoid the external interference



(Fig. 4.2-2)

5. Setup

For the thermocouple and RTD input, the sensor input characters and temperature unit are indicated in the PV display, and the input range high limit value is indicated in the SV display for approximately 3 seconds after the power is turned on. (Table 5-1)

For DC input, the sensor input characters are indicated in the PV display and the scaling high limit value is indicated in the SV display for approximately 3 seconds after the power is turned on. (Table 5-1)If any other value is set during the scaling high limit setting mode, the set value is indicated in the SV Display.
During this time, all outputs and the LED indicators are in OFF status.
Control will then start, indicating the PV in the PV display and SV1 or SV2 in the SV display.
While control output OFF function is working, oFF□ is indicated in the PV display.
To cancel control output OFF function, press the ⏻ key for approximately 1 second.

(Table. 5-1)

Sensor input	℃		℉	
	PV display	SV display	PV display	SV display
K	t□□C	1370	t□□F	2500
	t□ .C	400.0	t□ .F	750.0
J	J□□C	1000	J□□F	1800
R	r□□C	1760	r□□F	3200
S	S□□C	1760	S□□F	3200
B	b□□C	1820	b□□F	3300
E	E□□C	□800	E□□F	1500
T	T□ .C	400.0	T□ .F	750.0
N	n□□C	1300	n□□F	2300
PL-Ⅱ	PL2C	1390	PL2F	2500
C (W/Re5-26)	c□□C	2315	c□□F	4200
Pt100	Pt .C	850.0	Pt .F	999.9
JPt100	JPt.C	500.0	JPt.F	900.0
Pt100	Pt□C	□850	Pt□F	1500
JPt100	JPtC	□500	JPtF	□900
4 to 20mA DC	420A	Scaling high limit value		
0 to 20mA DC	020A			
0 to 1V DC	0□ 1V			
0 to 5V DC	0□5V			
1 to 5V DC	1□5V			
0 to 10V DC	0 10V			

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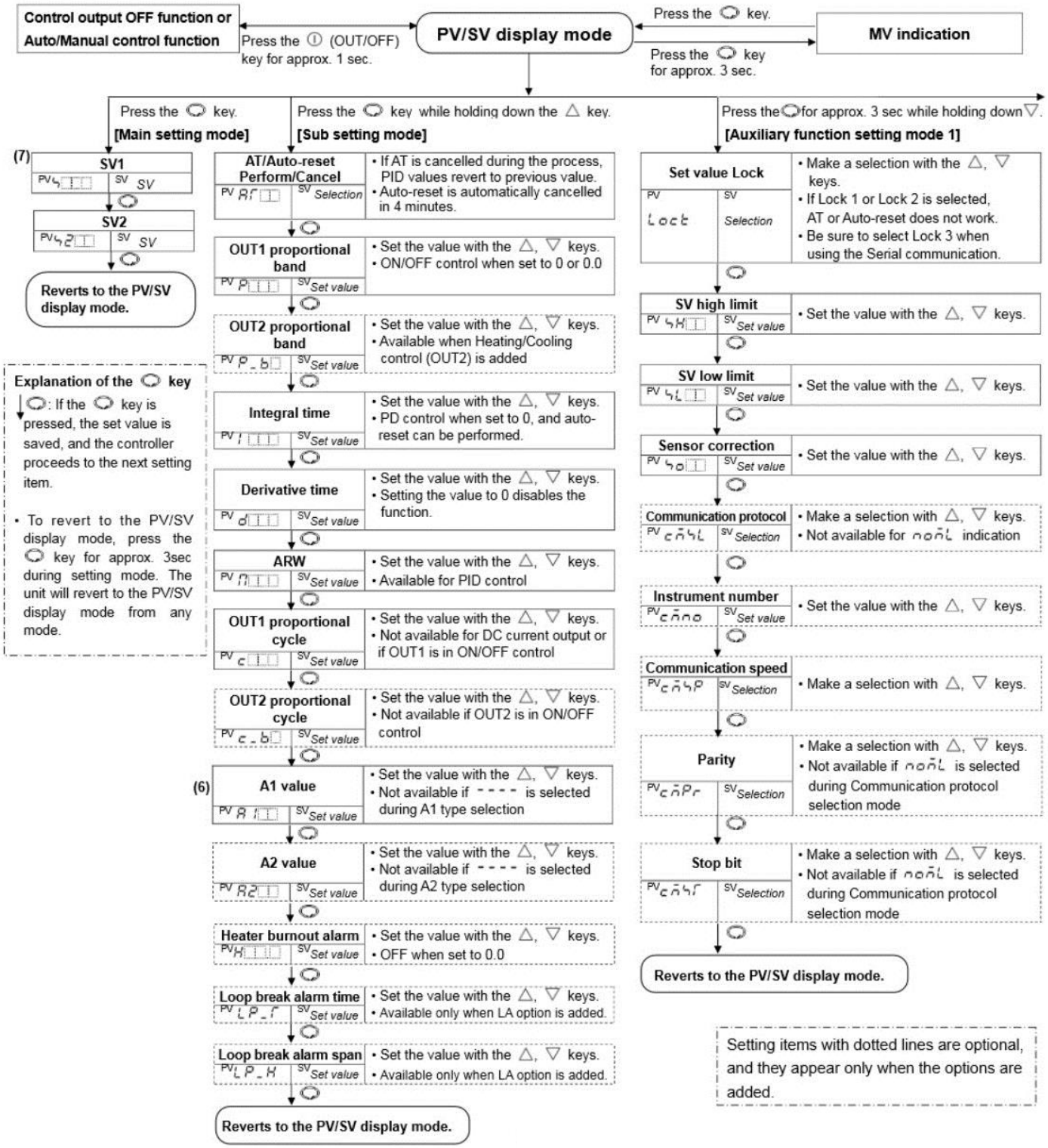
5.1 Operation flowchart

Outline of operation procedure

Set an Input type, Alarm (type, value, etc.) and SV, following the procedures below. Setting item numbers (1) to (7) are indicated on the flowchart.

[Step 1 Operation before Run]	Turn the load circuit power OFF, and turn the power supply to the JCD, JCR-33A ON.
[Step 2 Auxiliary function setting mode 2]	Set an Input type and Alarm type, etc. in Auxiliary function setting mode 2. **(1) Input type**: Select an input type. Refer to "Input type (character indication) and range" on p.17. **(2) A1 type**: Select an alarm type. Refer to "Alarm type" on p.17. [If an alarm type except for "----" is selected, items (3) to (5) will be indicated and they can be set if necessary.] **Note: If an alarm type is changed, the alarm set value becomes 0 (0.0). Therefore it is necessary to set it again.** **(3) A1 action Energized/De-energized**: Select Alarm 1 action Energized or De-energized. **(4) A1 hysteresis**: Set A1 hysteresis. **(5) A1 action delay timer**: Set A1 action delay time.
[Step 3 Sub setting mode]	**(6) A1 value**: Set an action point of A1 output in the Sub setting mode.
[Step 4 Main setting mode]	**(7) SV1**: Set the SV in the Main setting mode.
[Step 5 Run]	Turn the load circuit power ON. Control action starts so as to keep the control target at the SV.



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Input type (character indication) and range

K	–200 to 1370℃	K	–320 to 2500℉
	–199.9 to 400.0℃		–199.9 to 750.0℉
J	–200 to 1000℃	J	–320 to 1800℉
R	0 to 1760℃	R	0 to 3200℉
S	0 to 1760℃	S	0 to 3200℉
B	0 to 1820℃	B	0 to 3300℉
E	–200 to 800℃	E	–320 to 1500℉
T	–199.9 to 400.0℃	T	–199.9 to 750.0℉
N	–200 to 1300℃	N	–320 to 2300℉
PL-Ⅱ	0 to 1390℃	PL-Ⅱ	0 to 2500℉
C(W/Re5-26)	0 to 2315℃	C(W/Re5-26)	0 to 4200℉
Pt100	–199.9 to 850.0℃	Pt100	–199.9 to 999.9℉
JPt100	–199.9 to 500.0℃	JPt100	–199.9 to 900.0℉
Pt100	–200 to 850℃	Pt100	–300 to 1500℉
JPt100	–200 to 500℃	JPt100	–300 to 900℉
4 to 20mA DC	–1999 to 9999		
0 to 20mA DC	–1999 to 9999		
0 to 1V DC	–1999 to 9999		
0 to 5V DC	–1999 to 9999		
1 to 5V DC	–1999 to 9999		
0 to 10V DC	–1999 to 9999		

Alarm type

(High limit alarm): The alarm action is the ±deviation setting from the SV. The alarm is activated if the input value reaches the high limit set value.

(Low limit alarm): The alarm action is the ±deviation setting from the SV. The alarm is activated if the input value goes under the low limit set value.

(High/Low limits alarm): Combines High limit and Low limit alarm actions. When input value reaches high limit set value or goes under the low limit set value, the alarm is activated.

(High/Low limit range alarm): When input value is between the high limit set value and low limit set value, the alarm is activated.

(Process high alarm), (Process low alarm): Within the scale range of the controller, alarm action points can be set at random and if the input reaches the randomly set action point, the alarm is activated.

(High limit alarm with standby), (Low limit alarm with standby),

(High/Low limits alarm with standby):

After the power to the controller is turned on, even if the input enters the alarm action range, the alarm is not activated. If SV is changed while the controller is running, the alarm is not activated even if input is in the alarm action range.

(If the controller is allowed to keep running, once the input exceeds the alarm action point, the standby function will be released.)

Press the ▽ key for approx. 3 sec while holding down the △ key.

[Auxiliary function setting mode 2]

(1) **Input type** — PV: sEnS, SV: Selection
- Make a selection with the △, ▽ keys.
- Default value: tC

Scaling high limit — PV: SCLH, SV: Set value
- Set the value with the △, ▽ keys.
- Available for DC current, DC voltage input

Scaling low limit — PV: SCLL, SV: Set value
- Set the value with the △, ▽ keys.
- Available for DC current, DC voltage input

Decimal point place — PV: dP, SV: Selection
- Make a selection with the △, ▽ keys.
- Available for DC current, DC voltage input

PV filter time constant — PV: FILT, SV: Set value
- Set the value with the △, ▽ keys.

OUT1 high limit — PV: oLH, SV: Set value
- Set the value with the △, ▽ keys.
- Not available for ON/OFF control

OUT1 low limit — PV: oLL, SV: Set value
- Set the value with the △, ▽ keys.
- Not available for ON/OFF control

OUT1 ON/OFF hysteresis — PV: HYS, SV: Set value
- Set the value with the △, ▽ keys.
- Available only for ON/OFF control

OUT2 action mode — PV: cAct, SV: Selection
- Make a selection with the △, ▽ keys.
- Available when Heat/Cool control (OUT2) is added

OUT2 high limit — PV: oLHb, SV: Set value
- Set the value with the △, ▽ keys.
- Available when Heat/Cool control (OUT2) is added

OUT2 low limit — PV: oLLb, SV: Set value
- Set the value with the △, ▽ keys.
- Available when Heat/Cool control (OUT2) is added

Overlap/Dead band — PV: db, SV: Set value
- Set the value with the △, ▽ keys.
- Available when Heat/Cool control (OUT2) is added

OUT2 ON/OFF hysteresis — PV: HYSb, SV: Set value
- Set the value with the △, ▽ keys.
- Available when Heat/Cool control (OUT2) is added

(2) **A1 type** — PV: AL 1F, SV: Selection
- Make a selection with the △, ▽ keys.
- Default value: ----

A2 type — PV: AL2F, SV: Selection
- Make a selection with the △, ▽ keys.
- Available when A2 option is added

(3) **A1 action Energized/De-energized** — PV: A 1LN, SV: Selection
- Make a selection with the △, ▽ keys.
- Not available if ---- is selected during A1 type selection

A2 action Energized/De-energized — PV: A2LN, SV: Selection
- Make a selection with the △, ▽ keys.
- Not available if ---- is selected in A2 type selection

(4) **A1 hysteresis** — PV: A 1HY, SV: Set value
- Set the value with the △, ▽ keys.
- Not available if ---- is selected during A1 type selection

A2 hysteresis — PV: A2HY, SV: Set value
- Set the value with the △, ▽ keys.
- Not available if ---- is selected during A2 type selection

(5) **A1 action delay timer** — PV: A 1dY, SV: Set value
- Set the value with the △, ▽ keys.
- Not available if ---- is selected during A1 type selection

A2 action delay timer — PV: A2dY, SV: Set value
- Set the value with the △, ▽ keys.
- Not available if ---- is selected during A2 type selection

Direct/Reverse action — PV: conF, SV: Selection
- Make a selection with the △, ▽ keys.
- Default value: REAF (Reverse)

AT bias — PV: AT_b, SV: Set value
- Set the value with the △, ▽ keys.
- Available for thermocouple, RTD input

SVTC bias — PV: SV_b, SV: Set value
- Set the value with the △, ▽ keys.
- Available only when the C5 option is added.

