

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.

⚠ 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 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 in 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 supplied to the instrument OFF before cleaning this instrument.
- Use a soft, dry cloth when cleaning the instrument.
(Alcohol based substances may cause tarnishing or defacement of 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 damages or secondary damages incurred as a result of using this product, including any indirect damages.

1. Model name

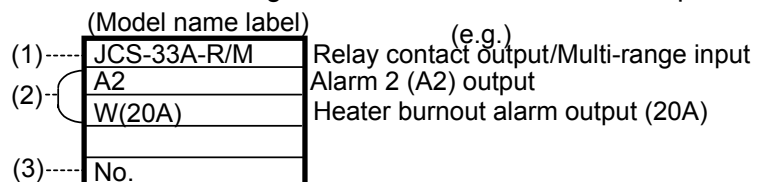
1.1 Model name

JCS-33	3	□-□/□	□, □□□	Series name: JCS-33A (W48 x H48 x D95mm)
Control action	3			PID
A1	A			Alarm action can be selected by keypad. *1
OUT1 (Control output 1)	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	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	OUT2 (Heating/Cooling control output)		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 actions (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 key operation.
- *3: Supply voltage 100 to 240V AC is standard. When ordering 24V AC/DC, enter "1" after the input code.

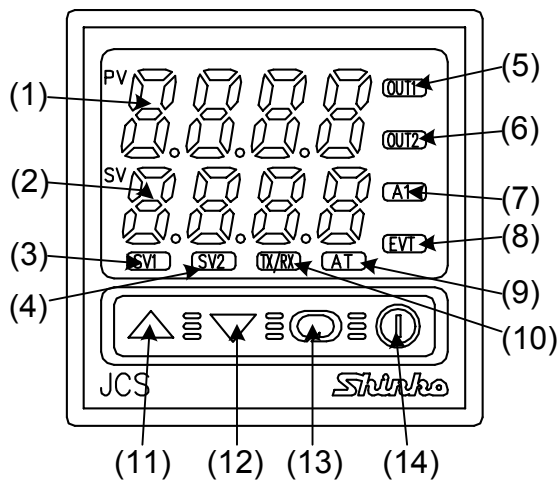
1.2 How to read the model name label

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



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

2. Name and functions of the sections



(Fig. 2-1)

- (1) **PV display**: Indicates the input value with a red LED.
- (2) **SV display**: Indicates the setting value with a green LED.
- (3) **SV1 indicator**: A green LED lights up when SV1 is indicated on the SV display.
- (4) **SV2 indicator**: A yellow LED lights up when SV2 is indicated on the SV display.
- (5) **OUT1 indicator**: When OUT1 or heating output is ON, a green LED lights up. (For A/□ type, it flashes corresponding to the manipulated variable in a 0.25 second cycle)
- (6) **OUT2 indicator**: When OUT2 (option DT) is ON, a yellow LED lights up.
- (7) **A1 indicator** : When A1 output is ON, a red LED lights up.
- (8) **EVT indicator**: When Event output (option: A2, LA or W) is ON, a red LED lights up.
- (9) **AT indicator** : When auto-tuning or auto-reset is being performed, a yellow LED flashes.

- (10) **TX/RX indicator** : A yellow LED flashes during serial communication output (transmitting).
- (11) **Increase key (Δ)** : Increases the numeric value.
- (12) **Decrease key (▽)**: Decreases the numeric value.
- (13) **Mode key (⊙)** : Selects the setting mode or registers the setting value.
(By pressing the Mode key, the setting 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 source first, then set them referring to Chapter "5. Setup" before performing "3. Mounting to control panel" and "4. Wiring connection".

3. Mounting to control panel

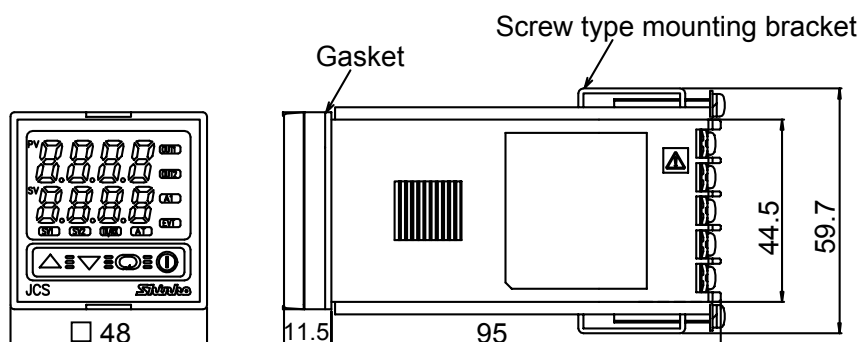
3.1 Site selection

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

Ensure the mounting location corresponds to the following conditions:

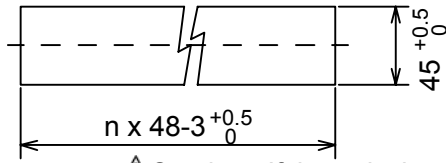
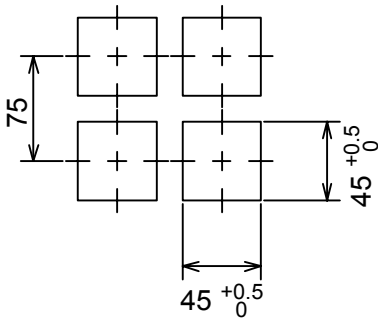
- A minimum of dust, and an absence of corrosive gases
- No flammable, explosive gases
- Few mechanical vibrations or shocks
- No exposure to direct sunlight, an ambient temperature of 0 to 50°C (32 to 122°F) that does not change rapidly
- An ambient non-condensing humidity of 35 to 85%RH
- No large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

3.2 External dimensions



(Fig. 3.2-1)

