INSTRUCTION MANUAL

Micro-computer based digital indicating controller **JCS-33A**

JCS31JE1 2007.09

To prevent accidents arising from the misuse of this controller, please ensure the operator receives this manual.

⚠ 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 consulting purpose of use with our agency or main office. (Never use this instrument for medical purposes with which human lives are involved.)
- External protection devices such as protection 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.

⚠ 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.

⚠ Caution

- This instrument should be used according to 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. Not doing so could cause serious injury or malfunction.
- Specifications of the JCS-33A and the contents of this instruction manual are subject to change without notice.
- This instrument is designed to be installed through a control panel. If it is not, measures must be taken to ensure that the operator cannot touch power terminals or other high voltage sections.
- Be sure to turn the power supply to the instrument OFF before cleaning this instrument.
- 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.
- 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 a result of using this product, including any indirect damage.

1. Model

1.1 Model

J C S – 3 3 □–□／□ □, □ □ □								Series name: JCS-33A (W48 x H48 x D95mm)	
Control action	3							PID	
A1		A						Alarm type can be selected by keypad. ***1**	
Control output (OUT1)			R					Relay contact: 1a	
			S					Non-contact voltage (for SSR drive): 12^{+2}_{0}V DC	
			A					DC current: 4 to 20mA DC	
Input				M				Multi-range ***2**	
Supply voltage								100 to 240V AC (standard)	
					1			24V AC/DC ***3**	
Option						A2		Alarm 2 (A2) ***1**	
						W (5A)	Heater burnout alarm	CT rated current: 5A	
						W (10A)		CT rated current: 10A	
						W (20A)		CT rated current: 20A	
						W (50A)		CT rated current: 50A	
						DT	Heating/Cooling control, Control output (OUT2)	Non-contact relay	
						C5	Serial communication (RS-485)		
						SM	SV1/SV2 external selection		
						LA	Loop break alarm		
						BK	Color Black		
						TC	Terminal cover		

*1: Alarm types (9 types and No alarm action) and Energized/Deenergized can be selected by keypad.

*2: Thermocouple, RTD, DC current, and DC voltage can be selected by keypad.

*3: Supply voltage 100 to 240V AC is standard. When ordering 24V AC/DC, enter “1” after the input code.

1.2 How to read the model label

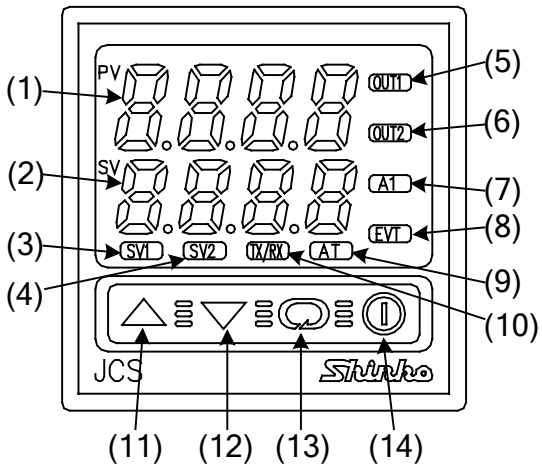
Model labels are attached to the case and the inner assembly. For Heater burnout alarm output, CT rated current is written in the bracket.

(Model label) (e.g.)

(1)	JCS-33A-R/M	Relay contact output/Multi-range input
(2)	A2	Alarm 2 (A2) output
	W(20A)	Heater burnout alarm output (20A)
(3)	No.	

(1)Model (2)Option, supply voltage ("1" is entered only for 24V AC/DC)
(3)Serial number (Only on inner assembly)

2. Name and functions



(Fig. 2-1)

(1) **PV display** : Indicates the PV (process variable) or setting characters in the setting mode with the red LED.
(2) **SV display** : Indicates the SV (desired value), MV (manipulated variable) or each set value in the setting mode with the green LED.
(3) **SV1 indicator** : The green LED lights when SV1 is indicated on the SV display.
(4) **SV2 indicator** : The yellow LED lights when SV2 is indicated on the SV display.
(5) **OUT1 indicator** : When OUT1 is ON, the green LED lights. (For A/□ type, it flashes corresponding to the manipulated variable in 0.25 second cycles.)
(6) **OUT2 indicator** : When OUT2 (DT option) is ON, the yellow LED lights.
(7) **A1 indicator** : When A1 output is ON, the red LED lights.
(8) **EVT indicator** : When Event output (A2, LA or W option) is ON, the red LED lights.
(9) **AT indicator** : When auto-tuning (AT) or auto-reset is performing, the yellow LED flashes.
(10) **TX/RX indicator** : The yellow LED flashes during Serial communication output (transmitting).
(11) **Increase key** (△) : Increases the numeric value.
(12) **Decrease key** (▽) : Decreases the numeric value.
(13) **Mode key** (◎) : Selects the setting mode or registers the set value. (By pressing the Mode key, the set value or selected value can be registered)
(14) **OUT/OFF key** (◎) : The control output ON/OFF function or Auto/Manual control function can be switched. (To cancel the control output ON/OFF function, press the OUT/OFF key again for approx. 1 second.)

⚠ Notice

When setting the specifications and functions of this controller, connect terminals 1 and 2 for power supply first, then set them referring to Chapter "5. Setup" before performing "3. Mounting to the control panel" and "4. Wiring".

3. Mounting to the control panel

3.1 Site selection

⚠ Caution

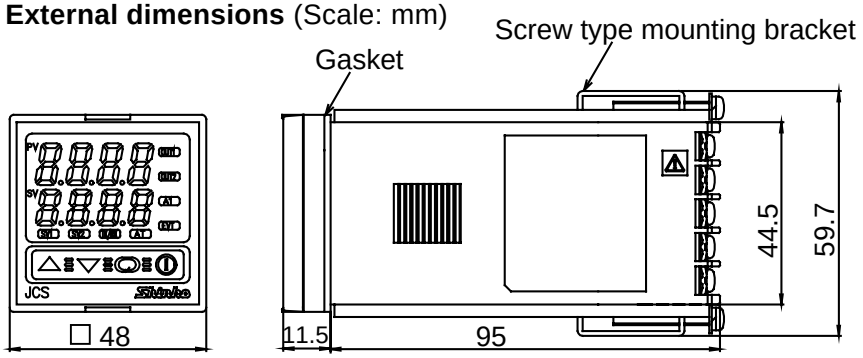
Use within the following temperature and humidity ranges.
Temperature: 0 to 50℃ (32 to 122℉), Humidity: 35 to 85%RH (No icing, no condensation)
If the JCS-33A is installed through the control panel, the ambient temperature of the JCS-33A must be kept to under 50℃. Otherwise the life of electronic parts (especially electrolytic capacitors) of the JCS-33A will be shortened.

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

Ensure the mounting location corresponds to the following conditions:

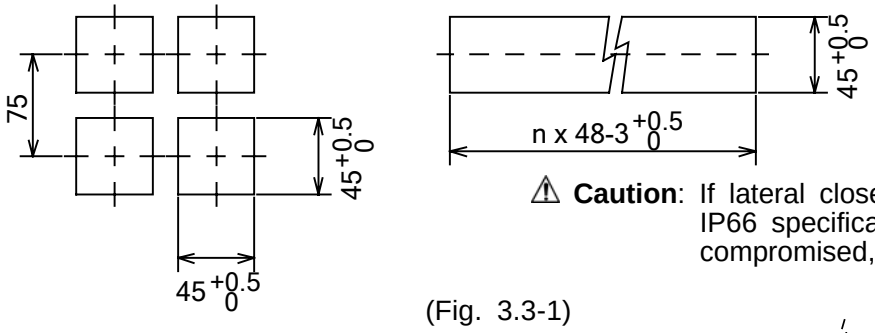
- A minimum of dust, and an absence of corrosive gases
- No flammable, explosive gases
- Few mechanical vibrations or shocks
- No exposure to direct sunlight, an ambient temperature of 0 to 50℃ (32 to 122℉) that does not change rapidly
- An ambient non-condensing humidity of 35 to 85%RH
- No large capacity electromagnetic switches or cables through which large current flows
- No water, oil or chemicals or where the vapors of these substances can come into direct contact with the controller

3.2 External dimensions (Scale: mm)



(Fig. 3.2-1)