SV2 indication — PV: SV2, SV: Selection
- Set the value with the △, ▽ keys.

Output status when input abnormal — PV: EoUT, SV: Selection
- Make a selection with the △, ▽ keys.
- Available only when input is DC current or DC voltage, and output is DC current.

OUT/OFF key function — PV: AAnU, SV: Selection
- Make a selection with the △, ▽ keys.

Reverts to the PV/SV display mode.

5.2 Main setting mode

Press the key in the PV/SV display mode to enter the Main setting mode.
The SV can be increased or decreased by pressing the △ or ▽ key.
If the key is pressed, the SV is registered, and the controller will revert to the PV/SV display mode.

Character	Name, Function, Setting range	Default value
SV	**SV** • Sets SV1 (desired value). • Setting range: SV low limit to SV high limit or Scaling low limit value to Scaling high limit value	0℃
SV2	**SV2** • Sets SV2 (desired value). • Not available if Serial communication (option) is added • Setting range: SV low limit to SV high limit or Scaling low limit value to Scaling high limit value	0℃

5.3 Sub setting mode

Press the key while holding down the △ key in the PV/SV display mode to enter the Sub setting mode.
The △ or ▽ key increases or decreases the set value (numeric value).
By pressing the key, the set value is registered, and the unit moves to the next setting item.

Character	Name, Function, Setting range	Default value
AT	AT/Auto-reset Perform/Cancel • Selects AT or Auto-reset (offset correction) Perform/Cancel. • Auto-reset can be performed only during PD and P control. • Not available for PI and ON/OFF control. • Selection item: ---- : AT/Auto-reset Cancel AT / rSET: AT/Auto-reset Perform • Default: AT/Auto-reset Cancel **[About AT]** • If the AT Perform is selected, the AT indicator flashes, and the controller reverts to the PV/SV display mode. • After AT is finished, the AT indicator is turned off, and P, I, D and ARW values are automatically set. • During AT, none of the settings can be performed. • If the AT is cancelled during the process, P, I, D and ARW values revert to the previous value at which AT was performed. • If the key is pressed during AT, control output OFF function is activated, and if the key is pressed again, AT is cancelled. • AT will be forced to stop if it has not been completed within 4 hours. **[About Auto-reset (offset correction)]** • If the auto-reset is performed, offset correction immediately starts, and the controller reverts to the PV/SV display mode.(The corrected value is automatically set and the AT indicator flashes.) • During 4 minutes of auto-reset performance, other settings cannot be performed to prevent key misoperations. • After auto-reset ends, the AT indicator is turned off, and all settings can be performed.	AT/Auto-reset Cancel
P	**OUT1 proportional band** • Sets OUT1 proportional band. ON/OFF control when set to 0 or 0.0. • Setting range: 0 to 1000(0 to 2000) With a decimal point: 0.0 to 999.9(0.0 to 999.9) DC input: 0.0 to 100.0%	10℃

Character	Name, Function, Setting range	Default value
P_b□	**OUT2 proportional band** • Sets OUT2 proportional band. ON/OFF control (OUT2) when set to 0 or 0.0. • Not available if Heating/Cooling control (option) is not added or if OUT1 is in ON/OFF control • Setting range: 0.0 to 10.0 times (multiplying factor to OUT1 proportional band)	1.0 times
I□□□	**Integral time** • Sets the integral time. Setting the value to 0 disables the function (PD control). • Not available if OUT1 is in ON/OFF control • Setting range: 0 to 1000 seconds	200 seconds
d□□□	**Derivative time** • Sets the derivative time. Setting the value to 0 disables the function (PI control). • Not available if OUT1 is in ON/OFF action • Setting range: 0 to 300 seconds	50 seconds
n□□□	**ARW (Anti-reset windup)** • Sets the ARW (anti-reset windup). • Available only for PID control • Setting range: 0 to 100%	50%
c□□□	**OUT1 proportional cycle** • Sets OUT1 proportional cycle. Not available for ON/OFF control or DC current output type **•For the relay contact output type, if the proportional cycle time is decreased, the frequency of the relay action increases, and the life of the relay contact is shortened.** • Setting range: 1 to 120 seconds	30 sec: Relay contact output 3 sec: Non-contact voltage output
c_b□	**OUT2 proportional cycle** • Sets OUT2 proportional cycle. • Not available for ON/OFF control or DC current output type Not available if Heating/Cooling control (option) is not added or if OUT2 is in ON/OFF control •For the relay contact output type, if the proportional cycle time is decreased, the frequency of the relay action increases, and the life of the relay contact is shortened. • Setting range: 1 to 120 seconds	30 sec: Relay contact output 3 sec: Non-contact voltage output
A1□□	**A1 value** • Sets the action point of A1 output. **Setting the value to 0 or 0.0 disables the function.** **(Excluding Process high alarm and Process low alarm)** • Not available if No alarm action is selected during the A1 type selection • Setting range: Refer to (Table 5.3-1).	0℃
A2□□	**A2 value** • Sets the action point of A2 output. **Setting the value to 0 or 0.0 disables the function.** **(Excluding Process high alarm and Process low alarm)** • Not available if A2 output (option) is not added or if No alarm action is selected during the A2 type selection • Setting range: Refer to (Table 5.3-1).	0℃

Character	Name, Function, Setting range	Default value
H□□□ and □□X.X, alternating display	**Heater burnout alarm value** • Sets the heater current value for Heater burnout alarm. Setting the value to 0.0 disables the function. CT current value and character H are indicated alternately in the PV display. When OUT1 is ON, the CT current value is updated. When OUT1 is OFF, heater current value shows the same value as when OUT1 was ON. • It is recommended to set approx. 80% of the heater current value(set value) in consideration of the voltage fluctuation. • Upon returning to set limits, the alarm will stop. • Available only when Heater burnout alarm (W option) is added • Setting range: Rated current 5A: 0.0 to 5.0A Rated current 10A: 0.0 to 10.0A Rated current 20A: 0.0 to 20.0A Rated current 50A: 0.0 to 50.0A	0.0A
LP_T	**Loop break alarm time** • Sets the action time to assess the Loop break alarm. • Available only when Loop break alarm (LA option) is added • Setting range: 0 to 200 minutes	0 minutes
LP_H	**Loop break alarm span** • Sets the action span to assess the Loop break alarm. • Available only when Loop break alarm (LA option) is added • Setting range: 0 to 150℃(℉), however, with a decimal point: 0.0 to 150.0℃(℉) DC input: 0 to 1500 (The placement of the decimal point follows the selection.)	0℃

[A1, A2 setting range]
(Table 5.3-1)

Alarm type	Setting range
High limit alarm	–Input span to Input span℃(℉)*1
Low limit alarm	–Input span to Input span℃ (℉)*1
High/Low limits alarm	0 to Input span℃ (℉)*1
High/Low limit range alarm	0 to Input span℃ (℉)*1
Process high alarm	Input range low limit to Input range high limit *2
Process low alarm	Input range low limit to Input range high limit *2
High limit alarm with standby	–Input span to Input span℃ (℉)*1
Low limit alarm with standby	–Input span to Input span℃ (℉)*1
High/Low limits alarm with standby	0 to Input span℃ (℉)*1

• When the input has a decimal point, the negative low limit value is –199.9, and the positive high limit value is 999.9.
*1: For DC input, the input span is the same as the scaling span.
*2: For DC input, input range low (or high) limit is the same as the scaling low (or high) limit.

[Loop break alarm]
The alarm will be activated when the PV does not **rise** as much as the span or more within the time it takes to assess the loop break alarm after the MV has reached 100%or the output high limit value.
The alarm will also be activated when the PV does not **fall** as much value as the span or more within the time it takes to assess loop break alarm after the MV has reached 0% or the output low limit value.
When the control action is Direct (Cooling), read **“fall”** for “rise” and vice versa.

5.4 Auxiliary function setting mode 1

Press the key for approx. 3 seconds while holding down the ▽ key in the PV/SV display mode. The unit enters Auxiliary function setting mode 1.
The set values can be increased or decreased by pressing the or key.
If the key is pressed, the set value is registered, and the unit moves to the next setting item.

Character	Name, Function, Setting range	Default value
Lock	**Set value lock** • Locks the set values to prevent setting errors. The setting item to be locked depends on the selection. • When selecting Lock, set the necessary items in the Unlock status, then select Lock 1, Lock 2 or Lock 3. • Selection item: ---- (Unlock): All set values can be changed. Loc 1 (Lock 1): None of the set values can be changed. Loc2 (Lock 2): Only SV can be changed. Loc3 (Lock 3): All set values except input type can be changed. However, they reverts to their previous value after the power is turned off because they are not saved in the non-volatil memory. Be sure to select Lock 3 when changing the set value frequently via communication function. (If the value set by the communication function is the same as the value before the setting, the value will not be written in the non-volatile memory.) **Do not change any setting item in Auxiliary function setting mode 2. If any item in Auxiliary function setting mode 2 is changed, it will affect other setting items such as the SV and Alarm value.**	Unlock
SH□	**SV high limit** • Sets SV high limit. • Setting range: SV low limit to input range high limit value DC input: SV low limit to scaling high limit value (The placement of the decimal point follows the selection.)	1370℃
SL□	**SV low limit** • Sets SV low limit. • Setting range: Input range low limit value to SV high limit value DC input: Scaling low limit value to SV high limit value (The placement of the decimal point follows the selection.)	-200℃
So□	**Sensor correction** • Sets the sensor correction value. This corrects the input value from the sensor. When a sensor cannot be set at the exact location where control is desired, temperatures measured by the sensor may deviate from the temperature in the controlled location. When controlling with plural controllers, sometimes the measured temperatures (input value) do not concur due to differences in sensor accuracy or dispersion of load capacities. In such a case, the control can be set at the desired temperature (SV) by adjusting the input value of sensors. However, it is effective within the input rated range regardless of the sensor correction value. PV after sensor correction= Current PV+ (Sensor correction value) • Setting range: –100.0 to 100.0()DC input: –1000 to 1000 (The placement of the decimal Point follows the selection.)	0.0℃

Character	Name, Function, Setting range	Default value
cōhL	**Communication protocol** • Selects communication protocol. • Available only when the Serial communication (option) is added • Selection item: noōL (Shinko protocol) ōodA (Modbus ASCII) ōodr (Modbus RTU)	Shinko protocol
cōno	**Instrument number** • Sets the instrument number. (The instrument number should be set individually when communicating by connecting plural instruments in Serial communication. Otherwise it is impossible to communicate.) • Available only when the Serial communication (option) is added • Setting range: 0 to 95	0
cōhP	**Communication speed** • Selects the communication speed. (The communication speed of the controller must be equal to that of host computer. Otherwise communication is impossible.) • Available only when the Serial communication (option) is added • Selection item: □□24 (2400bps), □□48 (4800bps), □□96 (9600bps), □192 (19200bps)	9600bps
cōPr	**Parity** • Selects the parity. • Not available if the Serial communication (option) is not added or if Shinko protocol is selected during the Communication protocol selection. • Selection item: nonE (No parity), EUEn (Even parity) odd□ (Odd parity)	Even parity
cōhr	**Stop bit** • Selects the stop bit. • Not available if the Serial communication (option) is not added or if Shinko protocol is selected during the Communication protocol selection mode. • Selection item: □□□1 (Stop bit 1), □□□2 (Stop bit 2)	1

5.5 Auxiliary function setting mode 2

Press the ▽ key for approx. 3 seconds while holding down the △ key in the PV/SV display mode. The unit enters Auxiliary function setting mode 2.
The set values can be increased or decreased by pressing the △ or ▽ key.
If the ⟲ key is pressed, the set value is registered, and the unit moves to the next setting item.