3.3 Panel cutout

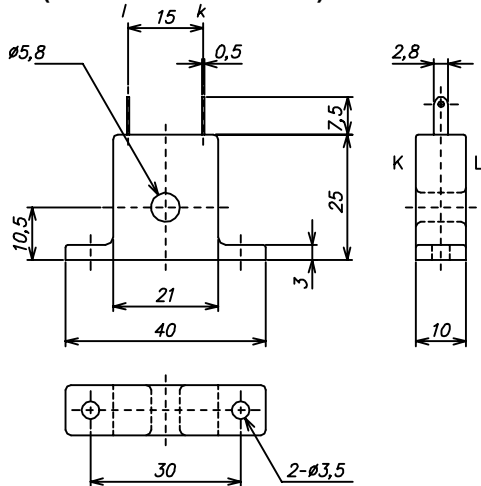


Lateral close mounting
n: Number of units mounted

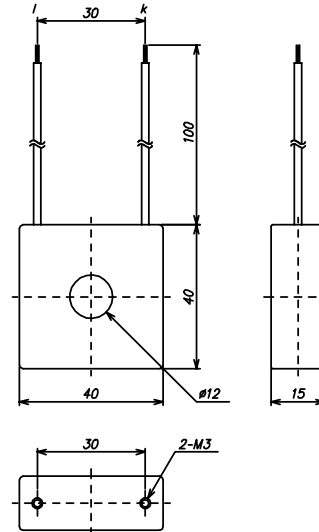
⚠ Caution: If lateral close mounting is used for the controller, IP66 specification will not be fulfilled.

(Fig. 3.3-1)

3.4 CT (Current transformer) external dimension



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



CTL-12-S36-10L1 (for 50A)

(Fig. 3.4-1)

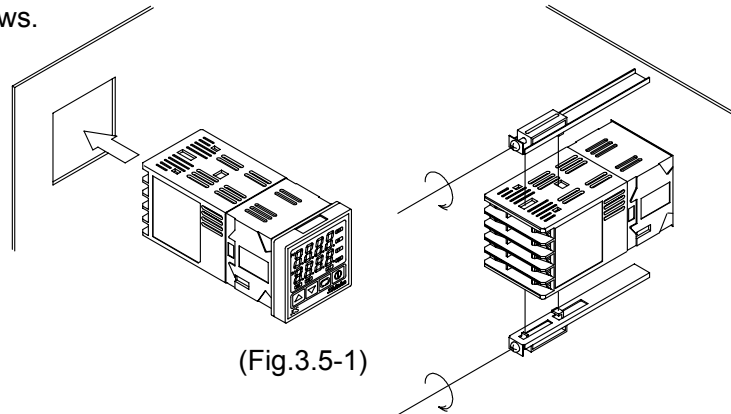
3.5 Mounting

Mount the controller vertically to ensure it adheres to the Dust-proof/Drip-proof specification (IP66).

Mountable panel thickness: Within 1 to 15mm

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)



Warning

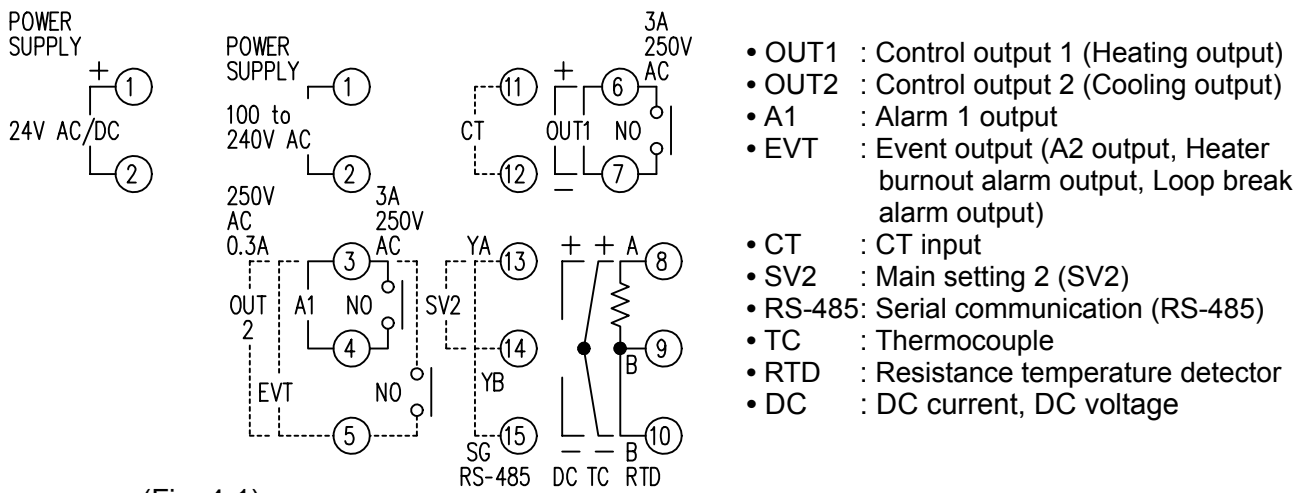
As the case is made of resin, do not use excessive force while screwing in the mounting bracket, or the case or screw type mounting bracket could be damaged. The torque is approximately 0.12N•m.

4. Wiring connection



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)

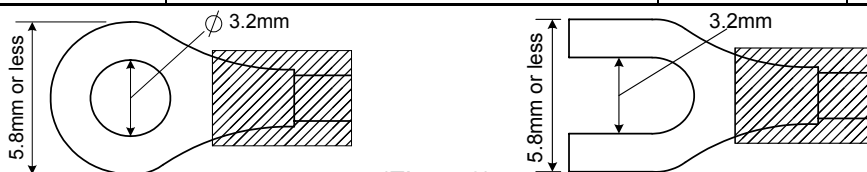
⚠ Notice

- 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 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)
- **When using a 24V AC/DC for the power source, do not confuse the polarity when it is 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 isolation sleeve in which an M3 screw fits as shown below. The torque is approximately 0.6N•m to 1.0N•m.

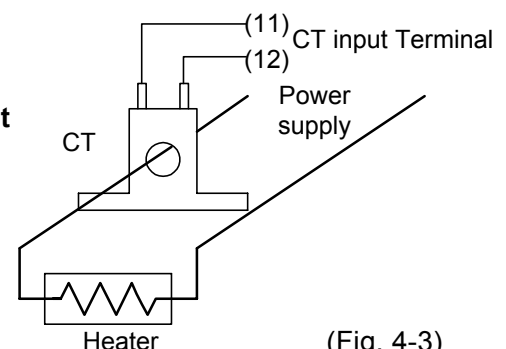
Solderless terminal	Manufacturer	Model name	Tightening torque
Y type	Nichifu Terminal Industries CO.,LTD.	1.25Y-3	0.6N•m Max. 1.0N•m
	Japan Solderless Terminal MFG CO.,LTD.	VD1.25-B3A	
Round type	Nichifu Terminal Industries CO.,LTD.	1.25-3	
	Japan Solderless Terminal MFG CO.,LTD.	V1.25-3	



(Fig. 4-2)

Option: Heater burnout alarm

- (1) **This alarm is not available 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 the external interference.