3.3 Panel cutout (Scale: mm)

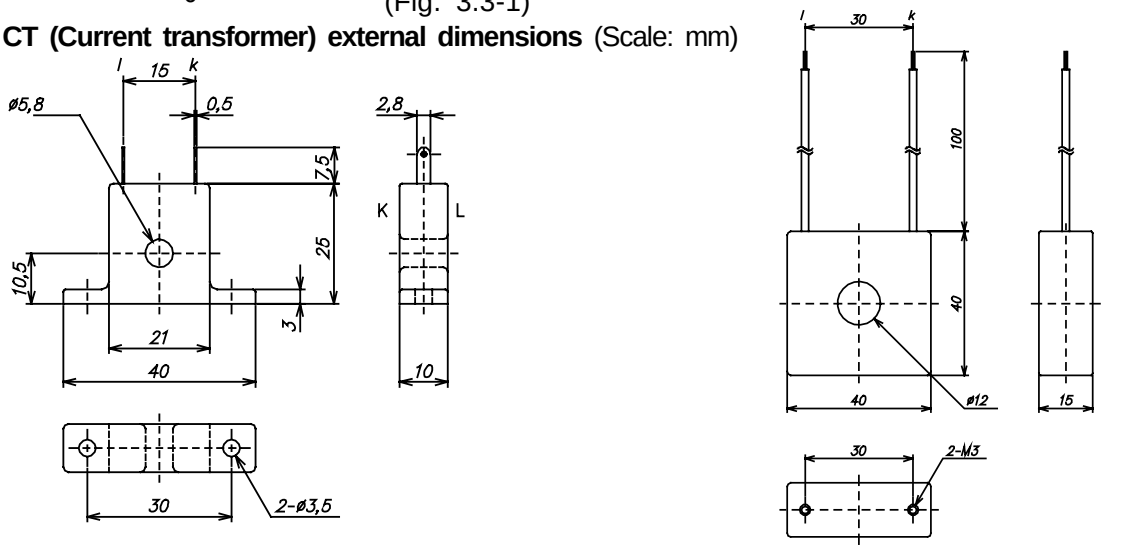


Lateral close mounting
n: Number of units mounted

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

(Fig. 3.3-1)

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



CTL-6S (for 5A, 10A, 20A)

CTL-12-S36-10L1U (for 50A)

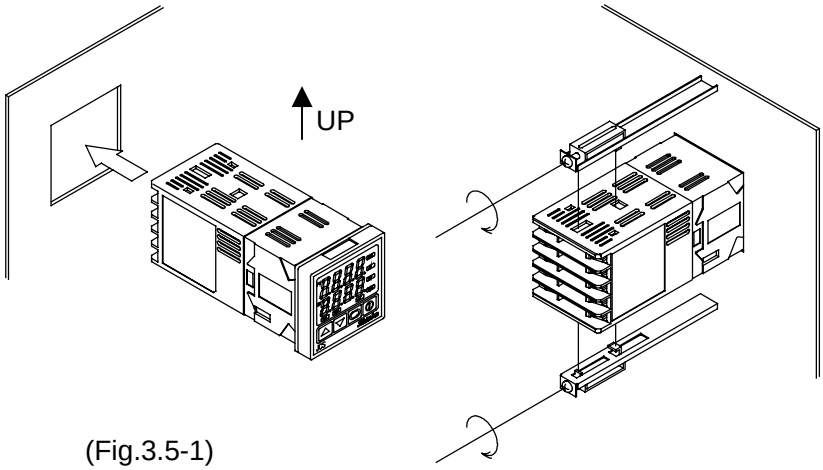
(Fig. 3.4-1)

3.5 Mounting

⚠ Caution

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

Mount the controller vertically to ensure it adheres to the Dust-proof/Drip-proof specification (IP66).
Mountable panel thickness: 1 to 8mm
Insert the controller 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.

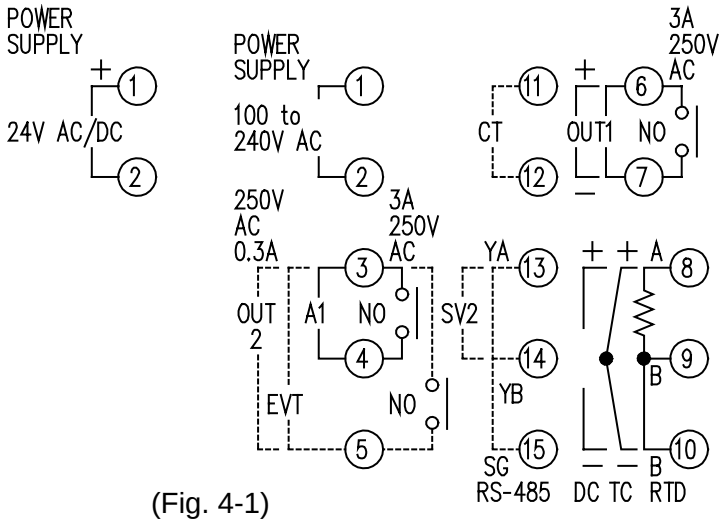


(Fig.3.5-1)

4. Wiring

⚠ Warning

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



(Fig. 4-1)

- OUT1 : Control output 1
- OUT2 : Control output 2
- A1 : Alarm 1 output
- EVT : Event output (A2 output, Heater burnout alarm output, Loop break alarm output)
- CT : CT input
- SV2 : SV1/SV2 external selection
- RS-485: Serial communication (RS-485)
- TC : Thermocouple input
- RTD : Resistance temperature detector input
- DC : DC current, DC voltage input
  For DC current input, 50Ω shunt resistor must be connected between input terminals.

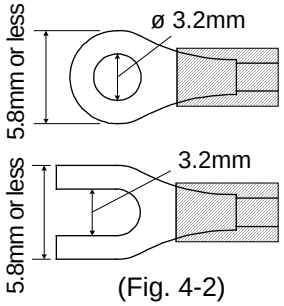
⚠ Notice

- The terminal block of the JCS-33A is designed to be wired from the left side.
  The lead wire must be inserted from the left side of the terminal, and fastened by the terminal screw.
- Dotted lines show options.
- Use a thermocouple and compensating lead wire that correspond to the sensor input specification of this controller.
- Use the 3-wire RTD which corresponds to the input specification of this controller.
- This controller does not have a built-in power switch, circuit breaker or fuse. Therefore, it is necessary to install them in the circuit near the external controller.
  (Recommended fuse: Time-lag fuse, rated voltage 250V AC, rated current 2A)
- **For a 24V AC/DC power source, do not confuse polarity when using direct current (DC).**
- When using a relay contact output type, externally use a relay according to the capacity of the load to protect the built-in relay contact.
- When wiring, keep input wires (thermocouple, RTD, etc.) away from AC sources or load wires to avoid external interference.
- Do not apply a commercial power source to the sensor connected to the input terminal nor allow the power source to come into contact with the sensor.

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 approximately 0.63N•m.

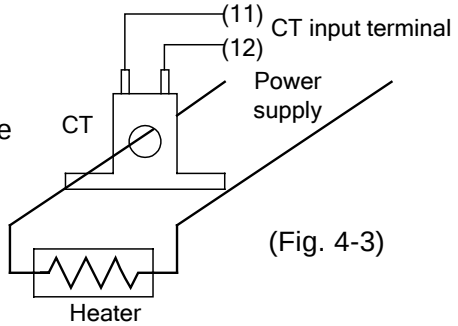
Solderless terminal	Manufacturer	Model	Tightening torque
Y type	Nichifu Terminal Industries CO.,LTD.	TMEV1.25Y-3	Approx. 0.63N•m
	Japan Solderless Terminal MFG CO.,LTD.	VD1.25-B3A	
Round type	Nichifu Terminal Industries CO.,LTD.	TMEV1.25-3	
	Japan Solderless Terminal MFG CO.,LTD.	V1.25-3	



(Fig. 4-2)