If Lock 3 is selected in the Set value lock selection, release Lock 3 to Unlock, then change each set value in Auxiliary function setting mode 2.

Character	Name, Function, Setting range	Default value
InōE	**Input type** • An input type from thermocouple (10 types), RTD (2 types), DC current (2 types), DC voltage (4 types) and the unit/can be selected. •When changing the input from DC voltage to other inputs, **remove the sensor connected to this controller, then change the input. If the input is changed with the sensor connected, the input circuit may break.**	K (–200 to 1370)

Input type	Input range								
K	tC	–200	to	1370 ℃	tF	–320	to	2500 ℃
	tC	–199.9	to	400.0 ℃	tF	–199.9	to	750.0 ℃
J	JC	–200	to	1000 ℃	JF	–320	to	1800 ℃
R	rC	0	to	1760 ℃	rF	0	to	3200 ℃
S	SC	0	to	1760 ℃	SF	0	to	3200 ℃
B	bC	0	to	1820 ℃	bF	0	to	3300 ℃
E	EC	–200	to	800 ℃	EF	–320	to	1500 ℃
T	TC	–199.9	to	400.0 ℃	TF	–199.9	to	750.0 ℃
N	nC	–200	to	1300 ℃	nF	–320	to	2300 ℃
PL-Ⅱ	PLC	0	to	1390 ℃	PLF	0	to	2500 ℃
C(W/Re5-26)	CC	0	to	2315 ℃	CF	0	to	4200 ℃
Pt100	PtC	–199.9	to	850.0 ℃	PtF	–199.9	to	999.9 ℃
JPt100	JPtC	–199.9	to	500.0 ℃	JPtF	–199.9	to	900.0 ℃
Pt100	PtC	–200	to	850 ℃	PtF	–300	to	1500 ℃
JPt100	JPtC	–200	to	500 ℃	JPtF	–300	to	900 ℃
4 to 20mA DC	4 20A	–1999 to 9999						
0 to 20mA DC	0 20A	–1999 to 9999						
0 to 1V DC	0 1V	–1999 to 9999						
0 to 5V DC	0 5V	–1999 to 9999						
1 to 5V DC	1 5V	–1999 to 9999						
0 to 10V DC	0 10V	–1999 to 9999						

SrLH	**Scaling high limit** • Sets scaling high limit value. • Available only for the DC input • Setting range: Scaling low limit value to Input range high limit value (The placement of the decimal point follows the selection.)	9999
SrLL	**Scaling low limit** • Sets scaling low limit value. • Available only for the DC input • Setting range: Input range low limit value to scaling high limit value(The placement of the decimal point follows the selection.)	–1999
dP	**Decimal point place** • Selects the decimal point place. • Available only for DC input • Selection item: 0 (No decimal point) 0.0 (1 digit after the decimal point) 0.00 (2 digits after the decimal point) 0.000 (3 digits after the decimal point)	No decimal point
FILT	**PV filter time constant** • Sets PV filter time constant. However, if the value is set too large, it affects control result due to the delay of response. • Setting range: 0.0 to 10.0 seconds	0.0 seconds

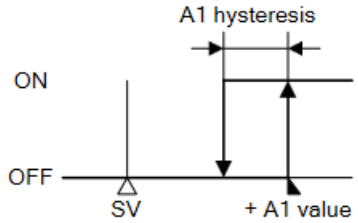
Character	Name, Function, Setting range	Default value
oLH□	**OUT1 high limit** • Sets the OUT1 high limit value. Not available for ON/OFF control • Setting range: OUT1 low limit value to 100% (Relay contact output, Non-contact voltage output) OUT1 low limit value to 105% (DC current output)	100%
oLL□	**OUT1 low limit** • Sets OUT1 low limit value. Not available for ON/OFF control • Setting range: 0% to OUT1 high limit value (Relay contact output, Non-contact voltage output) –5% to OUT1 high limit value (DC current output)	0%
HY4□	**OUT1 ON/OFF hysteresis** • Sets ON/OFF hysteresis for OUT1. Available for ON/OFF control • Setting range: 0.1 to 100.0() DC input: 1 to 1000 (The placement of the decimal point follows the selection.)	1.0
cRcF	**OUT2 action mode** • Selects OUT2 cooling action from air cooling, oil cooling and water cooling. Not available if Heating/Cooling control (option) is not added or if OUT2is in ON/OFF control. • Selection item: AIr□ (Air cooling, linear characteristic) oIL□ (Oil cooling, 1.5th power of the linear characteristic) WAr□ (Water cooling, 2nd power of the linear characteristic)	Air cooling
oLHb	**OUT2 high limit** • Sets the high limit value for OUT2. • Not available if Heating/Cooling control (option) is not added or if OUT2 is in ON/OFF control. • Setting range: OUT2 low limit value to 100% (Relay contact output, Non-contact voltage output) OUT2 low limit value to 105% (DC current output)	100%
oLLb	**OUT2 low limit** • Sets the low limit value for OUT2. • Not available if Heating/Cooling control (option) is not added or if OUT2is in ON/OFF control. • Setting range: 0% to OUT2 high limit value (Relay contact output, Non-contact voltage output) –5% to OUT2 high limit value (DC current output)	0%
db□□	**Overlap band/Dead band** • Sets Overlap band/Dead band for OUT1 and OUT2. + set value: Dead band, –set value: Overlap band • Not available if Heating/Cooling control (option) is not added. • Setting range: –100.0 to 100.0℃(℉) DC input: –1000 to 1000 (The placement of the decimal point follows the selection.)	0.0℃

Character	Name, Function, Setting range	Default value
HY5b	**OUT2 ON/OFF hysteresis** • Sets ON/OFF hysteresis for OUT2. • Available when Heating/Cooling control (option) is added and whenOUT2 is in ON/OFF control. • Setting range: 0.1 to 100.0(), DC input: 1 to 1000 (The placement of the decimal point follows the selection.)	1.0℃
AL 1F	**A1 type** • Selects Alarm 1 type.[Note] When an alarm type is changed, the alarm value reverts to the default value 0 (0.0). • Selection item: ---- : No alarm action H□□□ : High limit alarm L□□□ : Low limit alarm HL□□ : High/Low limits alarm oI d□ : Hi/Lo limit range alarm A5□□ : Process high alarm rA5□ : Process low alarm H□□□ : High limit alarm with standby L□□□ : Low limit alarm with standby HL□□ : High/Low limits alarm w/standby	No alarm action
AL2F	**A2 type** • Selects Alarm 2 type.[Note] When an alarm type is changed, the alarm value reverts to the default value 0 (0.0). • Available only when A2 option is added • Selection items are the same as those of A1 type selection.	No alarm action
A 1LA	**A1 action Energized/De-energized** • Selects A1 action Energized/De-energized. • Not available if No alarm action is selected during the A1 type selection. • Selection item: noAL (Energized) rEV5 (De-energized)	Energized
A2LA	**A2 action Energized/De-energized** • Selects Energized or De-energized for A2 action. • Not available if No alarm action is selected during the A2 type selection or if A2 (option) is not added. • Selection items are the same as those of A1 action Energized/ De-energized selection.	Energized
A 1HY	**A1 hysteresis** • Sets A1 hysteresis. • Not available if No alarm action is selected during the A1 type selection • Setting range: 0.1 to 100.0℃(℉), DC input: 1 to 1000 (The placement of the decimal point follows the selection	1.0℃
A2HY	**A2 hysteresis** • Sets A2 hysteresis. • Not available if No alarm action is selected during the A2 type selection or if A2 (option) is not added. • Setting range is the same as those of A1 hysteresis setting.	1.0℃

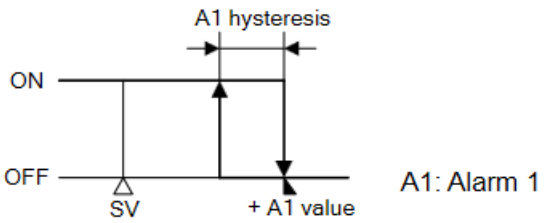
Character	Name, Function, Setting range	Default value
A1dY	**A1 action delay timer** • Sets A1 action delay timer. When setting time has elapsed after the input enters the alarm output range, the alarm is activated. • Not available if No alarm action is selected during the A1 type selection. • Setting range: 0 to 9999 seconds	0 seconds
A2dY	**A2 action delay timer** • Sets A2 action delay timer. When setting time has elapsed after the input enters the alarm output range, the alarm is activated. • Not available if No alarm action is selected during the A2 type selection or if A2 option is not added. • Setting range: 0 to 9999 seconds	0 seconds
conF	**Direct/Reverse action** • Selects Reverse (Heating) or Direct (Cooling) control action. • Selection item:[Reverse (Heating), [Direct (Cooling)]	Reverse (Heating) action
AT_b	**AT bias** • Sets the bias value when AT is performing. • Not available for the DC input • Setting range: 0 to 50℃(0 to 100℉) With a decimal point: 0.0 to 50.0℃(0.0 to 100.0℉)	20℃
SV_b	**SVTC bias** • The SV adds SVTC bias value to the value received by the SVTC command (Set value digital transmission). • Available only when the Serial communication (option) is added. • Setting range: Converted value of20% of the rated value. DC input: Converted value of20% of the scaling span (The placement of the decimal point follows the selection.) However, the negative minimum value is –1999, –199.9, –19.9or –1.999.	0
SV□2	**SV2 indication** • Selects either Indication or No indication of SV2. • Not available if Serial communication (option) is added. • Selection item: on□ (Indication), oFF□ (No indication)	Indication
EoUT	**Output status when input abnormal** • Selects the output status of OUT1 and OUT2 (DR, RS, DA option) when DC input is overscale or underscale. Available only for DC current output type with DC input. • Selection item (See page 42.) oFF□ : Outputs OFF(4mA) or OUT1(OUT2) low limit value. on□ : Outputs a value between OFF(4mA) and ON(20mA) or between OUT1(OUT2) low limit value and OUT1(OUT2) high limit value, depending on a deviation.	Outputs OFF(4mA) or OUT1(OUT2) low limit value
mAnU	**OUT/OFF Key function** • Selects whether the OUT/OFF Key (ⓘ) is used for “Control output OFF function” or for “Auto/Manual control function”. • Selection item: oFF□ (Control output OFF function), mAnU (Auto/Manual control function)	Control output OFF function

[Energized/De-energized]

When alarm action Energized is selected, the alarm output (between terminals 7-8, or 12-13) is conducted (ON) while the alarm output indicator is lit.
The alarm output is not conducted (OFF) while the alarm output indicator is not lit.
See (Fig. 5.5-1).
When alarm action De-energized is selected, the alarm output (between terminals 7-8, or 12-13) is not conducted (OFF) while the alarm output indicator is lit.
The alarm output is conducted (ON) while the alarm output indicator is not lit.
See (Fig. 5.5-2).



High limit alarm (when Energized is set)
(Fig. 5.5-1)



High limit alarm (when De-energized is set)
(Fig. 5.5-2)

5.6 Control output OFF function

- A function to pause the control action or turn the control output of the unused instrument of the plural units OFF even if the power to the instrument is supplied.
- Pressing the key (OUT/OFF Key) for approx. 1 sec from any mode turns the control output OFF.

[oFF] is indicated in the PV display while this function is working.
In this status, pressing the key again for approx. 1 second cancels this function.

- Once the Control output OFF function is enabled, the function cannot be released even if the power to the instrument is turned OFF and ON again.

To cancel this function, press the key again for approx. 1 second.

5.7 Auto/Manual control switching function

- Select “Auto/Manual control function” during the “OUT/OFF Key function” selection in Auxiliary function setting mode 2.
- Press the key in the PV/SV display mode. Auto/Manual control can be switched.
- If the control action is changed from automatic to manual control, the MV on the SV display flashes. The control can be performed manually by increasing or decreasing the MV in the SV Display with the △ or ▽ key.
- By pressing the key again, the unit reverts to the PV/SV display (automatic control) mode.

When the power supply to the instrument is turned ON, automatic control starts.

- When control is changed from automatic to manual and vice versa, the balanceless-bumpless function works to prevent sudden change of the MV.
- If Auto/Manual control function is selected, Control output OFF function is disabled.

5.8 MV indication

- If the key is pressed for approx. 3 seconds in the PV/SV display mode, the MV will be indicated in the SV Display. During the MV indication, the last point on the right in the SV Display flashes at a cycle of 500ms.
- By pressing the key again, the unit reverts to the PV/SV display mode.