(Fig. 4-3)

5. Setup

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. (Table 5-1)

(If any other value is set during the scaling high limit setting, the set value is indicated on the SV display) During this time, all outputs and the LED indicators are in OFF status.

Control will then start and the input value will be indicated on the PV display and main setting value (SV) will be indicated on the SV display. (While control output OFF function is working, OFF is indicated on the PV display.)

(Table 5-1)

Sensor input	°C		°F	
	PV display	SV display	PV display	SV display
K	ℓ ℓ	1310	ℓ F	2500
	ℓ ℓ	4000	ℓ F	7500
J	ℓ ℓ	1000	ℓ F	1800
R	ℓ ℓ	1760	ℓ F	3200
S	ℓ ℓ	1760	ℓ F	3200
B	ℓ ℓ	1820	ℓ F	3300
E	ℓ ℓ	800	ℓ F	1500
T	ℓ ℓ	4000	ℓ F	7500
N	ℓ ℓ	1300	ℓ F	2300
PL-II	PL2ℓ	1390	PL2F	2500
C (W/Re5-26)	ℓ ℓ	2315	ℓ F	4200
Pt100	Pℓ ℓ	8500	Pℓ F	9999
	Pℓ ℓ	850	Pℓ F	1500
JPt100	JPℓℓ	5000	JPℓF	9000
	JPℓℓ	500	JPℓF	900
4 to 20mA DC *	420A	Scaling high limit value	420A	Scaling high limit value
0 to 20mA DC *	020A		020A	
0 to 1V DC	0 1ℓ		0 1ℓ	
0 to 5V DC	0 5ℓ		0 5ℓ	
1 to 5V DC	1 5ℓ		1 5ℓ	
0 to 10V DC	0 10ℓ		0 10ℓ	

* 50 Ω shunt resistor (sold separately) must be installed between input terminals.

5.2 Main setting mode

Character	Name, Function, Setting range	Default value
ℓ	SV1 • Sets SV1. • Setting range: SV low limit to SV high limit	0°C
ℓ2	SV2 • Sets SV2. • Available only when the option SM is applied. • Setting range: SV low limit to SV high limit	0°C

5.3 Sub setting mode

Character	Name, Function, Setting range	Default value
AT r4EF	AT setting/Auto-reset setting • Designates auto-tuning Performance or auto-reset Performance. • If the auto-tuning is cancelled during the process, P, I and D values revert to the former value at which AT is performed. • When auto-tuning has not finished after 4 hours, it is cancelled automatically. • Auto-reset is cancelled in approximately 4 minutes.	----
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°C(2000°F), 0.0 to 999.9°C(°F) or 0.0 to 100.0%	10°C
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 option DT is not added or if OUT1 is ON/OFF action. • 0.0 to 10.0 times (multiplying factor to OUT1 proportional band)	1.0 times

5.1 Operation flowchart

Outline of operation procedure

Operation before running

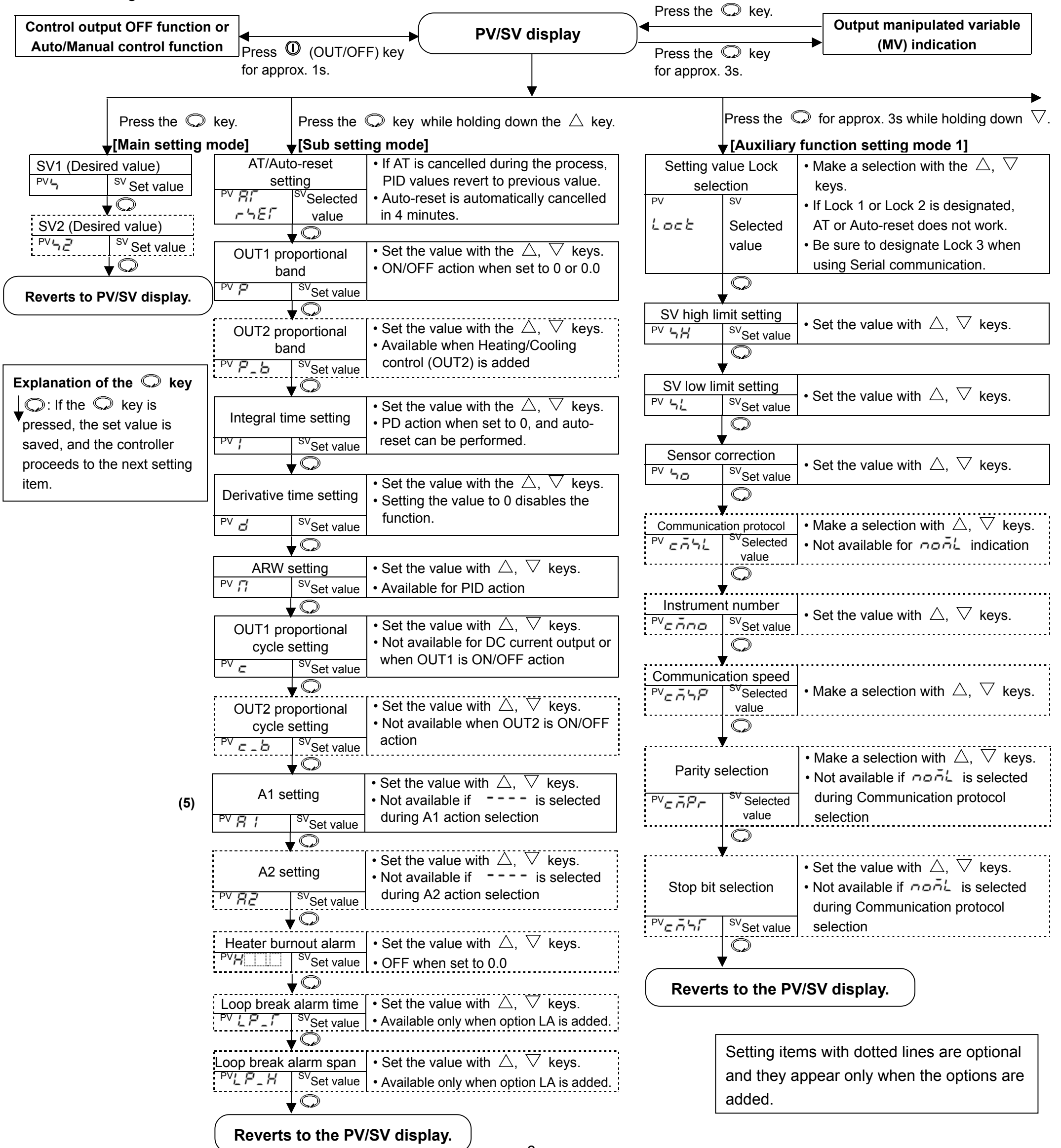
- [Step 1 Initial setting]** : Set Input type, Alarm action type, control action, etc. in Auxiliary function setting mode 2.
- [Step 2 Sub setting mode]**: Set PID values and Alarm setting values in the Sub setting mode.
- [Step 3 Auxiliary function setting mode 1]**: Set Setting value Lock, SV high limit and SV low limit in Auxiliary function setting mode 1 (If Step 3 is not necessary, skip this step.).
- [Step 4 Main setting mode]**: Set SV (desired value) in the Main setting mode.