Heater burnout alarm option

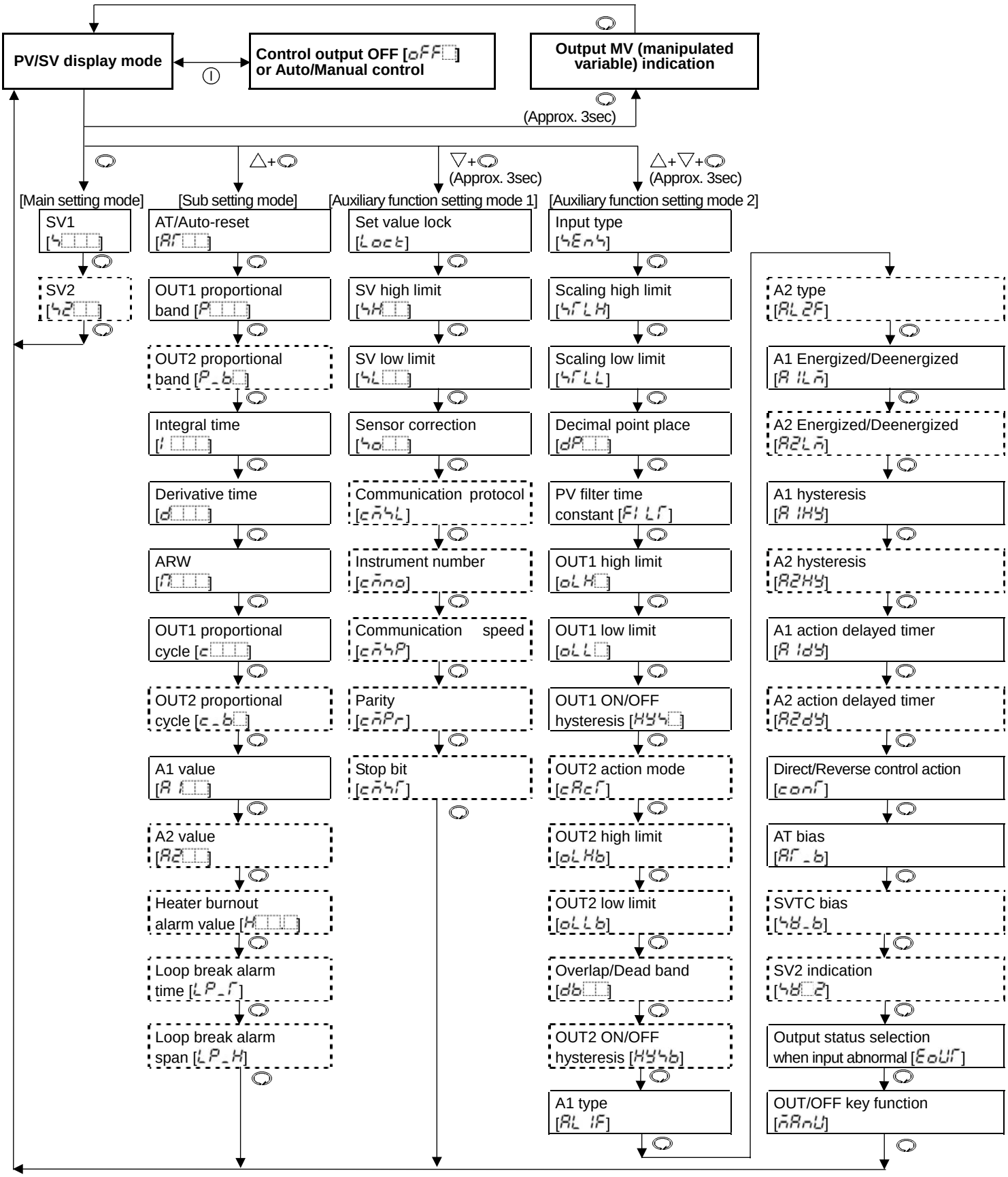
(1) **This alarm is not usable for detecting heater current under phase control.**
(2) Use the current transformer (CT) provided, and pass one lead wire of the heater circuit into the hole of the CT.
(3) When wiring, keep the CT wire away from AC sources or load wires to avoid external interference.



(Fig. 4-3)

5. Operation

5.1 Operation flowchart



[Explanation of the ◯ key]

- ↓◯ : If the ◯ key is pressed, the set value is saved, and the controller proceeds to the next setting item.
- If the ◯ key is pressed for approx. 3sec, the controller reverts to the PV/SV display mode from any mode.

[Key operation]

- △+◯ : Press the ◯ while pressing the △ key.
- ▽+◯(Approx. 3sec) : Press the ◯ for approx. 3 sec while holding down the ▽ key.
- △+▽+◯(Approx. 3sec): Press the ◯ for approx. 3 sec while holding down the △ and ▽ keys.
- Dotted lines are optional and they appear only when the options are added.

Wire the power terminals only. After the power is turned on, the sensor input characters and temperature unit are indicated on the PV display and the input range high limit value is indicated on the SV display for approximately 3 seconds.
(For DC current and voltage input, scaling high limit value is indicated.) (Table 5.1-1)
During this time, all outputs and the LED indicators are in OFF status.
Control will then start, indicating PV (process variable) on the PV display and SV (desired value) on the SV display.
(While control output OFF function is working, oFF□ is indicated on the PV display.)

(Table 5.1-1)

Sensor input	℃			℉		
	PV display	SV display (Default)	Setting range	PV display	SV display (Default)	Setting range
K	t□□C	1370	–200 to 1370℃	t□□F	2500	–320 to 2500℉
	t□ .C	400.0	–199.9 to 400.0℃	t□ .F	750.0	–199.9 to 750.0℉
J	J□□C	1000	–200 to 1000℃	J□□F	1800	–320 to 1800℉
R	r□□C	1760	0 to 1760℃	r□□F	3200	0 to 3200℉
S	S□□C	1760	0 to 1760℃	S□□F	3200	0 to 3200℉
B	b□□C	1820	0 to 1820℃	b□□F	3300	0 to 3300℉
E	E□□C	□800	–200 to 800℃	E□□F	1500	–320 to 1500℉
T	T□ .C	400.0	–199.9 to 400.0℃	T□ .F	750.0	–199.9 to 750.0℉
N	n□□C	1300	–200 to 1300℃	n□□F	2300	–320 to 2300℉
PL-Ⅱ	PL2C	1390	0 to 1390℃	PL2F	2500	0 to 2500℉
C (W/Re5-26)	c□□C	2315	0 to 2315℃	c□□F	4200	0 to 4200℉
Pt100	Pt .C	850.0	–199.9 to 850.0℃	Pt .F	999.9	–199.9 to 999.9℉
	Pt□C	□850	–200 to 850℃	Pt□F	1500	–300 to1500℉
JPt100	JPt.C	500.0	–199.9 to 500.0℃	JPt.F	900.0	–199.9 to 900.0℉
	JPtC	□500	–200 to 500℃	JPtF	□900	–300 to 900℉
4 to 20mA DC	4 20A			4 20A		
0 to 20mA DC	0 20A			0 20A		
0 to 1V DC	0□ 1V	9999	–1999 to 9999	0□ 1V	9999	–1999 to 9999
0 to 5V DC	0□5V			0□5V		
1 to 5V DC	1□5V			1□5V		
0 to 10V DC	0 10V			0 10V		

5.2 Main setting mode

Character	Name, Function, Setting range	Default value
S□□□	**SV1** • Sets SV1. • Setting range: SV low limit to SV high limit	0℃
S2□□	**SV2** • Sets SV2. • Available only when the SM option is applied. • Setting range: SV low limit to SV high limit	0℃

5.3 Sub setting mode

Character	Name, Function, Setting range	Default value
AT□□	**AT/Auto-reset selection** • Selects auto-tuning (AT) Perform/Cancel or auto-reset Perform/Cancel. • If the auto-tuning is cancelled during the process, P, I and D values revert to the previous value at which AT was performed. • When auto-tuning has not finished 4 hours after starting, it is cancelled automatically. • Auto-reset is cancelled in approximately 4 minutes. • ---- : AT/Auto-reset Cancel AT□□ / rSET : AT/Auto-reset Perform	----
P□□□	**OUT1 proportional band setting** • Sets the proportional band for OUT1. • OUT1 becomes ON/OFF action when set to 0 or 0.0 • 0 to 1000℃(2000℉), 0.0 to 999.9℃(℉) or 0.0 to 100.0%	10℃
P_b□	**OUT2 proportional band setting** • Sets the proportional band for OUT2. • OUT2 becomes ON/OFF action when OUT1 proportional band is set to 0 or 0.0. • Not available if DT option is not added or if OUT1 is in ON/OFF action. • 0.0 to 10.0 times (multiplying factor to OUT1 proportional band)	1.0 times