6. Operation

After the unit is mounted to the control panel and wiring is completed, operate the unit following the procedures below.

(1) Turn the power supply to the JCR-33A, JCD-33A ON.

Thermocouple and RTD inputs: Sensor input characters and temperature unit are indicated in the PV Display, and the input range high limit value is indicated in the SV Display for approx. 3 seconds after the power is switched ON. See (Table 6-1).

DC input: Sensor input characters are indicated in the PV Display, and the scaling high limit value is indicated in the SV Display for approx. 3 seconds after the power is switched ON. See (Table 6-1).
However, if the scaling high limit value has been changed during the Scaling high limit setting, the changed value is indicated in the SV Display.
During this time, all outputs and the LED indicators are in OFF status.

After that, control starts, indicating the PV in the PV Display, and SV1 or SV2 in the SV Display. When the Control output OFF function is working, [oFF□] is indicated in the PV Display. To cancel this function, press the ⏻ key again for approx. 1 second.

(Table 6-1)

Input type	℃		℉	
	PV display	SV display	PV display	SV display
K	t□□C	1370	t□□F	2500
	t□.C	400.0	t□.F	750.0
J	J□□C	1000	J□□F	1800
R	r□□C	1760	r□□F	3200
S	S□□C	1760	S□□F	3200
B	b□□C	1820	b□□F	3300
E	E□□C	□800	E□□F	1500
T	T□.C	400.0	T□.F	750.0
N	n□□C	1300	n□□F	2300
PL-Ⅱ	PL2C	1390	PL2F	2500
C (W/Re5-26)	C□□C	2315	C□□F	4200
Pt100	Pt.C	850.0	Pt.F	999.9
JPt100	JPt.C	500.0	JPt.F	900.0
Pt100	Pt□C	□850	Pt□F	1500
JPt100	JPtC	□500	JPtF	□900
4 to 20mA DC	420A	Scaling high limit value		
0 to 20mA DC	020A			
0 to 1V DC	0□1V			
0 to 5V DC	0□5V			
1 to 5V DC	1□5V			
0 to 10V DC	0□10V			

(2) Input each set value.

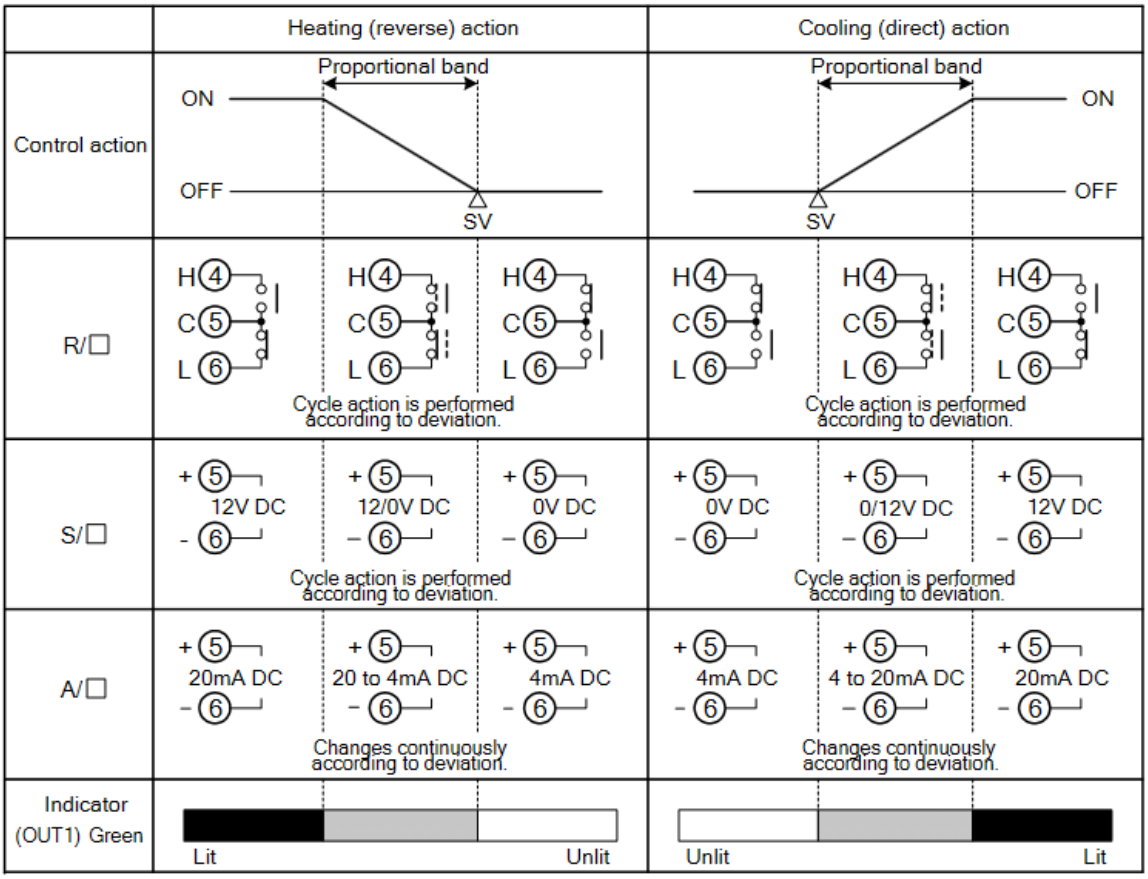
Input each set value, referring to “5. Setup”.

(3) Turn the load circuit power ON.

Control action starts so as to keep the control target at the SV.

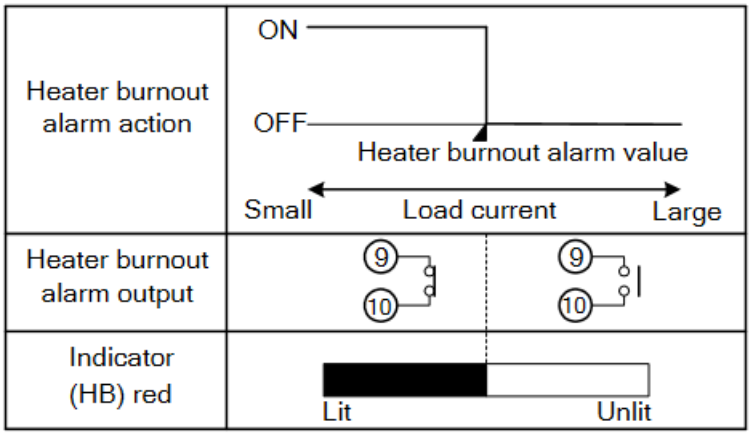
7. Action explanation

7.1 OUT1 action



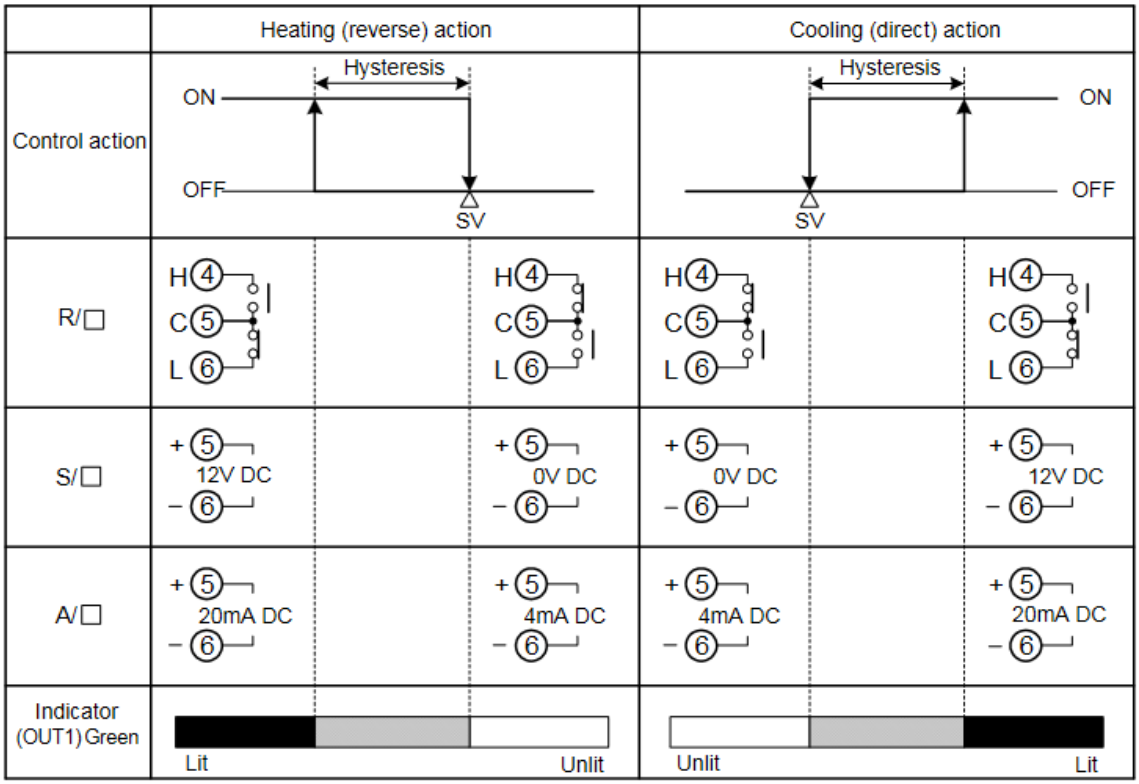
: Turns ON (lit) or OFF (unlit).

7.2 Heater burnout alarm action (option)



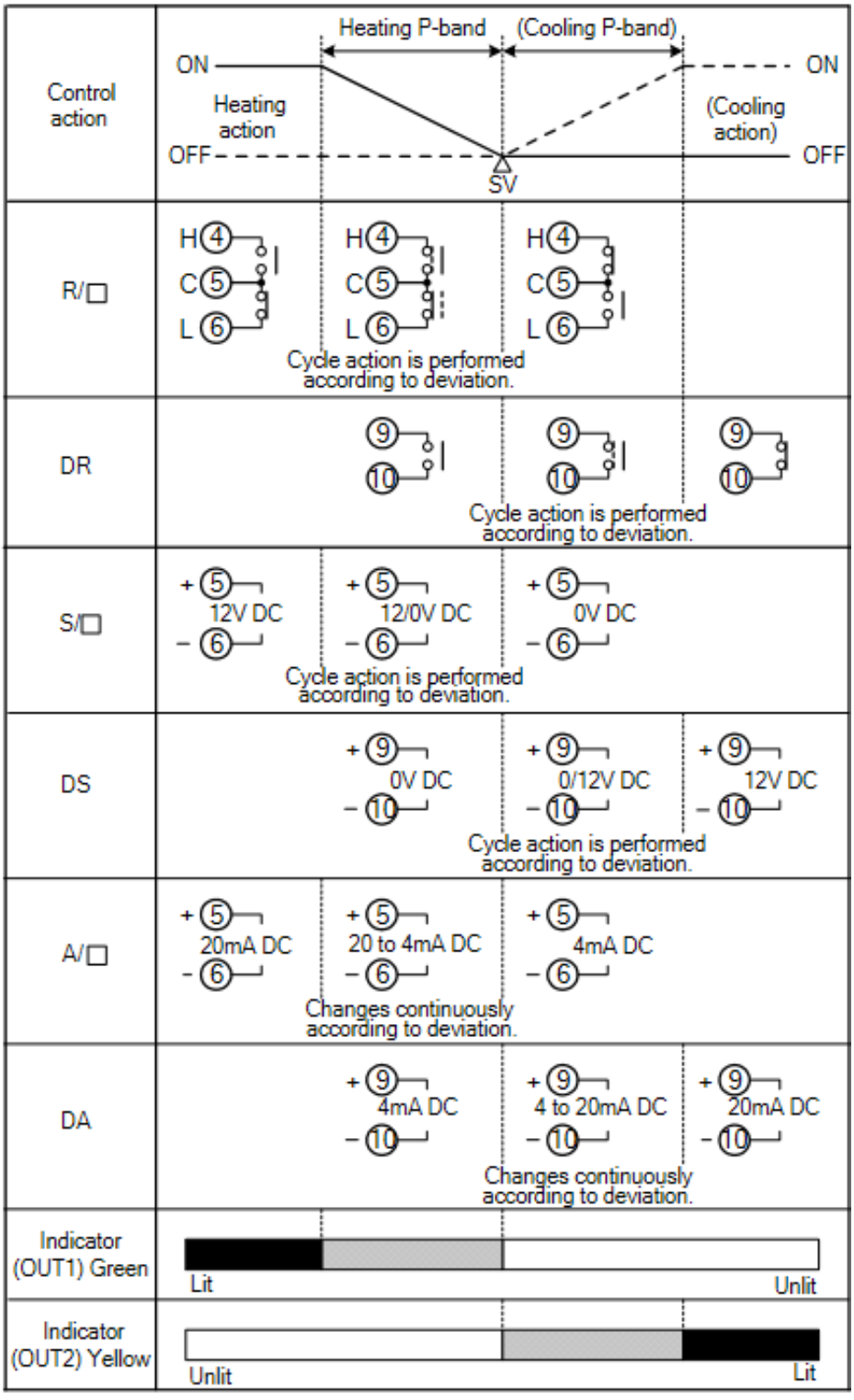
When the Heating/Cooling control (option) is added, terminals 12 and 13 are used for the Heater burnout alarm.