Running

Alarm 1 (A1) setting procedure [Numbers (1) to (5) are indicated on the flowchart.]

- (1) [A1 action selection]: Select an alarm type.
[If an alarm type except for - - - - is selected, items (2) to (5) are indicated and they can be set if necessary.]
- (2) [A1 action Energized/Deenergized selection]: Select Alarm 1 contact output ON (Energized: *noñL*) or OFF (Deenergized: *rEBL*).
- (3) [A1 hysteresis setting]: Set A1 hysteresis.
- (4) [A1 action delayed timer setting]: Set A1 action delayed time.
(If input enters alarm action range and setting time has passed, the alarm is activated.)
- (5) [A1 setting]: Set action point of A1 output.

[Note] If an alarm action is changed, the alarm setting value becomes 0 (0.0). Therefore it is necessary to reset it.



<i>i</i>	Integral time setting <ul style="list-style-type: none"> • Sets integral time for OUT1. • Setting the value to 0 disables the function. • Not available when OUT1 is ON/OFF action. • Auto-reset can be performed when PD is control action (I=0). • Setting range: 0 to 1000 seconds 	200 seconds
<i>d</i>	Derivative time setting <ul style="list-style-type: none"> • Sets derivative time for OUT1. • Setting the value to 0 disables the function. • Not available when OUT1 is ON/OFF action. • Setting range: 0 to 300 seconds 	50 seconds
<i>n</i>	ARW setting <ul style="list-style-type: none"> • Sets ARW for OUT1. • Available only when PID is the control action. • Setting range: 0 to 100% 	50%
<i>c</i>	OUT1 proportional cycle setting <ul style="list-style-type: none"> • Sets proportional cycle for OUT1. • Not available when OUT1 is DC current output type or ON/OFF action. • Setting range: 1 to 120 seconds 	30 seconds or 3 seconds
<i>c_b</i>	OUT2 proportional cycle setting <ul style="list-style-type: none"> • Sets proportional cycle for OUT2. • Not available if the option DT is not applied or when OUT2 is ON/OFF action. • Setting range: 1 to 120 seconds 	3 seconds
<i>A1</i>	A1 setting <ul style="list-style-type: none"> • Sets action point for A1 output. • Not available if No alarm action is selected during A1 action selection • Refer to (Table 5.3-1). 	0°C
<i>A2</i>	A2 setting <ul style="list-style-type: none"> • Sets action point for A2 output. • Not available if option A2 is not applied or if No alarm action is selected during A2 action selection. • Refer to (Table 5.3-1). 	0°C
<i>H000</i> <i>XX.X</i> indicated in turn	Heater burnout alarm setting <ul style="list-style-type: none"> • Sets the heater current value for Heater burnout alarm. • Self-holding is not available for the alarm output. • Available only when the option W is added. • Rating 5A : 0.0 to 5.0A Rating 10A: 0.0 to 10.0A • Rating 20A: 0.0 to 20.0A Rating 50A: 0.0 to 50.0A 	0.0A
<i>LP_r</i>	Loop break alarm action time setting <ul style="list-style-type: none"> • Sets the time to assess the Loop break alarm. • Available only when the option LA is applied. • Setting range: 0 to 200 minutes 	0 minutes
<i>LP_H</i>	Loop break alarm action span setting <ul style="list-style-type: none"> • Sets the temperature to assess the Loop break alarm. • Available only when the option LA is applied. • Setting range: 0 to 150°C (°F), 0.0 to 150.0°C (°F) or 0 to 1500 	0°C

(Table 5.3-1)

Alarm action	Setting range	
High limit alarm	– (Input span) to input span°C(°F)	*1
Low limit alarm	– (Input span) to input span°C(°F)	*1
High/Low limits alarm	0 to input span°C(°F)	*1
High/Low limit range alarm	0 to input span°C(°F)	*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°C(°F)	*1
Low limit alarm with standby	– (Input span) to input span°C(°F)	*1
High/Low limits alarm with standby	0 to input span°C(°F)	*1

• When input has a decimal point, the negative lower limit value is –199.9, and the positive upper limit value is 999.9.

• All alarm actions except process value alarms are \pm deviation setting from the main setting.

*1: For DC input, the input span is the same as the scaling span.