I □□□	**Integral time setting** • Sets integral time for OUT1. • Setting the value to 0 disables the function. • Not available if OUT1 is in ON/OFF action. • Auto-reset can be performed when PD is control action (I=0). • Setting range: 0 to 1000 seconds	200 seconds
d□□□	**Derivative time setting** • Sets derivative time for OUT1. • Setting the value to 0 disables the function. • Not available if OUT1 is in ON/OFF action. • Setting range: 0 to 300 seconds	50 seconds
r□□□	**ARW setting** • Sets ARW for OUT1. • Available only when PID is the control action. • Setting range: 0 to 100%	50%
c□□□	**OUT1 proportional cycle setting** • Sets proportional cycle for OUT1. • Not available if OUT1 is in ON/OFF action or DC current output type. • Setting range: 1 to 120 seconds	30 seconds or 3 seconds
c_b□	**OUT2 proportional cycle setting** • Sets proportional cycle for OUT2. • Not available if the DT option is not applied or if OUT2 is in ON/OFF action. • Setting range: 1 to 120 seconds	3 seconds
A1□□	**A1 value setting** • Sets A1 output action point. • Not available if No alarm action is selected during A1 type selection • Setting the value to 0 or 0.0 disables the function (except Process high and Process low alarm). • Refer to (Table 5.3-1).	0℃
A2□□	**A2 value setting** • Sets A2 output action point. • Not available if A2 option is not applied or if No alarm action is selected during A2 type selection. • Setting the value to 0 or 0.0 disables the function (except Process high and Process low alarm). • Refer to (Table 5.3-1).	0℃
H□□□, □XX.X alternating display	**Heater burnout alarm value setting** • Sets the heater current value for Heater burnout alarm. • Upon returning to set limits, the alarm will stop. • Available only when the W option is added. • Rated current: 5A (0.0 to 5.0A), 10A (0.0 to 10.0A) 20A (0.0 to 20.0A), 50A (0.0 to 50.0A)	0.0A
LP_T	**Loop break alarm time setting** • Sets the time to assess the Loop break alarm. • Available only when the LA option is applied. • Setting range: 0 to 200 minutes	0 minutes
LP_H	**Loop break alarm span setting** • Sets the temperature to assess the Loop break alarm. • Available only when the LA option is applied. • Setting range: 0 to 150℃(℉), 0.0 to 150.0℃(℉) or 0 to 1500	0℃

(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 value to input range high limit value	*2
Process low alarm	Input range low limit value to input range high limit value	*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 input has a decimal point, the negative low limit value is –199.9, and the positive high limit value is 999.9.
• All alarm actions except process alarm are the ±deviation setting from the SV (desired value).
*1: For DC input, the input span is the same as the scaling span.
*2: For DC input, input range low (or high) limit value is the same as scaling low (or high) limit value.

5.4 Auxiliary function setting mode 1

Character	Name, Function, Setting range	Default value
Loc t	**Set value lock selection** • Locks the set values to prevent setting errors. The setting item to be locked depends on the selection. • When Lock 1 or Lock 2 is selected, Auto- tuning and Auto-reset cannot be carried out. • ---- (Unlock): All set values can be changed. Loc 1 (Lock 1): None of the set values can be changed. Loc2 (Lock 2): Only main setting mode can be changed. Loc3 (Lock 3): All set values except Input type can be changed. However, they return to their previous value after power is turned off because they are not saved in the non-volatile 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 the mode is changed, it will affect other setting items such as the SV and Alarm value.	Unlock
SH□□	**SV high limit setting** • Sets the SV high limit. • Setting range: SV low limit to input range high limit value or SV low limit to scaling high limit value	Input range high limit value
SL□□	**SV low limit setting** • Sets the SV low limit. • Setting range: Input range low limit value to SV high limit or scaling low limit value to SV high limit	Input range low limit value
So□□	**Sensor correction setting** • Sets the correction value for the sensor. PV= Current actual temperature + Sensor correction value • Setting range: –100.0 to 100.0℃ (℉), or –1000 to 1000	0.0℃
cōSL	**Communication protocol selection** • Selects communication protocol. • Available only when the C5 option is applied. • noñL: Shinko protocol, ñodA: Modbus ASCII mode, ñodr: Modbus RTU mode	Shinko protocol
cōno	**Instrument number setting** • Sets the instrument number individually to each instrument when communicating by connecting plural instruments in Serial communication. • Available only when C5 option is added. • Setting range: 0 to 95	0
cōSP	**Communication speed selection** • Selects a communication speed equal to that of the host computer. • Available only when C5 option is added. • □□24: 2400bps, □□48: 4800bps, □□96: 9600bps, □ 192: 19200bps	9600bps
cōPr	**Parity selection** • Selects the parity. • Not available if the C5 option is not added or if Shinko protocol is selected during the Communication protocol selection. • nonE: No parity, EvEn: Even parity, odd□: Odd parity	Even parity
cōSr	**Stop bit selection** • Selects the stop bit. • Not available if the C5 option is not added or if Shinko protocol is selected during the Communication protocol selection. • Setting range: 1, 2	1

5.5 Auxiliary function setting mode 2

Character	Name, Function, Setting range	Default value
SEnS	**Input type selection** • The input type can be selected from thermocouple (10 types), RTD (2 types), DC current (2 types) and DC voltage (4 types), and the unit ℃/℉ can be selected as well.(Table 5.1-1) • **When changing the input from DC voltage to other inputs, remove the sensor connected to this controller first, then change the input. If the input is changed with the sensor connected, the input circuit may be broken.**	K (–200 to 1370℃)
SrLH	**Scaling high limit setting** • Sets scaling high limit value. • Available only for DC inputs • Setting range: Scaling low limit value to input range high limit value	9999
SrLL	**Scaling low limit setting** • Sets scaling low limit value. • Available only for DC inputs • Setting range: Input range low limit value to scaling high limit value	–1999

dP□□	**Decimal point place selection** • Selects decimal point place. • Available only for DC inputs • □□□0: No decimal point □□0.0: 1 digit after decimal point □0.00: 2 digits after decimal point 0.000: 3 digits after decimal point	No decimal point
FILr	**PV filter time constant setting** • Sets PV filter time constant. (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
oLH□	**OUT1 high limit setting** • Sets the high limit value of OUT1. • Not available if OUT1 is in ON/OFF action • Setting range: OUT1 low limit value to 100% (DC current output type: OUT1 low limit value to 105%)	100%
oLL□	**OUT1 low limit setting** • Sets the low limit value of OUT1. Not available if OUT1 is in ON/OFF action. • Setting range: 0% to OUT1 high limit value (DC current output type: –5% to OUT1 high limit value)	0%
HYS□	**OUT1 ON/OFF action hysteresis setting** • Sets ON/OFF action hysteresis for OUT1. • Available only when OUT1 is in ON/OFF action • Setting range: 0.1 to 100.0℃ (℉), or 1 to 1000	1.0℃
cAcr	**OUT2 action mode selection** • Selects OUT2 action from air, oil and water cooling. • Not available if the DT option is not added or if OUT2 is in ON/OFF action • AIr□: Air cooling, oIL□: Oil cooling, WAr□: Water cooling	Air cooling
oLHb	**OUT2 high limit setting** • Sets the high limit value of OUT2. • Not available if the DT option is not added or if OUT2 is in ON/OFF action • Setting range: OUT2 low limit value to 100%	100%
oLLb	**OUT2 low limit setting** • Sets the low limit value of OUT2. • Not available if the DT option is not added or if OUT2 is in ON/OFF action • Setting range: 0% to OUT2 high limit value	0%
db□□	**Overlap band/Dead band setting** • Sets the overlap band or dead band for OUT1 and OUT2. + set value: Dead band, – set value: Overlap band • Available only when the DT option is added • Setting range: -100.0 to 100.0℃ (℉), or -1000 to 1000	0℃
HYSb	**OUT2 ON/OFF action hysteresis setting** • Sets ON/OFF action hysteresis for OUT2. • Available only when the DT option is added • Setting range: 0.1 to 100.0℃ (℉), or 1 to 1000	1.0℃
AL 1F	**A1 type selection** • Selects an action type for A1. **Note: If an alarm type is changed, the alarm set value becomes 0 (0.0).** ----: No alarm action A5□□: Process high alarm H□□□: High limit alarm rA5□: Process low alarm L□□□: Low limit alarm H□□J: High limit alarm with standby HL□□: High/Low limits alarm L□□J: Low limit alarm with standby Ji d□: High/Low limit range alarm HL□J: High/Low limits alarm with standby	No alarm action
AL2F	**A2 type selection** • Selects an action type for A2. **Note: If an alarm type is changed, the alarm set value becomes 0 (0.0).** • Available only when A2 option is added • Types and action are the same as those of A1 type selection.	No alarm action
A 1LA	**A1 action Energized/Deenergized selection** • Selects Energized/Deenergized for A1. • Not available if No alarm action is selected during A1 type selection • nonL: Energized, rEVS: Deenergized	Energized