7.3 OUT1 ON/OFF control action



: Turns ON (lit) or OFF (unlit).

7.4 OUT2 (Heating/Cooling control) action (option)

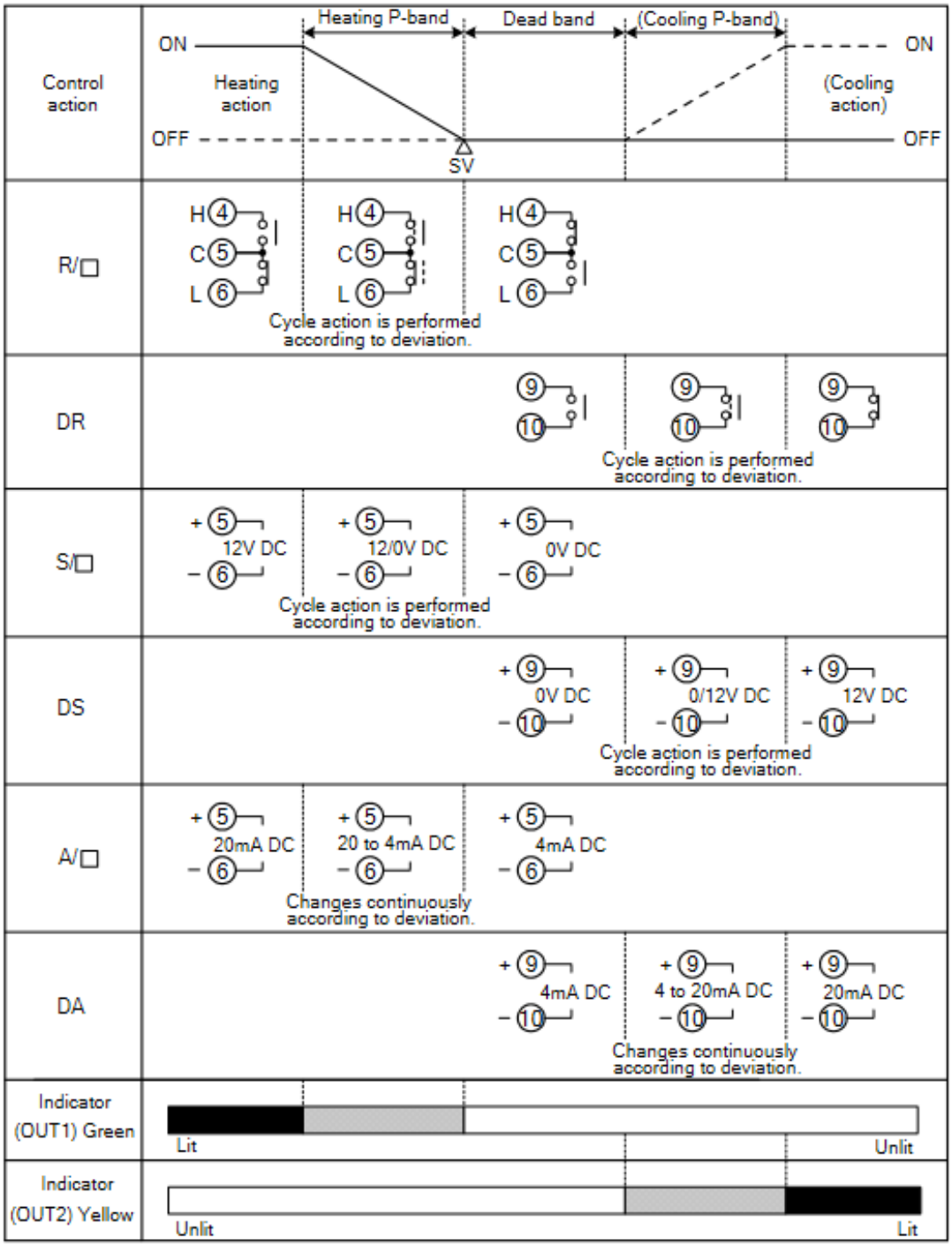


: Turns ON (lit) or OFF (unlit).

: Represents Heating control action.

: Represents Cooling control action.

When setting Dead band

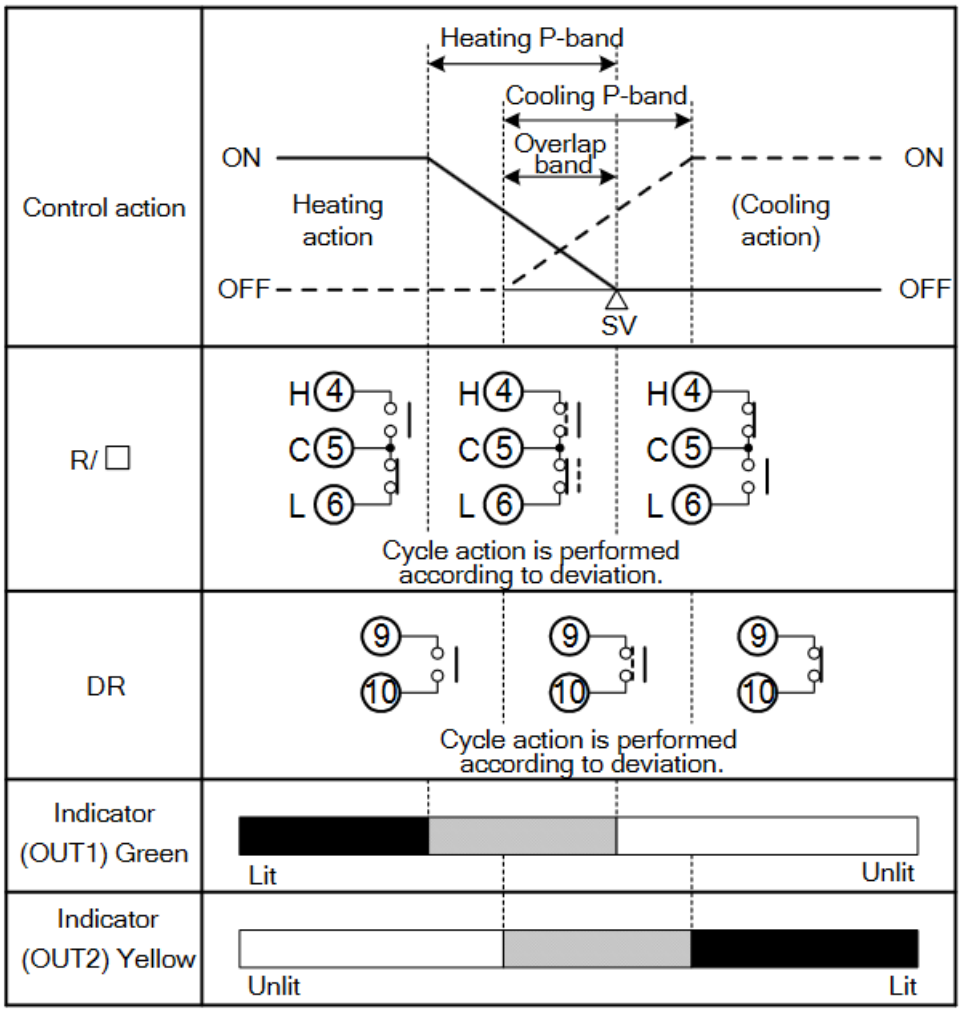


: Turns ON (lit) or OFF (unlit).

: Represents Heating control action.

: Represents Cooling control action.

When setting Overlap band with Relay contact output

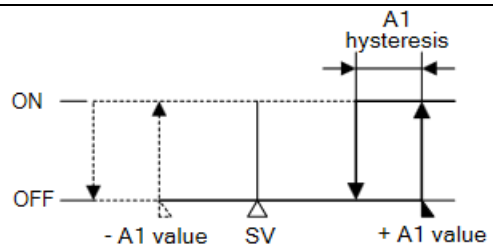
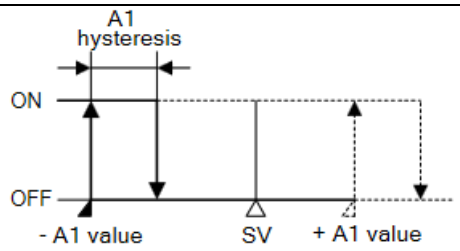
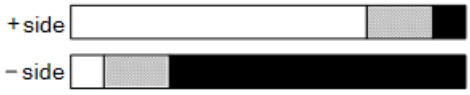
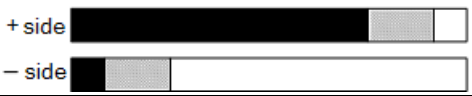
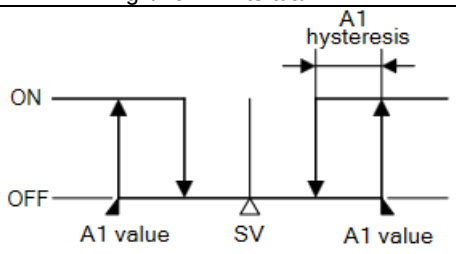
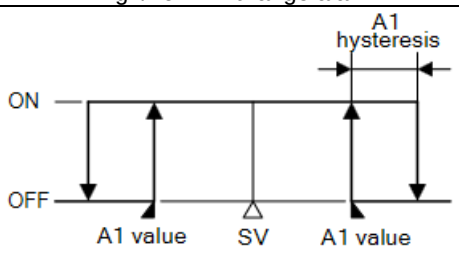
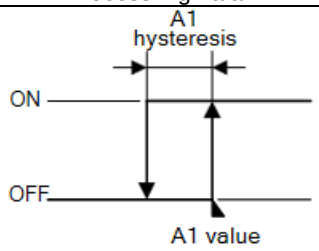
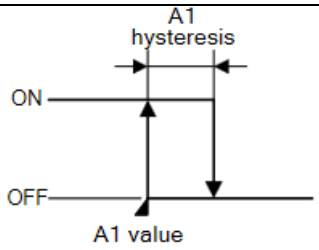
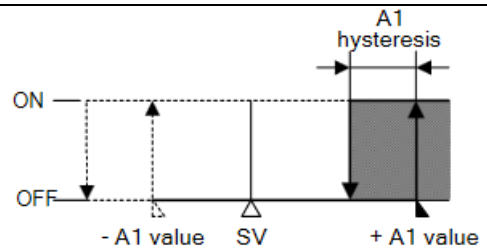
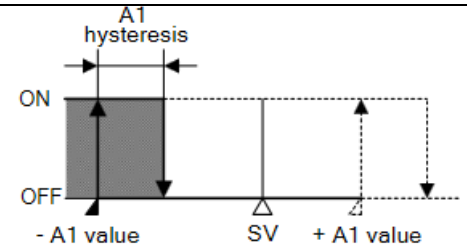
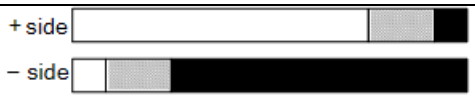
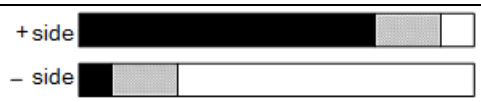
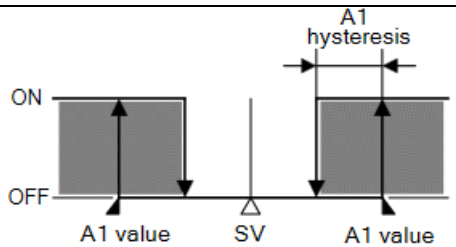
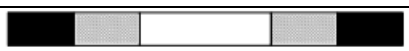


: Turns ON (lit) or OFF (unlit).