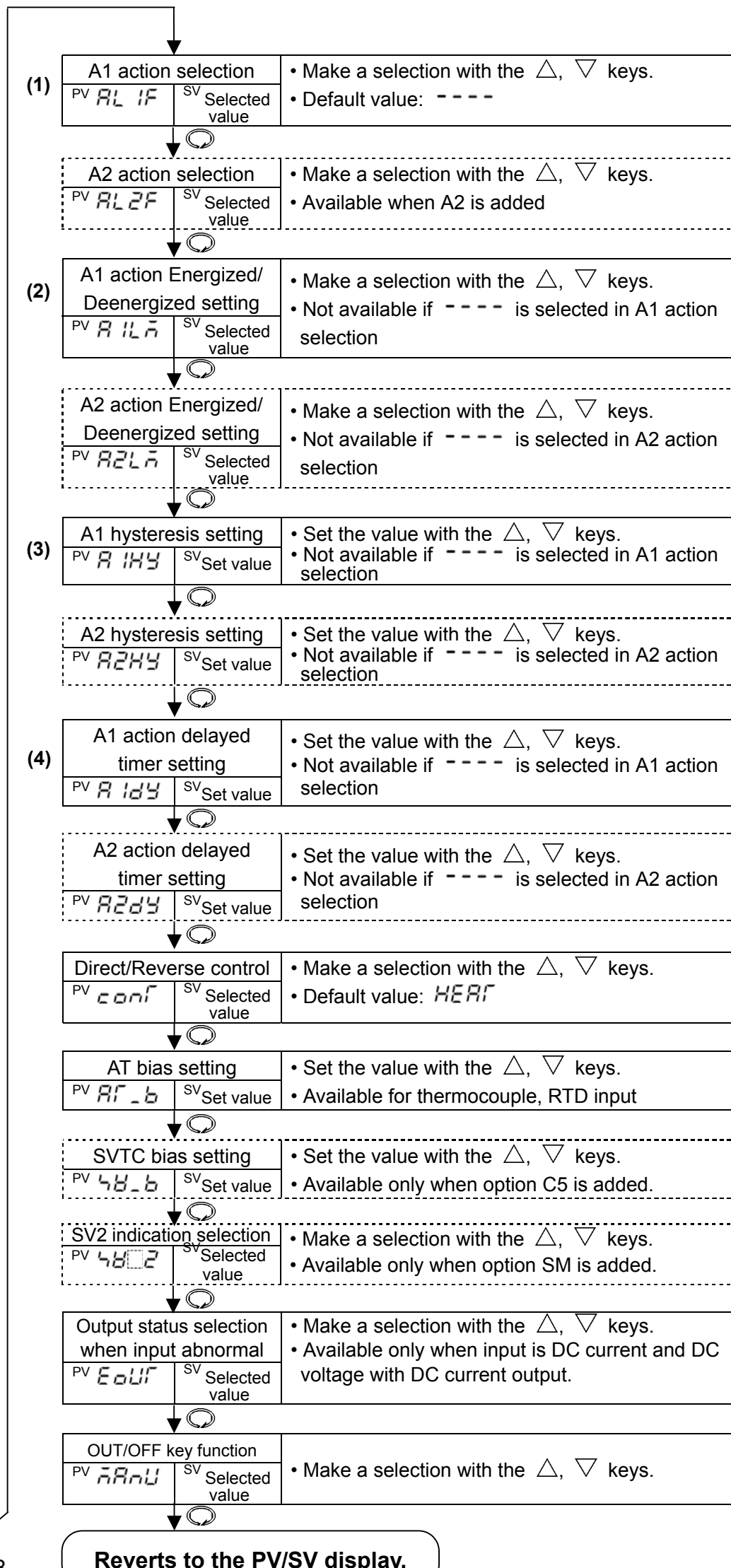
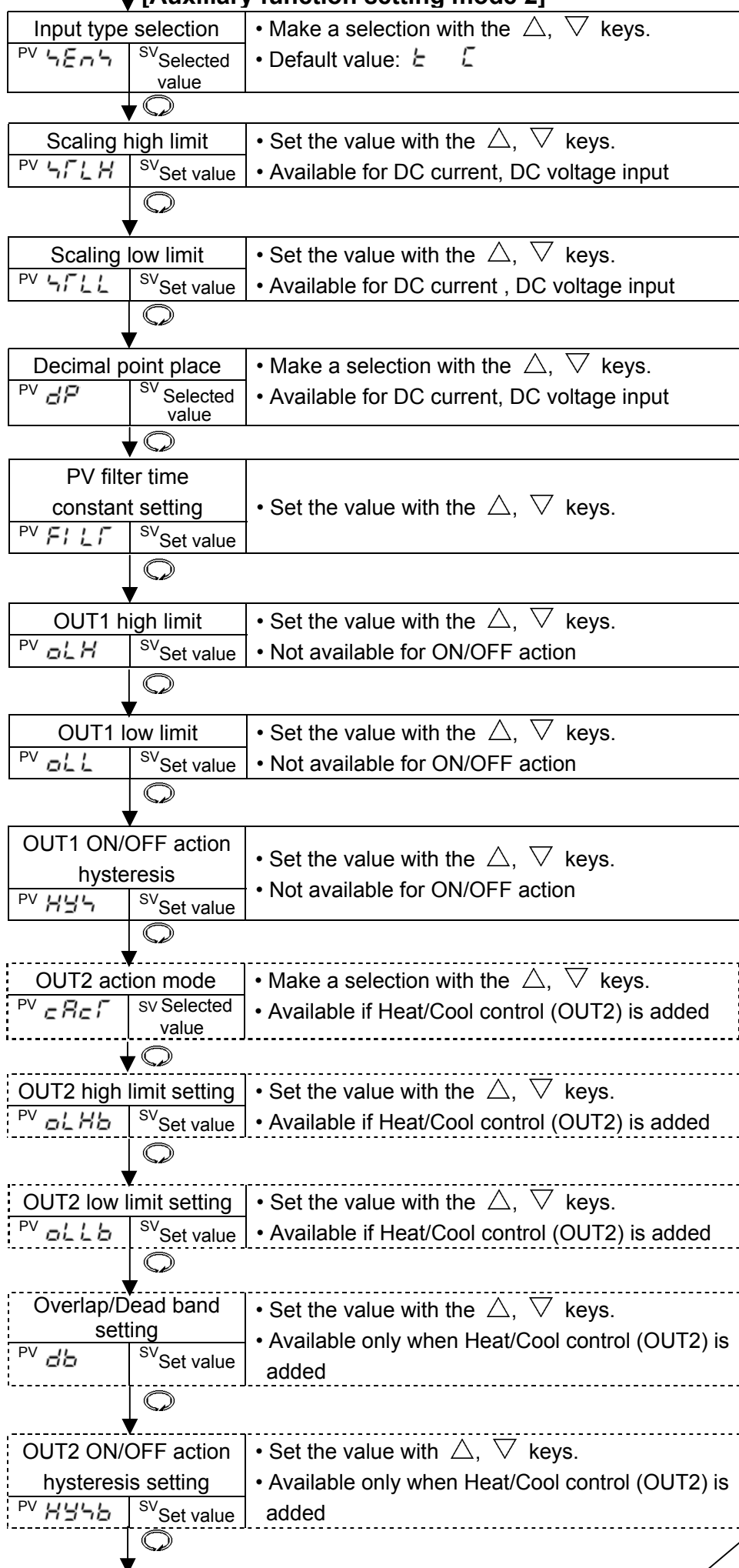
*2: For DC input, input range low (or high) limit value is the same as scaling low (or high) limit value.