A2LA	**A2 action Energized/Deenergized selection** • Selects Energized/Deenergized for A2. • Not available if A2 option is not added or if No alarm action is selected during A2 type selection • nonL: Energized, rEVS: Deenergized	Energized
A1HY	**A1 hysteresis setting** • Sets hysteresis for A1. • Not available if No alarm action is selected during A1 type selection • Setting range: 0.1 to 100.0℃(℉), or 1 to 1000	1.0℃
A2HY	**A2 hysteresis setting** • Sets hysteresis for A2. • Not available if A2 option is not added or if No alarm action is selected during A2 type selection • Setting range: 0.1 to 100.0℃(℉), or 1 to 1000	1.0℃
A1dY	**A1 action delayed timer setting** • Sets action delayed timer for A1. When setting time has passed after the input enters the alarm output range, the alarm is activated. • Not available if No alarm action is selected during A1 type selection • Setting range: 0 to 9999 seconds	0 seconds
A2dY	**A2 action delayed timer setting** • Sets action delayed timer for A2. When setting time has passed after the input enters the alarm output range, the alarm is activated. • Not available if A2 option is not added or if No alarm action is selected during A2 type selection • Setting range: 0 to 9999 seconds	0 seconds
conF	**Direct/ Reverse control action selection** • Selects Reverse (Heating) or Direct (Cooling) control action. • HEAT: Reverse (Heating), cooL: Direct (Cooling)	Reverse (Heating) control action
AT_b	**AT bias setting** • Sets bias value during auto-tuning. • Not available for DC input • Setting range: 0 to 50℃ (0 to 100℉), or 0.0 to 50.0℃ (0.0 to100.0℉)	20℃
SV_b	**SVTC bias setting** • Control desired value adds SVTC bias value to the value received by the SVTC command. • Available only when C5 option is added • Converted value of ±20% of the rated value or ±20% of the scaling range	0
SV2□	**SV2 indication selection** • Selects either Indication or No indication of SV2. • Available only when the SM option is added. • on□: Indication, oFF□: No indication	Indication
EoUT	**Output status selection when input abnormal** • Selects OUT1, OUT2 (DT option) status when DC input is overscale or underscale. Refer to “Input abnormality indication” on p.15. • Available only for DC current output with DC input • 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.	Output OFF
AAnU	**OUT/OFF key function selection** • Selects the OUT/OFF key function if it is used for control output OUT/OFF function or for Auto/Manual control function. • oFF□: OUT/OFF function , AAnU: Auto/Manual control function	OUT/OFF function

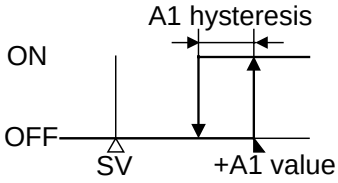
Sensor correction function

This corrects the input value from the sensor. When a sensor cannot be set at a location where control is desired, the sensor measured temperature may deviate from the temperature in the controlled location. When controlling with plural controllers, sometimes the measured temperatures (PV) 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 by adjusting the input value of sensors. However, it is effective within the input rated range regardless of the sensor correction value.

Energized/Deenergized

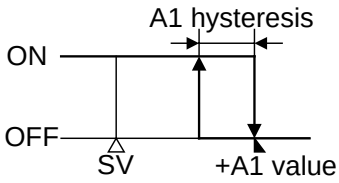
When [alarm action Energized] is selected, the alarm output (between terminals 3-4, or 3-5) is conducted (ON) while the alarm output indicator is lit. The alarm output is not conducted (OFF) while the alarm output indicator is not lit.
When [alarm action Deenergized] is selected, the alarm output (between terminals 3-4, or 3-5) 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.

High limit alarm (when Energized is set)



(Fig. 5.5-1)

High limit alarm (when Deenergized is set)



(Fig. 5.5-2)

6. Operation

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

(1) Switch power supply to the JCS-33A ON.

- For approx. 3sec after the power is switched ON, the sensor input characters and the temperature unit are indicated on the PV display, and input range high limit value is indicated on the SV display. (For DC current and voltage input, scaling high limit value is indicated.) See (Table 5.1-1). During this time, all outputs and LED indicators are in OFF status.
- After that, control starts indicating PV (process variable) on the PV display, and SV (desired value) on the SV display.
- While the Control output OFF function is working, oFF is indicated on the PV display.

(2) Input each set value. Refer to “5. Operation”.

(3) Turn the load circuit power ON.

Control action starts so as to keep the control target at the SV (desired value).

7. Action explanation

7.1 OUT1 action

	Heating (Reverse) action	Cooling (Direct) action
Control action	Proportional band; ON; OFF; SV	Proportional band; ON; OFF; SV
Relay contact output	⑥ ⑦	⑥ ⑦
Non-contact voltage output	+⑥ 12V DC / 12/0V DC / 0V DC, –⑦	+⑥ 0V DC / 0/12V DC / 12V DC, –⑦
DC current output	+⑥ 20mA DC / 20 to 4mA DC / 4mA DC, –⑦	+⑥ 4mA DC / 4 to 20mA DC / 20mA DC, –⑦
Indicator (OUT1) Green	Lit / Unlit	Unlit / Lit

Cycle action is performed according to deviation

Changes continuously according to deviation

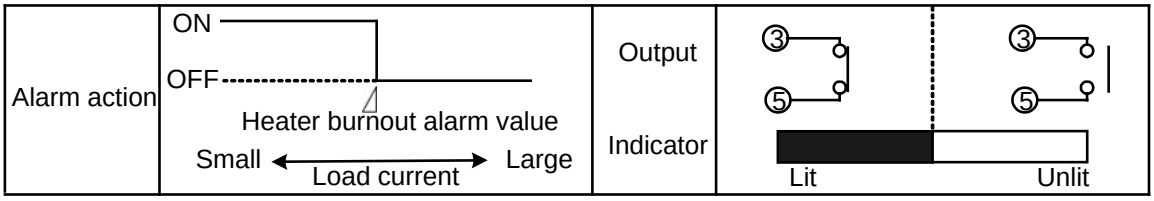
: Acts ON (lit) or OFF (unlit).

7.2 OUT1 ON/OFF action

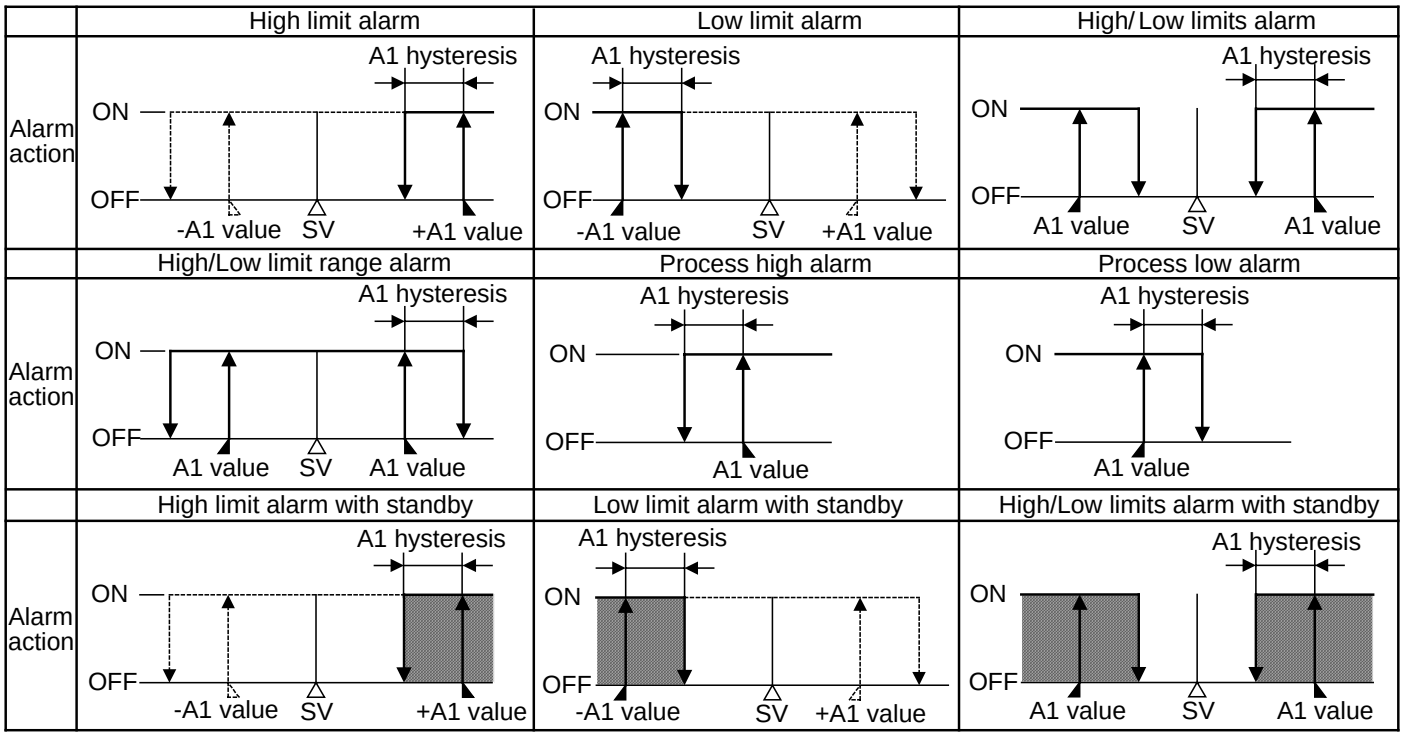
	Heating (Reverse) action	Cooling (Direct) action
Control action	Hysteresis; ON; OFF; SV	Hysteresis; ON; OFF; SV
Relay contact output	⑥ ⑦	⑥ ⑦
Non-contact voltage output	+⑥ 12V DC / 0V DC, –⑦	+⑥ 0V DC / 12V DC, –⑦
DC current output	+⑥ 20mA DC / 4mA DC, –⑦	+⑥ 4mA DC / 20mA DC, –⑦
Indicator (OUT1) Green	Lit / Unlit	Unlit / Lit