: Represents Heating control action.

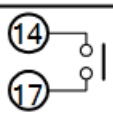
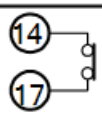
: Represents Cooling control action.

7.5 A1 and A2 action

	High limit alarm	Low limit alarm
Alarm action		
Alarm output		
	High/Low limits alarm	High/Low limit range alarm
Alarm action		
Alarm output		
	Process high alarm	Process low alarm
Alarm action		
Alarm output		
	High limit alarm with standby	Low limit alarm with standby
Alarm action		
Alarm output		
	High/Low limits alarm with standby	
		: A1 output terminals 7, 8: ON : A1 output terminals 7, 8: ON or OFF : A1 output terminals 7, 8: OFF : Standby functions.
Alarm output		

For A2 output, use terminals 12 and 13.
A1 and A2 indicators light when their output terminals are closed, and go off when their output terminals are opened.

7.6 SV1/SV2 external selection

	SV1	SV2
SV1/SV2 external selection		
Indicator Green	SV1 Lit SV2 Unlit	SV1 Unlit SV2 Lit

If the Serial communication option is added, this function is disabled.

SV1 or SV2 can be selected by the external operation.
Between terminals 14 and 17 Open : SV1 can be selected.
Between terminals 14 and 17 Closed : SV2 can be selected.
SV1 or SV2 cannot be selected by the external operation during setting mode or AT

8. Control action explanations

8.1 PID

(1) Proportional band (P)

Proportional action is the action during which the control output varies in proportion to the deviation between the SV and the PV.
If the proportional band is narrowed, even if the output changes by a slight variation of the PV, better control results can be obtained as the offset decreases.
However, if the proportional band is narrowed too much, even slight disturbances may cause variation in the PV, control action changes to ON/OFF control and the so-called hunting phenomenon occurs.
Therefore, when the PV comes to the balanced position near the SV and a constant temperature is maintained, the most suitable value is selected by gradually narrowing the proportional band while observing the control results.

(2) Integral time (I)

Integral action is used to eliminate offset. When the integral time is shortened, there turning speed to the set point is accelerated. However, the cycle of oscillation is also accelerated and stability becomes unfavorable.

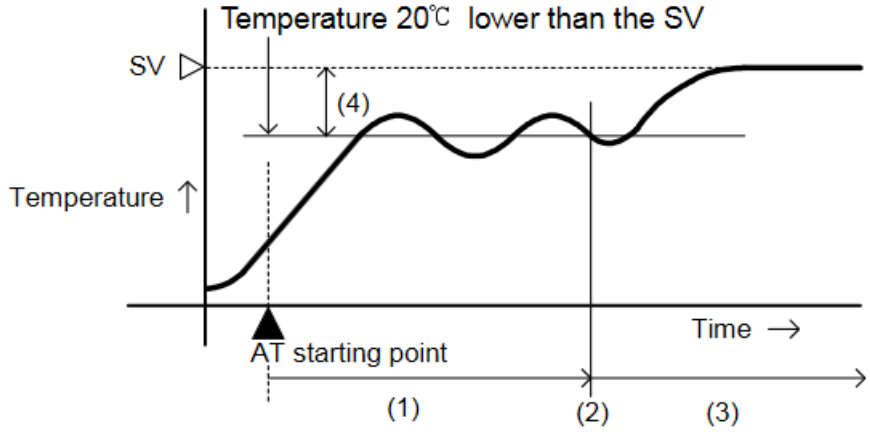
(3) Derivative time (D)

Derivative action is used to restore the change in the PV according to the rate-of-change. It reduces the amplitude of overshoot and undershoot width.
If the derivative time is shortened, restoring value becomes small, and if the derivative time is adjusted to be longer, an excessive returning phenomenon may occur and the control system may oscillate.

8.2 AT of this controller

In order to set each value of P, I, D and ARW automatically, the AT process should be made to fluctuate to obtain an optimal value.
For DC input, the AT process will fluctuate around the SV for conditions of (A), (B) and(C) below.
Sometimes the AT process will not fluctuate if AT is performed at or near room temperature. Therefore AT might not finish normally.

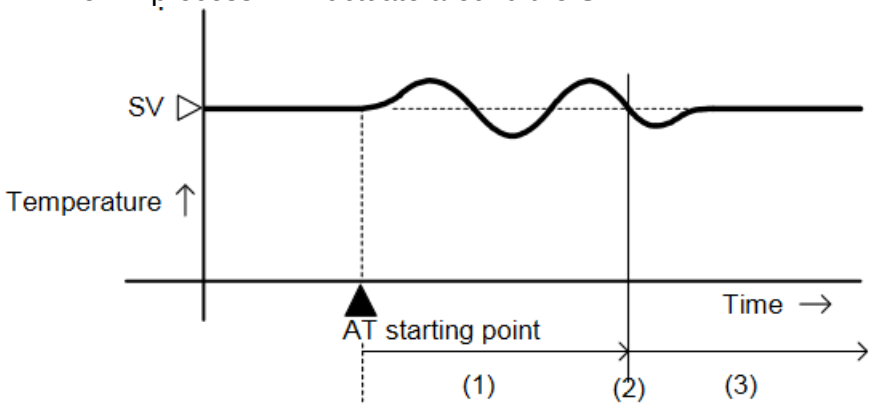
(A) In the case of large difference between the SV and PV as the temperature is rising.
When AT bias is set to 20˚C, the AT process will fluctuate at a temperature 20˚C lowerthan the SV.



(1) Calculating PID constant
(2) PID constant calculated
(3) Controlled by the PID constant set by AT.
(4) AT bias value

(Fig. 8.2-1)

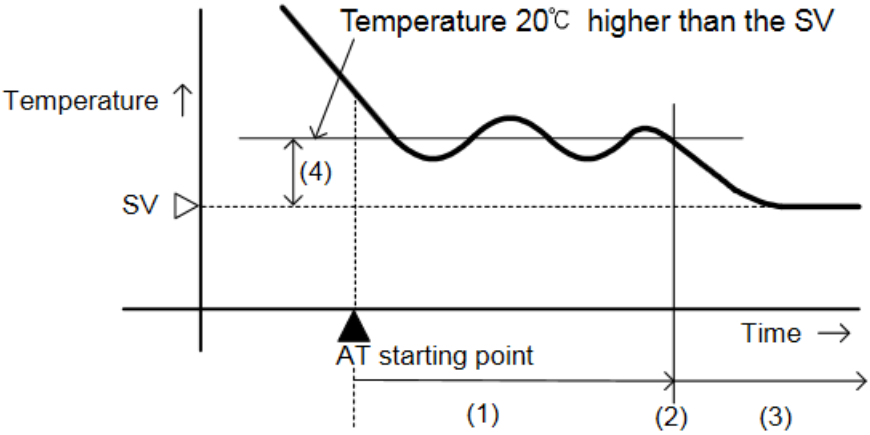
(B) When the control is stable or when PV is within ±20˚C of the SV.
The AT process will fluctuate around the SV.



(1) Calculating PID constant
(2) PID constant calculated
(3) Controlled by the PID constant set by AT.

(Fig. 8.2.2)

(C) In the case of a large difference between the SV and PV as the temperature is falling
When AT bias is set to 20˚C, the AT process will fluctuate at a temperature 20˚C higher than the SV.

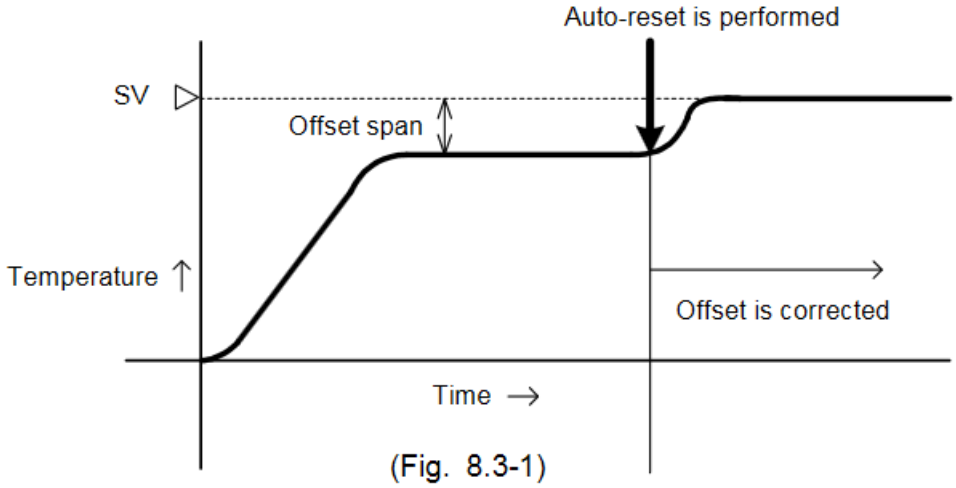


(1) Calculating PID constant
(2) PID constant calculated
(3) Controlled by the PID constant set by AT.
(4) AT bias value

(Fig. 8.2-3)

8.3 Auto-reset (offset correction)

Auto-reset is performed to correct the offset at the point at which PV indication is stabilized within the proportional band during the PD control.
Since the corrected value is internally memorized, it is not necessary to perform the auto-reset again as long as the process is the same.
However, when the proportional band (P) is set to 0, the corrected value is cleared.



(Fig. 8.3-1)

9. Specifications

9.1 Standard specifications

Mounting : Flush
Setting : Membrane sheet key
Display
JCR-33A PV display: Red LED 4 digits, character size, 11.2 x 5.4 (H x W)mm
SV display: Green LED 4 digits, character size, 11.2 x 5.4 (H x W)mm
JCD-33A PV display: Red LED 4 digits, character size, 18 x 8 (H x W)mm
SV display: Green LED 4 digits, character size, 12.6 x 6(H x W)mm
Accuracy (Setting, indication)
Thermocouple : Within±0.2% of each input span±1digit or within±2℃(4℉), whichever is greater
However, R, S inputs, 0 to 200℃(0 to 400℉): Within±6℃(12℉)
B input, 0 to 300℃(0 to 600℉): Accuracy is not guaranteed.
K, J, E, T, N inputs, less than 0(32): Within0.4% of each input span1digit
RTD : Within±0.1% of each input span±1digit or within±1℃(2℉), whichever is greater
DC Voltage and Current:
Within±0.2% of each input span±1digit
Input sampling period: 250ms
Input
Thermocouple : K, J, R, S, B, E, T, N, PL-Ⅱ, C (W/Re5-26)
External resistance: 100Ωor less,
however, for B, 40Ωor less
RTD: Pt100, JPt100, 3-wire system
Allowable input lead wire resistance: 10Ωor less per wire
DC current: 0 to 20mA DC, 4 to 20mA DC
Input impedance: 50Ω
[50Ωshunt resistor (sold separately) must be connected between input terminals.]
Allowable input current: 50mA or less
[When 50Ωshunt resistor (sold separately) is used]

DC voltage: 0 to 1V DC:
Input impedance: 1MΩor more
Allowable input voltage: 5V or less
Allowable signal source resistance: 2kΩor less

0 to 5V DC, 1 to 5V DC, 0 to 10V DC:
Input impedance: 100kΩor more
Allowable input voltage: 15V or less
Allowable signal source resistance: 100Ωor less

Input type	Input range		Resolution
K	–200 to 1370 ℃	–320 to 2500 ℉	1℃(℉)
	–199.9 to 400.0℃	–199.9 to 750.0℉	0.1℃(℉)
J	–200 to 1000 ℃	–320 to 1800 ℉	1℃(℉)
R	0 to 1760 ℃	0 to 3200 ℉	1℃(℉)
S	0 to 1760 ℃	0 to 3200 ℉	1℃(℉)
B	0 to 1820 ℃	0 to 3300 ℉	1℃(℉)
E	–200 to 800 ℃	–320 to 1500 ℉	1℃(℉)
T	–199.9 to 400.0℃	–199.9 to 750.0℉	0.1℃(℉)
N	–200 to 1300℃	–320 to 2300 ℉	1℃(℉)
PL-Ⅱ	0 to 1390 ℃	0 to 2500 ℉	1℃(℉)
C(W/Re5-26)	0 to 2315 ℃	0 to 4200 ℉	1℃(℉)
Pt100	–199.9 to 850.0℃	–199.9 to 999.9℉	0.1℃(℉)
JPt100	–199.9 to 500.0℃	–199.9 to 900.0℉	0.1℃(℉)
Pt100	–200 to 850 ℃	–300 to 1500 ℉	1℃(℉)
JPt100	–200 to 500 ℃	–300 to 900 ℉	1℃(℉)
4 to 20mA DC	–1999 to 9999 *1 *2		1
0 to 20mA DC			
0 to 1V DC	–1999 to 9999 *1		1
0 to 5V DC			
1 to 5V DC			
0 to 10V DC			

*1: For DC input, input range and decimal point place are changeable.
*2: 50shunt resistor (sold separately) must be connected between input terminals.