Input type (character indication) and range			
K	-200 to 1370°C: <i>E L</i>	K	-320 to 2500°F: <i>E F</i>
J	-199.9 to 400.0°C: <i>E L</i>	J	-199.9 to 750.0°F: <i>E F</i>
R	-200 to 1000°C: <i>J L</i>	R	-320 to 1800°F: <i>J F</i>
S	0 to 1760°C: <i>L L</i>	S	0 to 3200°F: <i>L F</i>
B	0 to 1760°C: <i>L L</i>	B	0 to 3200°F: <i>L F</i>
E	0 to 1820°C: <i>b b</i>	E	0 to 3300°F: <i>b b</i>
T	-200 to 800°C: <i>E F</i>	T	-320 to 1500°F: <i>E F</i>
N	-199.9 to 400.0°C: <i>L L</i>	N	-199.9 to 750.0°F: <i>L F</i>
PL-II	-200 to 1300°C: <i>n L</i>	PL-II	-320 to 2300°F: <i>n F</i>
C(W/Re5-26)	0 to 2315°C: <i>c L</i>	C(W/Re5-26)	0 to 4200°F: <i>c F</i>
Pt100	-199.9 to 850.0°C: <i>P L</i>	Pt100	-199.9 to 999.9°F: <i>P F</i>
JPt100	-199.9 to 500.0°C: <i>J P L</i>	JPt100	-199.9 to 900.0°F: <i>J P F</i>
Pt100	-200 to 850°C: <i>P L</i>	Pt100	-300 to 1500°F: <i>P F</i>
JPt100	-200 to 500°C: <i>J P L</i>	JPt100	-300 to 900°F: <i>J P F</i>
4 to 20mA DC	-1999 to 9999: <i>4 2 0 A</i>		
0 to 20mA DC	-1999 to 9999: <i>0 2 0 A</i>		
0 to 1V DC	-1999 to 9999: <i>0 1 V</i>		
0 to 5V DC	-1999 to 9999: <i>0 5 V</i>		
1 to 5V DC	-1999 to 9999: <i>1 5 V</i>		
0 to 10V DC	-1999 to 9999: <i>0 1 0 V</i>		

Alarm action type	
High limit alarm: The alarm action is \pm deviation setting from the SV. The alarm is activated if the input value reaches the high limit setting value. Character indication: <i>H</i>	
Low limit alarm: The alarm action is \pm deviation setting from the SV. The alarm is activated if the input value goes under the low limit setting value. Character indication: <i>L</i>	
High/Low limits alarm: Combines High limit and Low limit alarm actions. When input value reaches high limit setting value or goes under the low limit setting value, the alarm is activated. Character indication: <i>HL</i>	
High/Low limit range alarm: When input value is between the high limit setting value and low limit setting value, the alarm is activated. Character indication: <i>Li d</i>	
Process value 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. Character indication: Process high alarm <i>PH</i> , Process low alarm <i>PL</i>	
Alarm with standby function: When the power to the controller is turned on, even if the input enters the alarm action range, the alarm is not activated. (If the controller is allowed to keep running, once the input exceeds the alarm action point, the standby function will be released.) Character indication: High limit alarm with standby: <i>H L</i> , Low limit alarm with standby: <i>L L</i> , High/Low limits alarm with standby: <i>HL L</i>	

Press the key for approx. 3s while holding down the and keys.

[Auxiliary function setting mode 2]



Reverts to the PV/SV display.

5.4 Auxiliary function setting mode 1

Character	Name, Function, Setting range	Default value
<i>Lock</i>	Setting value lock selection <ul style="list-style-type: none"> Locks the setting values to prevent setting errors. The setting item to be locked depends on the designation. When Lock 1 or Lock 2 is designated, PID Auto-tuning and Auto-reset cannot be carried out. Be sure to select Lock 3 when changing the setting value frequently via communication function considering the life of non-volatile memory. ---- (Unlock): All setting values can be changed. <i>Loc 1</i> (Lock 1): None of the setting values can be changed. <i>Loc 2</i> (Lock 2): Only main setting value can be changed. <i>Loc 3</i> (Lock 3): All setting values except for Input type selection can be changed. However, changed values revert to their former value after power is turned off because they are not saved in the non-volatile memory. <p>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 setting.</p>	Unlock
<i>4H</i>	SV high limit setting <ul style="list-style-type: none"> 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
<i>4L</i>	SV low limit setting <ul style="list-style-type: none"> 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
<i>40</i>	Sensor correction setting <ul style="list-style-type: none"> Sets the correction value for the sensor. Setting range: -100.0 to 100.0°C (°F), or -1000 to 1000 	0.0°C
<i>cā4L</i>	Communication protocol selection <ul style="list-style-type: none"> Selects communication protocol. Available only when the option C5 is applied. Shinko protocol : <i>noāL</i>, Modbus ASCII mode : <i>āodR</i>, Modbus RTU mode : <i>āodr</i> 	Shinko protocol
<i>cāno</i>	Instrument number setting <ul style="list-style-type: none"> Sets the instrument number individually to each instrument when communicating by connecting plural instruments in serial communication. Available only when option C5 is added. Setting range: 0 to 95 	0
<i>cā4P</i>	Communication speed selection <ul style="list-style-type: none"> Selects a communication speed equal to that of the host computer. Available only when option [C5] is added. 2400bps: <i>24</i>, 4800bps: <i>48</i>, 9600bps: <i>96</i>, 19200bps: <i>192</i> 	9600bps
<i>cāPr</i>	Parity selection <ul style="list-style-type: none"> Selects the parity. Not available when the option C5 is not added or when Shinko protocol is selected in the Communication protocol selection. No parity: <i>noāE</i>, Even parity: <i>EāEā</i>, Odd parity: <i>oāā</i> 	Even parity
<i>cā4r</i>	Stop bit selection <ul style="list-style-type: none"> Selects the stop bit. Not available when option C5 is not added or when Shinko protocol is selected in the Communication protocol selection. Setting range: 1, 2 	1