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

7.3 EVT (Heater burnout alarm) action



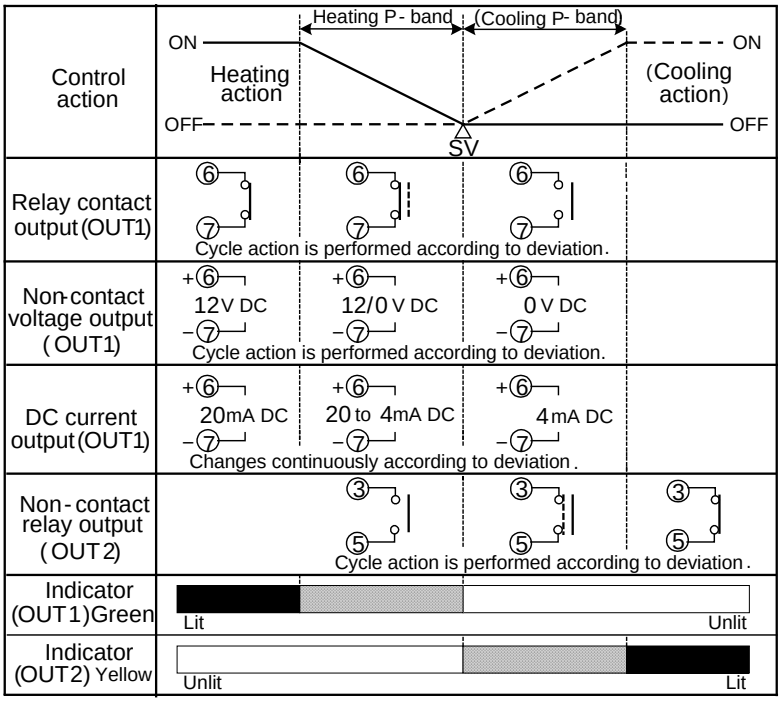
7.4 Alarm action



▒ : Standby functions.

A1 indicator lights when A1 output terminals 3 and 4 are connected, and goes off when they are disconnected.

7.5 OUT2 (Heating/Cooling control) action

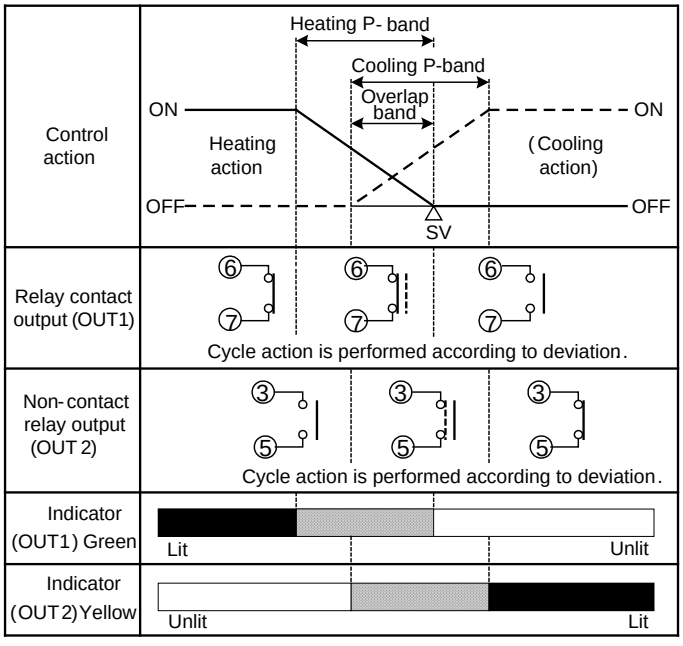


▒ : Acts ON (lit) or OFF (unlit).

——— : Represents Heating control action.

- - - - - : Represents Cooling control action.

7.6 OUT2 (Heating/Cooling control) action (When setting Overlap band)

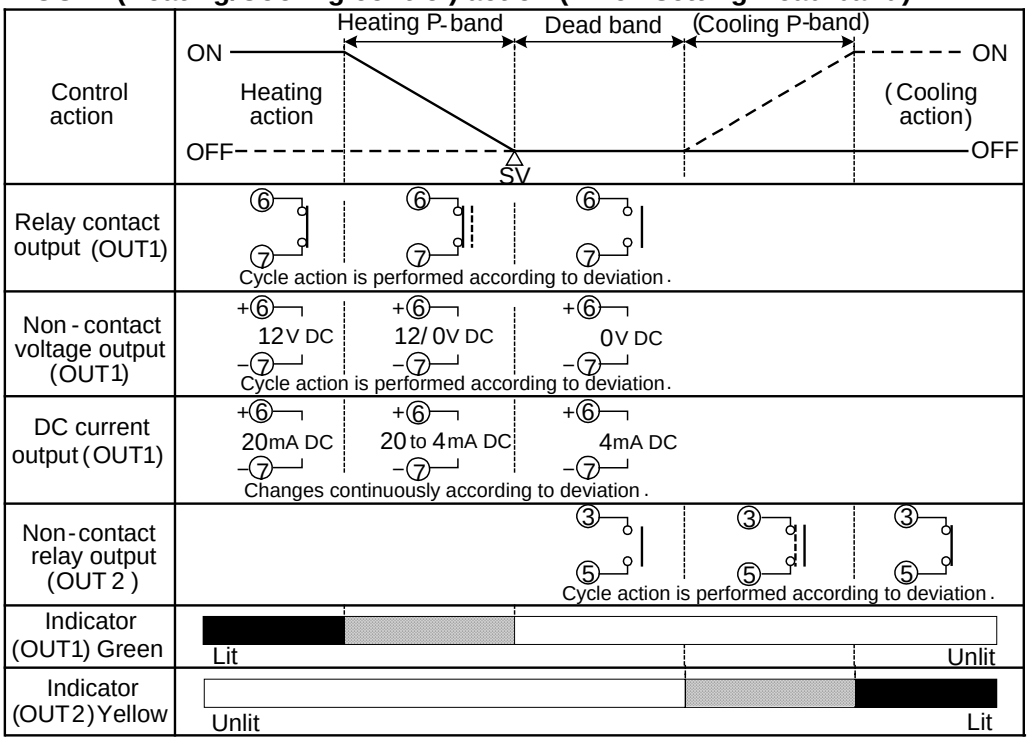


▒ : Acts ON (lit) or OFF (unlit).

——— : Represents Heating control action.

- - - - - : Represents Cooling control action.

7.7 OUT2 (Heating/Cooling control) action (When setting Dead band)



: Acts ON (lit) or OFF (unlit).
——— : Represents Heating control action.
- - - - - : Represents Cooling control action.

8. Auto-tuning of this controller

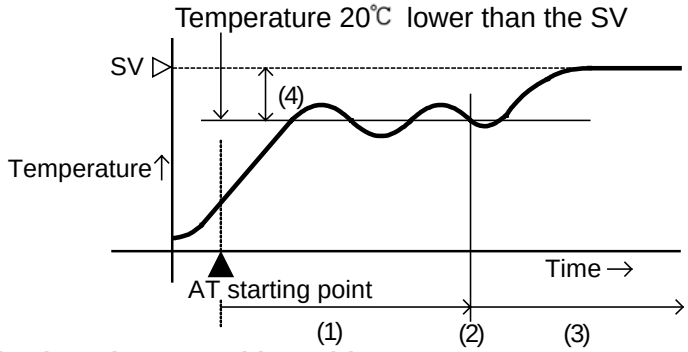
In order to set each value of P, I, D and ARW automatically, the auto-tuning process should be made to fluctuate to obtain an optimal value. One of 3 types of fluctuation below is automatically selected.