Control output (OUT1)

Relay contact: 1a1b
Control capacity: 3A 250V AC (resistive load)
1A 250V AC (inductive load cosØ=0.4)
Electrical life: 100,000 cycles
Non-contact voltage: 12^{+20}V DC, maximum 40mA (short circuit protected)
Number of connectable units in parallel when using Shinko SSR:
SA-400 series: 5 units
SA-500 series: 2 units
DC current : 4 to 20mA DC
Load resistance, maximum 550

A1 output

When A1 action is set as energized, the alarm action point is set by the ±deviation from the SV (except Process alarm).
When the input is out of the range, the output turns ON or OFF (in the case of High/Low limit range alarm).
When the alarm action is set as De-energized, the output acts conversely.
Setting accuracy : The same as the Indicating accuracy
Action : ON/OFF action
Hysteresis : Thermocouple, RTD input: 0.1 to 100.0℃(℉)
DC current, voltage input: 1 to 1000
(The placement of the decimal point follows the selection.)

Output : Relay contact, 1a
Control capacity: 3A 250V AC (resistive load)
Electrical life: 100,000 cycles

Control action

- PID control (with AT function)• PI control: When derivative time is set to 0
- PD control (with auto-reset function): When integral time is set to 0
- P control (with auto-reset function): When integral and derivative times are set to 0
- ON/OFF control: When OUT1 proportional band is set to 0

OUT1 proportional band (P): Thermocouple: 0 to 1000℃(0 to 2000℉)
RTD: 0.0 to 999.9℃(0.0 to 999.9℉)
DC current, voltage: 0.0 to 100.0%
[ON/OFF control when set to 0℃(℉), 0.0℃(℉) or 0.0%]
Integral time (I) : 0 to 1000 sec (off when set to 0)
Derivative time (D) : 0 to 300 sec (off when set to 0)
OUT1 proportional cycle : 1 to 120 sec (Not available for DC current output type)
ARW : 0 to 100%
OUT1 ON/OFF hysteresis : Thermocouple, RTD input: 0.1 to 100.0℃(℉)
DC current, voltage input: 1 to 1000 (The placement of the decimal point follows the selection.)

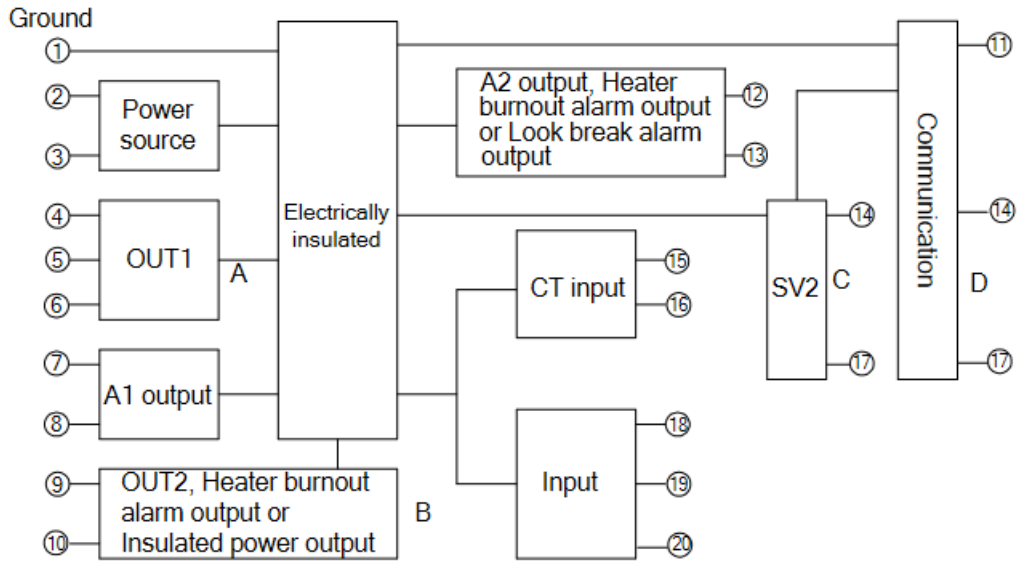
SV1/SV2 external selection: SV1 and SV2 can be selected by external contact.
Contact OPEN between terminals 14 and 17 : SV1
Contact CLOSED between terminals 14 and 17 : SV2
Contact current: 6mA

Supply voltage: 100 to 240V AC 50/60Hz, 24V AC/DC 50/60Hz

Allowable voltage fluctuation range:
100 to 240V AC : 85 to 264V AC
24V AC/DC : 20 to 28V AC/DC

Ambient temperature: 0 to 50(32 to 122)
Ambient humidity : 35 to 85%RH (non-condensing)
Power consumption : Approx. 8VA

Circuit Insulation configuration



- When OUT1 is non-contact voltage or DC current output type and OUT2 is Non-contact voltage or DC current output type, A is not electrically insulated from B.
- When OUT1 is non-contact voltage or DC current output type, A is not electrically insulated from C, and A is not electrically insulated from D. When OUT2 is non-contact voltage or DC current output type, B is not electrically insulated from C, and B is not electrically insulated from D.

Insulation resistance

10MΩ or more, at 500V DC for other combinations except the above mentioned

Dielectric strength

Between input terminal and ground terminal, 1.5kV AC for 1 minute
Between input terminal and power terminal, 1.5kV AC for 1 minute
Between output terminal and ground terminal, 1.5kV AC for 1 minute
Between output terminal and power terminal, 1.5kV AC for 1 minute
Between power terminal and ground terminal, 1.5kV AC for 1 minute

Weight : JCR-33A (approx. 250g), JCD-33A, (approx. 370g)
External dimensions : JCR-33A: 48 x 96 x 110mm (W x H x D)
JCD-33A : 96 x 96 x 110mm (W x H x D)
Material : Case: Flame-resistant resin
Color : Case: Light gray
Drip-proof/Dust-proof : IP66 for the front face
Attached functions **:[Sensor correction function], [Set value lock function]**
[Input error indication]

Output status when input abnormal (*1)	Contents and Indication	Output status			
		OUT1		OUT2	
		Direct action	Reverse action	Direct action	Reverse action
on	**Overscale** Measured value has exceeded Indication range high limit value. " - - - - " flashes.	ON (20mA) Or OUT1 High limit value**(*2)**	OFF(4mA) orOUT1 low limit value	OFF(4mA) orOUT2 low limit value	ON(20mA) or OUT2 High limit value(*2)
oFF		OFF (4mA)or OUT1 low limit value			OFF(4mA)or OUT2 low limit value
on	**Underscale** Measured value has dropped below Indication range low limit value. "- - - -' flashes.	OFF (4mA) Or OUT1 low limit value	ON (20mA) Or OUT1 high limit value(*2)	ON (20mA) Or OUT2 high limit value**(*2)**	OFF(4mA) Or OUT2 low limit value
oFF			OFF(4mA) orOUT1 low limit value	OFF(4mA) orOUT2 low limit value	

(*1)This is only available for DC input and when OUT1 is DC current output type.
If OUT1 is not DC current output, the output status will be the same one as when oFF is selected during “Output status when input abnormal”.
For manual control, the preset MV is outputted.

(*2)Outputs a value between OFF (4mA) and ON (20mA) or between OUT1 (or OUT2) low limit value and OUT1 (or OUT2) high limit value, depending on deviation.

Thermocouple, RTD input:

Input	Input range	Indication range	Control range
K，T	–199.9 to 400.0℃	–199.9 to 450.0 ℃	–205.0 to 450.0 ℃
	–199.9 to 750.0℉	–199.9 to 850.0 ℉	–209.0 to 850.0 ℉
Pt100	–199.9 to 850.0 ℃	–199.9 to 900.0 ℃	–210.0 to 900.0 ℃
	–200 to 850 ℃	–210 to 900 ℃	–210 to 900 ℃
	–199.9 to 999.9 ℉	–199.9 to 999.9 ℉	–211.0 to 1099.9 ℉
	–300 to 1500 ℉	–318 to 1600 ℉	–318 to 1600 ℉
JPt100	–199.9 to 500.0 ℃	–199.9 to 550.0 ℃	–206.0 to 550.0 ℃
	–200 to 500 ℃	–207 to 550 ℃	–207 to 550 ℃
	–199.9 to 900.0 ℉	–199.9 to 999.9 ℉	–211.0 to 999.9 ℉
	–300 to 900 ℉	–312 to 1000 ℉	–312 to 1000 ℉

•DC input

Indication range: [Scaling low limit value – Scaling span x 1%] to [Scaling high limit value + Scaling span x 10%]
However, if the input value is out of the range –1999 to 9999, the PV display flashes "- - - -" or "- - - -".

Control range :[Scaling low limit value – Scaling span x 1%] to [Scaling high limit value + Scaling span x 10%]

•DC input disconnection: When DC input is disconnected, PV display flashes "- - - -" for 4 to 20mA DC and 1 to 5V DC inputs, and "- - - -" for 0 to 1V DC input.
For 0 to 20mA DC, 0 to 5V DC and 0 to 10V DC inputs, the PV display indicates the value corresponding with 0mA or 0V input.

[Burnout]

When the thermocouple or RTD input is burnt out, OUT1 is turned off (for DC current output type, OUT1 low limit value) and the PV display flashes "- - - -".

[Self-diagnosis]

The CPU is monitored by a watchdog timer, and when an abnormal status is found on the CPU, the controller is switched to warm-up status.

[Automatic cold junction temperature compensation](Thermocouple input type)

This detects the temperature at the connecting terminal between thermocouple and the instrument, and always maintains it at the same status as if the reference junction location temperature was at 0(32).

[Power failure countermeasure]

The setting data is backed up in non-volatile IC memory.

[Warm-up indication]

Thermocouple and RTD input: Sensor input characters and temperature unit are indicated in the PV Display, and the input range high limit value is indicated in the SV Display for approx. 3 seconds after the power is switched ON.

DC input: Sensor input characters are indicated in the PV Display, and scaling high limit value is indicated In the SV Display for approx. 3 seconds after the power is switched ON.
(However, if the scaling high limit value has been changed during the Scaling high limit setting, the changed value will be indicated In the SV Display.)

[Auto/Manual control selection]

If "Auto/Manual control function" is selected during OUT/OFF Key function selection, automatic control can be switched to manual control and vice versa by pressing the ⓘ (OUT/OFF Key) in the PV/SV display mode.

When the control action is changed from automatic to manual control and vice versa, the balanceless-bumpless function works to prevent sudden change of the MV.

When the control action is changed from automatic to manual control, the MV in the SV Display flashes.

The control can be performed manually by increasing or decreasing the MV with the △ or ▽ key.

(When the power supply to the instrument is turned on, automatic control starts.)

Accessories: Instruction manual :1 copy
Screw type mounting brackets : 1 set
CT (current transformer):
CTL-6S : 1 piece [when W(5A, 10A, 20A) option is added]
CTL-12-S36-10L1U : 1 piece [when W(50A) option is added]
Terminal cover: JCR-33A: 1 piece (when the TC option is added)
JCD-33A: 2 pieces (when the TC option is added)

9.2 Optional specifications

Alarm 2 (option code: A2)

When A2 action is set as Energized, the alarm action point is set by the ±deviation from SV (except Process alarm).
When the input is out of the range, the output turns ON or OFF (in the case of High/Low limit range alarm).
When the alarm action is set as De-energized, the output acts conversely.

- When A2 option is added, one more option Heater burnout alarm or Heating/Cooling control can be added.
- If the A2 option and LA option are added together, they use common output terminals.