5.5 Auxiliary function setting mode 2

Character	Name, Function, Setting range	Default value																
<i>4Eā4</i>	Input type selection <ul style="list-style-type: none"> 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 °C/°F can be selected as well. When changing the input from DC voltage to other inputs, remove the sensor connected to this controller first, then change for the input. If the input is changed with the sensor connected, the input circuit may be broken. 	K (-200 to 1370°C)																
	<table border="0"> <tr> <td>K</td> <td>-200 to 1370°C: <i>ē ē</i></td> <td>K</td> <td>-320 to 2500 °F: <i>ē F</i></td> </tr> <tr> <td></td> <td>-199.9 to 400.0°C: <i>ē ē</i></td> <td></td> <td>-199.9 to 750.0°F: <i>ē F</i></td> </tr> <tr> <td>J</td> <td>-200 to 1000 °C: <i>ū ē</i></td> <td>J</td> <td>-320 to 1800 °F: <i>ū F</i></td> </tr> <tr> <td>R</td> <td>0 to 1760 °C: <i>r ē</i></td> <td>R</td> <td>0 to 3200 °F: <i>r F</i></td> </tr> </table>	K	-200 to 1370°C: <i>ē ē</i>	K	-320 to 2500 °F: <i>ē F</i>		-199.9 to 400.0°C: <i>ē ē</i>		-199.9 to 750.0°F: <i>ē F</i>	J	-200 to 1000 °C: <i>ū ē</i>	J	-320 to 1800 °F: <i>ū F</i>	R	0 to 1760 °C: <i>r ē</i>	R	0 to 3200 °F: <i>r F</i>	
K	-200 to 1370°C: <i>ē ē</i>	K	-320 to 2500 °F: <i>ē F</i>															
	-199.9 to 400.0°C: <i>ē ē</i>		-199.9 to 750.0°F: <i>ē F</i>															
J	-200 to 1000 °C: <i>ū ē</i>	J	-320 to 1800 °F: <i>ū F</i>															
R	0 to 1760 °C: <i>r ē</i>	R	0 to 3200 °F: <i>r F</i>															

	S 0 to 1760 °C: <i>5 F</i> B 0 to 1820 °C: <i>6 F</i> E -200 to 800 °C: <i>E F</i> T -199.9 to 400.0°C: <i>F F</i> N -200 to 1300 °C: <i>n F</i> PL-II 0 to 1390 °C: <i>PL2F</i> C (W/Re5-26) 0 to 2315 °C: <i>c F</i> Pt100 -199.9 to 850.0°C: <i>Pt F</i> JPt100 -199.9 to 500.0°C: <i>JPt F</i> Pt100 -200 to 850 °C: <i>Pt F</i> JPt100 -200 to 500 °C: <i>JPt F</i> 4 to 20mA -1999 to 9999: <i>420A</i> 0 to 20mA -1999 to 9999: <i>020A</i> 0 to 1V -1999 to 9999: <i>0 1V</i> 0 to 5V -1999 to 9999: <i>0 5V</i> 1 to 5V -1999 to 9999: <i>1 5V</i> 0 to 10V -1999 to 9999: <i>0 10V</i>	S 0 to 3200 °F: <i>5 F</i> B 0 to 3300 °F: <i>6 F</i> E -320 to 1500 °F: <i>E F</i> T -199.9 to 750.0°F: <i>F F</i> N -320 to 2300 °F: <i>n F</i> PL-II 0 to 2500 °F: <i>PL2F</i> C (W/Re5-26) 0 to 4200 °F: <i>c F</i> Pt100 -199.9 to 999.9°F: <i>Pt F</i> JPt100 -199.9 to 900.0°F: <i>JPt F</i> Pt100 -300 to 1500°F: <i>Pt F</i> JPt100 -300 to 900 °F: <i>JPt F</i>
<i>4FLH</i>	Scaling high limit setting <ul style="list-style-type: none"> • Sets scaling high limit value. • Available only for DC inputs • Setting range: Scaling low limit value to input range high limit value 	9999
<i>4FLl</i>	Scaling low limit setting <ul style="list-style-type: none"> • Sets scaling low limit value. • Available only for DC inputs • Setting range: Input range low limit value to scaling high limit value 	-1999
<i>dP</i>	Decimal point place selection <ul style="list-style-type: none"> • Selects decimal point place. • Available only for DC inputs • No decimal point: <i>0000</i> 1 digit after decimal point: <i>0000</i> 2 digits after decimal point: <i>0000</i> 3 digits after decimal point: <i>0000</i> 	No decimal point
<i>FILF</i>	PV filter time constant setting <ul style="list-style-type: none"> • 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
<i>oLH</i>	OUT1 high limit setting <ul style="list-style-type: none"> • Sets the high limit value of OUT1. • Not available when OUT1 is ON/OFF action • Setting range: OUT1 low limit value to 105% (Setting greater than 100% is effective to DC current output type) 	100%
<i>oLL</i>	OUT1 low limit setting <ul style="list-style-type: none"> • Sets the low limit value of OUT1. • Not available when OUT1 is ON/OFF action. • Setting range: -5% to OUT1 high limit value (Setting less than 0% is effective to DC current output type) 	0%
<i>H44</i>	OUT1 ON/OFF action hysteresis setting <ul style="list-style-type: none"> • Sets ON/OFF action hysteresis for OUT1. • Available only when OUT1 is ON/OFF action • Setting range: 0.1 to 100.0°C (°F), or 1 to 1000 	1.0°C
<i>cRcF</i>	OUT2 action mode selection <ul style="list-style-type: none"> • Selects OUT2 action from air, oil and water coolings. • Not available when the option DT is not added or when OUT2 is ON/OFF action • Air cooling: <i>Air</i>, oil cooling: <i>oil</i>, water cooling: <i>WAR</i> 	Air cooling
<i>oLHb</i>	OUT2 high limit setting <ul style="list-style-type: none"> • Sets the high limit value of OUT2. • Not available when the option DT is not added or when OUT2 is ON/OFF action • Setting range: OUT2 low limit value to 105% (Setting greater than 100% is effective to DC current output type) 	100%
<i>oLLb</i>	OUT2 low limit setting <ul style="list-style-type: none"> • Sets the low limit value of OUT2. • Not available when the option DT is not added or when OUT2 is ON/OFF action • Setting range: -5% to OUT2 high limit value (Setting less than 0% is effective to DC current output type) 	0%