For DC input, the AT process will fluctuate around the SV for conditions of (A), (B) and (C) below.

Sometimes the auto-tuning process will not fluctuate if auto-tuning is performed at or near room temperature. Therefore auto-tuning might not finish normally.

(A) In the case of a large difference between the SV and PV (process variable) as the temperature is rising

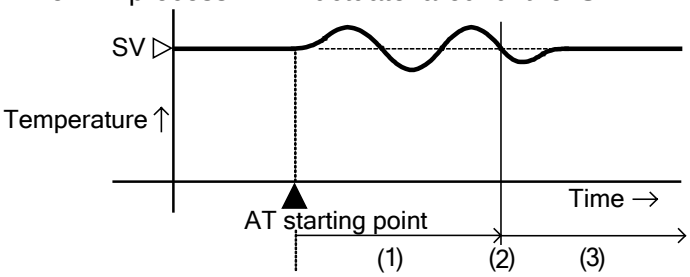
When AT bias is set to 20℃, the AT process will fluctuate at the temperature 20℃ lower than the SV.



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

(B) When the control is stable

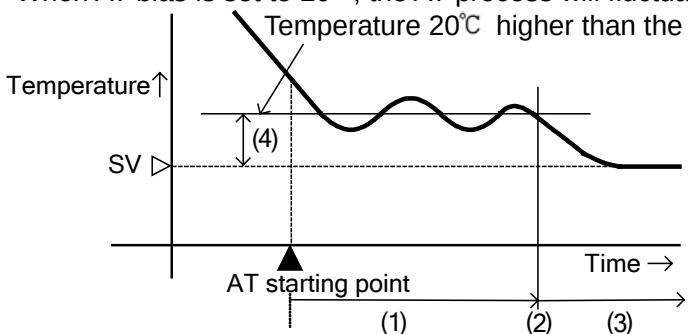
The AT process will fluctuate around the SV.



(1) Calculating PID constant
(2) PID constant calculated
(3) Controlled by the PID constant set by auto-tuning.

(C) In the case of a large difference between the SV and PV (process variable) as the temperature is falling

When AT bias is set to 20℃, the AT process will fluctuate at the temperature 20℃ higher than the SV.



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

9. Specifications

9.1 Standard specifications

Mounting : Flush
Setting : Input system using membrane sheet key
Display PV display : Red LED 4 digits, character size 10.2 x 4.9 mm (H x W)
SV display : Green LED 4 digits, character size 8.8 x 4.9 mm (H x W)

Accuracy (Setting and Indication):
Thermocouple : Within ±0.2% of each input span ±1digit, or within ±2℃ (4℉), whichever is greater
However R, S inputs, 0 to 200℃ (400℉): Within ±6℃ (12℉)
B input, 0 to 300℃ (600℉): Accuracy is not guaranteed.
K, J, E, T, N inputs, less than 0℃ (32℉): Within ±0.4% of input span±1digit
RTD : Within ±0.1% of each input span ±1digit, or within ±1℃ (2℉), whichever is greater
DC current : Within ±0.2% of each input span ±1digit
DC voltage : Within ±0.2% of each input span ±1digit

Input sampling period : 0.25 seconds

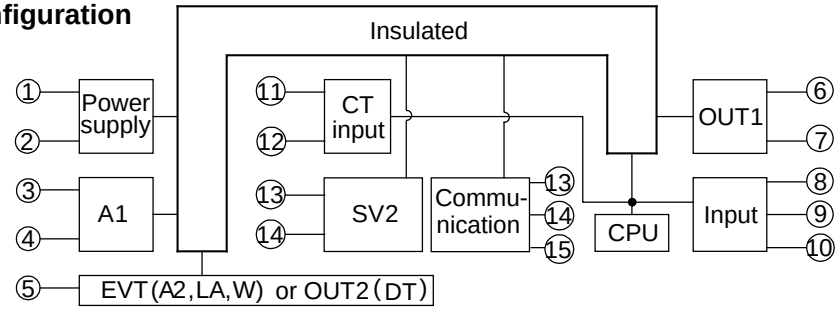
Input Thermocouple : K, J, R, S, B, E, T, N, PL-Ⅱ, C(W/Re5-26) External resistance, 100Ω or less (However, B input: External resistance, 40Ω or less)
RTD : Pt100, JPt100, 3-wire system
Allowable input lead wire resistance (10Ω or less per wire)
DC current : 0 to 20mA DC, 4 to 20mA DC
Input impedance: 50Ω [50Ω shunt resistor (sold separately) must be installed between input terminals.] Allowable input current, 50mA or less
DC voltage : 0 to 1V DC Input impedance (1MΩ or more)
Allowable input voltage (5V DC or less)
Allowable signal source resistance (2kΩ or less)
: 0 to 5V DC, 1 to 5V DC, 0 to 10V DC Input impedance (100kΩ or more)
Allowable input voltage (15V DC or less)
Allowable signal source resistance (100Ω or less)

OUT1 output
Relay contact : 1a, Control capacity 3A 250V AC (resistive load)
1A 250V AC (inductive load cosø=0.4)
Electrical life, 100,000 times
Non-contact voltage (For SSR drive): 12^{+2}_{0}V DC, maximum 40mA (short circuit protected)
DC current : 4 to 20mA DC, Load resistance, maximum 550Ω

A1 output
Action : ON/OFF action
Hysteresis : 0.1 to 100.0℃ (℉), or 1 to 1000
Output : Relay contact 1a
Control capacity, 3A 250V AC (resistive load)
Electrical life, 100,000 times

Control action
PID action (with auto-tuning function)
PI action: When derivative time is set to 0
PD action (with auto reset function): When integral time is set to 0
P action (with auto reset function): When derivative and integral times are set to 0.
ON/OFF action: When proportional band is set to 0 or 0.0
OUT1 proportional band : 0 to 1000℃ (2000℉), 0.0 to 999.9℃ (℉) or 0.0 to 100.0% (ON/OFF action when set to 0 or 0.0)
Integral time : 0 to 1000sec (OFF when set to 0)
Derivative time : 0 to 300sec (OFF when set to 0)
OUT1 proportional cycle : 1 to 120sec (Not available for DC current output type)
ARW : 0 to 100%
OUT1 ON/OFF action hysteresis: 0.1 to 100.0℃ (℉), or 1 to 1000
OUT1 high limit setting : 0 to 100% (DC current output type: –5 to 105%)
OUT1 low limit setting : 0 to 100% (DC current output type: –5 to 105%)

Circuit insulation configuration



When OUT1 is non-contact voltage output or DC current output, OUT1 is not insulated from Communication, and OUT1 is not insulated from SV2. So an insulation test **must not** be carried out between them.

Insulation resistance : 10MΩ or more, at 500V DC
Dielectric strength : 1.5kV AC for 1minute between input terminal and power terminal
1.5kV AC for 1minute between output terminal and power terminal
Supply voltage : 100 to 240V AC 50/60Hz, 24V AC/DC 50/60Hz
Allowable voltage fluctuation: 100 to 240V AC: 85 to 264V AC, 24V AC/DC: 20 to 28V AC/DC
Power consumption : Approx. 8VA
Ambient temperature : 0 to 50℃ (32 to 122℉)
Ambient humidity : 35 to 85%RH (no condensation)
Weight : Approx. 200g
External dimensions : 48 x 48 x 95mm (W x H x D)
Material : Flame-resistant resin (Case)
Color : Light gray (Case)
Attached functions : **[Set value lock], [Sensor correction], [Auto/manual control selection], [Input abnormality indication]**

Output status selection 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) or OUT1 low limit value	OFF or OUT2 low limit value	ON or OUT2 high limit value **(*2)**
oFF		OFF (4mA) or OUT1 low limit value			OFF 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 or OUT2 high limit value **(*2)**	OFF or OUT2 low limit value
oFF			OFF (4mA) or OUT1 low limit value	OFF or OUT2 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 selection when input abnormal".
For manual control, the preset manipulated variable (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℉

Indication range and Control range for thermocouple inputs other than the above:
Input range low limit value –50℃ (100℉) to Input range high limit value +50℃ (100℉)

DC input

Indication range: [Scaling low limit value–Scaling span x 1%] to [Scaling high limit value +Scaling span x 10%]
However, "----" or "____" flashes when a range of –1999 to 9999 is exceeded.
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 and OUT2 are turned off (for DC current output type, OUT1 low limit value, OUT2 low limit value) and PV display flashes " ".