Setting accuracy : The same as the Indication accuracy
Action : ON/OFF action
Hysteresis : Thermocouple, RTD input: 0.1 to 100.0˚C(˚F)
DC current, voltage input: 1 to 1000
(The placement of the decimal point follows the selection)
Output : Relay contact, 1a
Control capacity: 3A 250V AC (resistive load)
Electrical life: 100,000 cycles

Heater burnout alarm (option code: W)

Watches the heater current with CT (current transformer), and detects the heater burnout.
Heater burnout alarm is also activated when sensor is burnt out or when indication is overscale or underscale.

- When the Heater burnout alarm option is added, one more option A2 output or Heating/Cooling control can be added.
- This option cannot be added to DC current output type.

Heater rated current: 5A, 10A, 20A, 50A, Must be specified.
Setting accuracy : Within5% of heater rated current
Action : ON/OFF action
Output : Relay contact, 1a
Control capacity: 3A 250V AC (resistive load)
Electrical life: 100,000 cycles

Heating/Cooling control (option code: DR, DS, DA)

When the Heating/Cooling control option is added, one more option A2 output or Heater burnout alarm can be added.
OUT2 proportional band : 0.0 to 10.0 times OUT1 proportional band
(ON/OFF control when set to 0.0)
OUT2 integral time : The same as that of OUT1
OUT2 derivative time : The same as that of OUT1
OUT2 proportional cycle : 1 to 120 seconds
Overlap band/Dead band :
Thermocouple, RTD input : –100.0 to 100.0˚C(˚F)
DC current, voltage input : –1000 to 1000
(The placement of the decimal point follows the selection.)
OUT2 ON/OFF hysteresis:
Thermocouple, RTD input : 0.1 to 100.0˚C(˚F)
DC current, voltage input : 1 to 1000
(The placement of the decimal point follows the selection.)
Output: Relay contact output, 1a
Control capacity: 3A 250V AC (resistive load)
1A 250V AC (inductive load cosØ=0.4)
Electrical life: 100,000 cycles
Non-contact voltage output
12 V DC maximum 40mA (short circuit protected)
DC current output, 4 to 20mA DC, Load resistance: Maximum 550Ω

OUT2 action mode selection function:
One cooling action can be selected by the keypad from the following.
Air cooling (Linear characteristic)
Oil cooling (1.5th power of the linear characteristic)
Water cooling (2nd power of the linear characteristic)

Serial communication (option code: C5)

When this option is added, SV1/SV2 external selection function is disabled.
The following operations can be carried out from an external computer.
(1) Reading and setting of SV, PID values and various set values
(2) Reading of PV and action status (3) Function change
Communication line : EIA RS-485
Communication method : Half-duplex communication
Synchronization method: Start-stop synchronization
Communication speed : 2400, 4800, 9600, 19200bps (Selectable by keypad)
Parity : Even, Odd, No parity (Selectable by keypad)
Stop bit : 1 and 2 (Selectable by keypad)Data format

Data format

Communication protocol	Shinko protocol	Modbus ASCII	Modbus RTU
Start bit	1	1	1
Data bit	7	7	8
Parity	Even	Selection (Even)	Selection (No parity)
Stop bit	1	Selection (1)	Selection (1)

Data bit is automatically selected upon selecting the communication protocol.
( ): Basic set value

Digital external setting:

Receives digital set value from Shinko programmable controller (with SVTC option).
(It is necessary to set the Set value lock function to Lock 3 for the JCR and JCD.)
When the SV data from Shinko programmable controller is outside of the SV high limit or SV low limit, the JCR or JCD ignores the value, and performs the control at the SV high limit or SV low limit.

Loop break alarm (option code: LA)

Detects the breaking status on the loop such as heater burnout, sensor burnout or actuator trouble.
If LA option and A2 option are added together, they utilize common output terminals.
Setting range : Loop break alarm time: 0 to 200minutes
Loop break alarm span: 0 to 150℃(℉), 0.0 to 150.0℃(℉),
DC input: 0 to 1500 (The placement of the decimal point follows the selection.)
Output : Relay contact, 1a, Control capacity: 3A 250V AC (Resistive load)
Electrical life: 100,000 cycles

Insulated power output (option code: P24)

Output voltage: 24±3V DC (when load current is 30mA)
Ripple voltage: Within 200mV (when load current is 30mA)
Maximum load current: 30mA

Color Black (option code: BK)

Front panel frame and case: Black

Terminal cover (option code: TC)

Electrical shock protection terminal cover

10. Troubleshooting

If any malfunctions occur, refer to the following items after checking the power is being supplied to the controller.

⚠ Warning

Turn the power supply to the instrument off before wiring or checking. Working on or touching the terminal with the power switched on may result in severe injury or death due to Electric Shock.

10.1 Indication

Problem	Presumed cause and solution
The PV display is indicating [oFF].	• Control output OFF function is working. Press the ⏻ key (OUT/OFF Key) for approx. 1 second to release the function.
[----] is flashing in the PV Display.	• The thermocouple, RTD and DC voltage (0 to 1V DC) input may be burnt out. Replace each sensor. **How to check whether the sensor is burnt out** [Thermocouple] If the input terminals of the instrument are shorted, and if a value around room temperature is indicated, the instrument is likely to be operating normally, however, the sensor may be burnt out. [RTD] If approx. 100Ωresistance is connected to the input terminals between A-B of the instrument and between B-B is shorted, and if a value around 0(32) is indicated, the instrument is likely to be operating normally, however, the sensor may be burnt out. [DC voltage (0 to 1V DC)] If the input terminals of the instrument are shorted, and if a scaling low limit value is indicated, the instrument is likely to be operating normally, however, the signal wire may be disconnected. • Check whether the input terminal of thermocouple, RTD or DC voltage (0 to 1V DC) is securely mounted to the instrument terminal. Ensure that the sensor terminals are securely connected to the instrument input terminals.
[----] is flashing in the PV Display	• The input signal wire for DC voltage (1 to 5V DC) or DC current (4 to 20mA DC) may be disconnected. Replace the input signal wire. **How to check whether the input signal wire is disconnected** [DC voltage (1 to 5V DC)] If the input to the input terminal of this controller is 1V DC and if a scaling low limit value is indicated, the controller is likely to be operating normally, however, the input signal wire may be disconnected. [DC current (4 to 20mA DC)] If the input to the input terminal of this controller is 4mA DC and a scaling low limit value is indicated, the controller is likely to be operating normally, however, the input signal wire may be disconnected.

Problem	Presumed cause and solution
[- - - -] is flashing in the PV display	• Check whether the input signal wire of DC voltage (1 to 5V DC) and DC current (4 to 20mA DC) is securely connected to the input terminal of this controller. Ensure that they are wired properly. • Check whether the polarity of thermocouple or compensating lead wire is correct. • Check whether codes (A, B, B) of the RTD match with the controller terminal. Ensure that they are wired properly.
The PV display keeps indicating the value which was set during Scaling low limit setting.	• Check whether the input signal wire for DC voltage (0 to 5V DC, 0 to 10V DC) or DC current (0 to 20mA DC) is disconnected. **How to check whether the input signal wire is disconnected** [DC voltage (0 to 5V DC, 0 to 10V)] If the input to the input terminal of this controller is 1V DC and if a value (converted value from scaling high, low limit setting) corresponding to 1V DC is indicated, the controller is likely to be operating normally, however, the input signal wire may be disconnected. [DC current (0 to 20mA DC)] If the input to the input terminal of this controller is 4mA DC, and if a value (converted value from scaling high, low limit setting) corresponding to 4mA DC is indicated, the controller is likely to be operating normally, however, the input signal wire may be disconnected. • Check whether the input lead wire terminals for DC voltage (0 to 5V DC, 0 to 10V DC) or DC current (0 to 20mA DC) are securely connected to the instrument input terminals
The indication of the PV display is irregular or unstable	• Check whether the sensor input and temperature unit (or) are correct. Set the sensor input and the temperature unit properly. • Sensor correcting value is unsuitable. Set it to a suitable value. • Check whether the specification of the sensor is correct. • AC may be leaking into the sensor circuit. Use an ungrounded type sensor. • There may be equipment that interferes with or makes noise near the controller. Keep the instrument clear of any potentially disruptive equipment
The PV display flashes [Err 1].	Internal memory is defective. Please contact our agency or us.

10.2 Key operation

Problem	Presumed cause and solution
Settings (SV, P, I, D, proportional cycle, alarm value, etc.) are impossible. The values do not change by the △ or ▽ key	• Set value lock (Lock 1 or Lock 2) is selected. Release the lock selection. • During AT or auto-reset. Cancel AT. Auto-reset ends in 4 minutes after starting.

Problem	Presumed cause and solution
The setting indication does not change within the input range even if the △ or ▽ key is pressed, and new values are unable to be set.	• SV high limit or SV low limit may be set at the point where the value does not change. Set it to a suitable value while in Auxiliary function setting mode 1.

10.3 Control

Problem	Presumed cause and solution
PV (temperature)does not rise	• The sensor is out of order. Replace the sensor. • Check whether sensor or control output terminals are securely connected to the input or output terminals of the instrument. • Ensure that the wiring of sensor and control output terminals are correct.
The control output remains in an ON status.	• OUT1 low limit value is set to 100% or higher in Auxiliary function setting mode 2. Set it to a suitable value
The control output remains in an OFF status.	• OUT1 high limit value is set to 0% or less in Auxiliary function setting mode 2. Set it to a suitable value.

For all other malfunctions, please make inquiries at our agency or us.

11. Character table

Photocopiable material
[Main setting mode]

Character	Setting item	Default value	Data
SV1	SV1	0℃	
SV2	SV2	0℃	

[Sub setting mode]

Character	Setting item	Default value	Data
AT	AT/Auto-reset Perform/Cancel	AT/Auto-reset Cancel	
P	OUT1 proportional band	10℃	
P_b	OUT2 proportional band	1.0 times	
I	Integral time	200 sec	
d	Derivative time	50 sec	
n	ARW	50%	
c	OUT1 proportional cycle	30 sec, 3 sec	
c_b	OUT2 proportional cycle	30 sec, 3 sec	
A1	A1 value	0 ℃	
A2	A2 value	0 ℃	
H	Heater burnout alarm value	0.0A	
LP_T	Loop break alarm time	0 minutes	
LP_H	Loop break alarm span	0 ℃	

[Auxiliary function setting mode 1]

Character	Setting item	Default value	Data
Lock	Set value lock	Unlock	
SH□	SV high limit	1370	
SL□	SV low limit	-200	
So□	Sensor correction	0.0	
cōSL	Communication protocol	Shinko protocol	
cōno	Instrument number	0	
cōSP	Communication speed	9600bps	
cōPr	Parity	Even	
cōSr	Stop bit	1	

[Auxiliary function setting mode 2]

Character	Setting item	Default value	Data
SEnS	Input type	K: –200 to 1370℃	
SrLH	Scaling high limit	9999	
SrLL	Scaling low limit	–1999	
dP□	Decimal point place	No decimal point	
FILr	PV filter time constant	0.0 seconds	
oLH□	OUT1 high limit	100%	
oLL□	OUT1 low limit	0%	
HYS□	OUT1 ON/OFF hysteresis	1.0℃	
cRcr	OUT2 action mode	Air cooling	
oLHb	OUT2 high limit	100%	
oLLb	OUT2 low limit	0%	
db□	Overlap band/Dead band	0.0 ℃	
HYSb	OUT2 ON/OFF hysteresis	1.0 ℃	
AL 1F	A1 type	No alarm action	
AL2F	A2 type	No alarm action	
A1Lā	A1 action Energized/De-energized	Energized	
A2Lā	A2 action Energized/De-energized	Energized	
A1HY	A1 hysteresis	1.0 ℃	
A2HY	A2 hysteresis	1.0 ℃	
A1dY	A1 action delay timer	0 seconds	
A2dY	A2 action delay timer	0 seconds	
conr	Direct (Cooling)/Reverse (Heating)action	Reverse (Heating) action	
AT_b	AT bias	20 ℃	
SU_b	SVTC bias	0	
SU□2	SV2 indication	Indication	
EoUr	Output status when input abnormal	Outputs OFF(4mA)or OUT1(OUT2) low limit value	
āAnU	OUT/OFF Key function	Control output OFF function	