[Self-diagnosis]
The CPU is monitored by a watchdog timer, and if an abnormal status is found on the CPU, the controller is switched to warm-up status.

[Automatic cold junction temperature compensation] (Only thermocouple input type)
This detects the temperature at the connecting terminal between the thermocouple and the instrument, and always maintains it in the same status as if the reference junction is located at 0℃ (32℉).

[Power failure countermeasure]
The setting data is backed up in the non-volatile IC memory.

[Warm-up indication]
After the power supply to the instrument is turned on, the sensor input character and temperature unit are indicated on the PV display and input range high limit value is indicated on the SV display for 3 seconds.
For DC current and voltage input, the scaling high limit value is indicated.

Accessories: Screw type mounting brackets: 1 set
Instruction manual: 1 copy
CT (Current transformer): CTL-6S 1 piece (for rated current 5A, 10A, 20A)
CTL-12-S36-10L1U 1 piece (for rated current 50A)

9.2 Optional specifications

Alarm 2 (A2) (Option code: A2)

[A2], [W] and [LA] options utilize common output terminals.
Action : ON/OFF action
Hysteresis: 0.1 to 100.0℃ (℉), or 1 to 1000
Output : Relay contact 1a
Control capacity, 3A 250V AC (Resistive load)
Electrical life, 100,000 times

Loop break alarm (Option code: LA)

When MV (manipulated variable) is maximum or minimum and when the PV does not change as much as the preset span within the Loop break alarm assessment time, the alarm is activated.
This also detects the breaking status on the loop such as heater burnout, sensor burnout or actuator trouble.
[LA], [A2] and [W] options 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℃(℉), 0 to 1500
Output : Relay contact 1a
Control capacity, 3A 250V AC (Resistive load)
Electrical life, 100,000 times

Heater burnout alarm (including sensor burnout alarm) (Option code: W)

Monitors heater current with CT (current transformer), and detects burnout.
This alarm is also activated when indication is overscale and underscale.
[W], [A2] and [LA] options utilize common output terminals.
This option cannot be applied to DC current output type.
Rated current : 5A [W(5A)], 10A [W(10A)], 20A [W(20A)], 50A [W(50A)] (Must be specified)
Setting range : 5A [W(5A)] : 0.0 to 5.0A (Off when set to 0.0)
10A [W(10A)] : 0.0 to 10.0A (Off when set to 0.0)
20A [W(20A)] : 0.0 to 20.0A (Off when set to 0.0)
50A [W(50A)] : 0.0 to 50.0A (Off when set to 0.0)
Setting accuracy: Within ±5% of the rated value
Action : ON/OFF action
Output : Relay contact, 1a
Control capacity, 3A 250V AC (resistive load)
Electrical life, 100,000 times

Heating/Cooling control (Option code: DT)

The specification of Heating side is the same as that of OUT1.
OUT2 proportional band: 0.0 to 10.0 times OUT1 proportional band (ON/OFF action 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
OUT2 high limit setting : 0 to 100%
OUT2 low limit setting : 0 to 100%
Overlap band/Dead band setting range:
Thermocouple, RTD input: –100.0 to 100.0℃ (℉)
DC current, DC voltage input: –1000 to 1000 (The placement of the decimal point follows the selection)
Output: Non-contact relay output, 0.3A 250V AC
Cooling action mode selection function:
One cooling action can be selected from Air cooling (linear characteristic), Oil cooling (1.5th power of the linear characteristic) and Water cooling (2nd power of the linear characteristic) by keypad.

Serial communication (Option code: C5)

When this option is added, the [SM] option cannot be added.
The following operations can be carried out from the external computer.
(1) Reading and setting of the SV, PID values and each set value
(2) Reading of the PV and action status (3) Change of the functions

Cable length	: Maximum communication distance: 1.2km Cable resistance: Within 50Ω (Terminator is not necessary or 120Ω or more on one side.)
Communication line	: EIA RS-485
Communication method	: Half-duplex communication start-stop synchronization
Communication speed	: 2400, 4800, 9600, 19200bps (Selectable by keypad)
Parity	: Even, Odd, No parity (Selectable by keypad)
Stop bit	: 1, 2 (Selectable by keypad)
Communication protocol	: Shinko protocol, Modbus RTU, Modbus ASCII (Selectable by keypad)
Number of units connectable	: Maximum 31 units to 1 host computer
Communication error detection	: Double detection by parity and checksum
Digital external setting	: The SV from the programmable controller (with the SVTC option) can be digitally transmitted to the JCS-33A (with the C5 option). (The Set value lock of the JCS-33A must be set to Lock 3) When the data from the programmable controller is out of the SV high limit or low limit value, the JCS-33A ignores the value, and performs the control with the previous value. The control desired value adds SVTC bias value to the value received by the SVTC command.

SV1/SV2 external selection (Option code: SM)

SV1 or SV2 can be selected by the external contact.
When this option is added, the [C5] option cannot be added.
Contact Open between terminals 13-14: SV1
Contact Closed between terminals 13-14: SV2
Contact current: 6mA

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 supply to the controller.

10.1 Indication

Problem	Presumed cause and solution
PV display is indicating [oFF].	• Control output OFF function is working. Press the ⓘ key for approx. 1 second to release the function.
[- - - -] is flashing on the PV display.	• Thermocouple, RTD or DC voltage (0 to 1V DC) is burnt out. Change 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. 100Ω of resistance is connected to the input terminals between A-B of the instrument and between B-B is shorted, and if approximate 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 terminals of thermocouple, RTD or DC voltage (0 to 1V DC) are securely mounted to the instrument input terminals. Connect the sensor terminals to the instrument input terminals securely.
[- - - -] is flashing on the PV display.	• Check whether input signal source for DC voltage (1 to 5V DC) or DC current (4 to 20mA DC) is disconnected. **How to check whether the input signal wire is disconnected** [DC voltage (1 to 5V DC)] If the input to the input terminals of the instrument is 1V DC and if a scaling low limit value is indicated, the instrument is likely to be operating normally, however, the signal wire may be disconnected. [DC current (4 to 20mA DC)] If the input to the input terminals of the instrument is 4mA DC 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 input signal wire for DC voltage (1 to 5V DC) or DC current (4 to 20mA DC) is securely connected to the instrument input terminals. • Check if polarity of thermocouple or compensating lead wire is correct. • Check whether codes (A, B, B) of RTD agree with the instrument terminals.

The PV display keeps indicating the value which was set during Scaling low limit setting.	• Check whether the input signal source for DC voltage (0 to 5V DC, 0 to 10V DC) and 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 DC)] If the input to the input terminals of the instrument is 0V DC and if a scaling low limit value is indicated, the instrument is likely to be operating normally, however, the signal wire may be disconnected. [DC current (0 to 20mA DC)] If the input to the input terminals of the instrument is 0mA DC 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 lead wire terminals for DC voltage (0 to 5V DC, 0 to 10V DC) or DC current (0 to 20mA DC) are securely mounted to the instrument input terminals.
The indication of PV display is abnormal or unstable.	• Check whether sensor input or temperature unit (℃ or ℉) is correct. Select the sensor input and temperature unit (℃ or ℉) properly. • Sensor correcting value is unsuitable. Set it to a suitable value. • Check whether the specification of the sensor is correct. • AC leaks into the sensor circuit. Use an ungrounded type sensor. • There may be equipment that interferes with or makes noise near the controller. Keep equipment that interferes with or makes noise away from the controller.
The PV display is indicating [Err 1].	• Internal memory is defective. Contact our agency or us.

10.2 Key operation

Problem	Presumed cause and solution
• Unable to set the SV, P, I, D, proportional cycle or alarm value • The values do not change by △, ▽ keys.	• Set value lock (Lock 1 or Lock 2) is selected. Release the lock selection. • During auto-tuning or auto-reset. In the case of auto-tuning, cancel auto-tuning. It takes approximately 4 minutes until auto-reset is finished.
The setting indication does not change in the input range even if the △, ▽ keys are pressed, and new values are unable to be set.	• SV high or low limit value in Auxiliary function setting mode 1 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
Temperature does not rise.	• Sensor is out of order. Replace the sensor. • Check whether the Sensor or control output terminals are securely mounted to the instrument input terminals. Ensure that the sensor or control output terminals are mounted to the instrument input terminals securely. • Check whether the wiring of sensor or control output terminals is correct.
The control output remains in an ON status.	• OUT1 or OUT2 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 or OUT2 high limit value is set to 0% or less in Auxiliary function setting mode 2. Set it to a suitable value.

• If you have any inquiries, please consult our agency or the vender where you purchased the unit.

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