<i>db</i>	Overlap band/Dead band setting <ul style="list-style-type: none"> Sets the overlap band or dead band for OUT1 and OUT2. + setting value: Dead band, – setting value: Overlap band Available only when the option DT is added Setting range: –100.0 to 100.0°C (°F), or 1 to 1000 	0°C
<i>H34b</i>	OUT2 ON/OFF action hysteresis setting <ul style="list-style-type: none"> Sets ON/OFF action hysteresis for OUT2. Available only when the option DT is added Setting range: 0.1 to 100.0°C (°F), or 1 to 1000 	1.0°C
<i>AL IF</i>	A1 action selection <ul style="list-style-type: none"> Selects an action for A1. No alarm action : ---- Process high alarm : <i>AH</i> High limit alarm : <i>H</i> Process low alarm : <i>LAH</i> Low limit alarm : <i>L</i> High limit alarm with standby: <i>H u</i> H/L limits alarm : <i>HL</i> Low limit alarm with standby: <i>L u</i> H/L limit range alarm: <i>ul d</i> H/L limits alarm with standby: <i>HL u</i>	No alarm action
<i>AL2F</i>	A2 action selection <ul style="list-style-type: none"> Selects an action for A2. Available only when alarm A2 is added Action selection and default value are the same as those of A1 action selection. 	No alarm action
<i>A1Lā</i>	A1 action Energized/Deenergized selection <ul style="list-style-type: none"> Selects Energized/Deenergized for A1. Not available if No alarm action is selected in A1 action selection Energized: <i>noāL</i> Deenergized: <i>reāL</i> 	Energized
<i>A2Lā</i>	A2 action Energized/Deenergized selection <ul style="list-style-type: none"> Selects Energized/Deenergized for A2. Not available if alarm A2 is not added or if No alarm action is selected during A2 action selection Action selection and default value are the same as those of A1 action Energized/Deenergized selection. 	Energized
<i>A1H3</i>	A1 hysteresis setting <ul style="list-style-type: none"> Sets hysteresis for A1. Not available if No alarm action is selected in A1 action selection Setting range: 0.1 to 100.0°C(°F), or 1 to 1000 	1.0°C
<i>A2H3</i>	A2 hysteresis setting <ul style="list-style-type: none"> Sets hysteresis for A2. Not available if alarm A2 is not added or if No alarm action is selected during A2 action selection Setting range: 0.1 to 100.0°C(°F), or 1 to 1000 	1.0°C
<i>A1d3</i>	A1 action delayed timer setting <ul style="list-style-type: none"> 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 in A1 action selection Setting range: 0 to 9999 seconds 	0 seconds
<i>A2d3</i>	A2 action delayed timer setting <ul style="list-style-type: none"> 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 alarm A2 is not added or if No alarm action is selected during A2 action selection Setting range: 0 to 9999 seconds 	0 seconds
<i>conf</i>	Direct/ Reverse action selection <ul style="list-style-type: none"> Selects Reverse (Heating) or Direct (Cooling) action. Reverse (Heating): <i>HEAT</i> Direct (Cooling): <i>COOL</i> 	Reverse (Heating) action
<i>AT_b</i>	AT bias setting <ul style="list-style-type: none"> Sets bias value during PID auto-tuning. Not available for DC inputs Setting range: 0 to 50°C(0 to 100°F) or 0.0 to 50.0°C(0.0 to 100.0°F) 	20°C
<i>4b_b</i>	SVTC bias setting <ul style="list-style-type: none"> Control desired value adds SVTC bias value to the value received by the SVTC command. Available only when option C5 is added Converted value of ±20% of the rated value or ±20% of the scaling range 	0

482	SV2 indication selection <ul style="list-style-type: none"> • Selects whether SV2 setting item is indicated or not. • Available only when the option SM is added. • <i>OFF</i> (No indication), <i>ON</i> (Indication) 	No indication
EOUF	Output status selection when input abnormal <ul style="list-style-type: none"> • Selects whether OUT1 is turned OFF or not when DC input is in overscale or underscale. • Available only for DC current output type with DC input • <i>OFF</i> (Output OFF), <i>ON</i> (Output ON) 	Output OFF
ARNU	OUT/OFF key function selection <ul style="list-style-type: none"> • Selects whether OUT/OFF key is used for control output OUT/OFF function or for Auto/Manual control function. • <i>OFF</i> (OUT/OFF function), <i>ARNU</i> (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 measuring temperature may deviate from the temperature in the controlled location. When controlling with plural controllers, sometimes the temperatures measured (input value) do not concur with the same setting value due to difference 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.

Energized/Deenergized

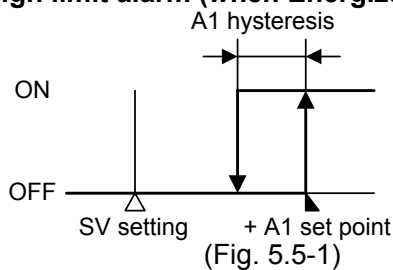
When [alarm action energized] is selected, the alarm output (between terminals 3-4, or 3-5) is conducted (ON) while the alarm output indicator is lit.

The alarm output is not conducted (OFF) while the alarm output indicator is not lit.

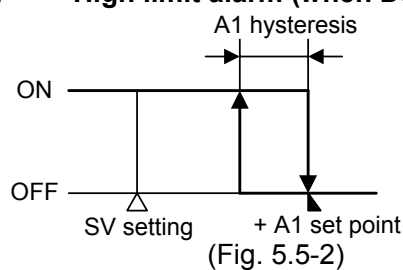
When [alarm action deenergized] is selected, the alarm output (between terminals 3-4, or 3-5) is not conducted (OFF) while the alarm output indicator is lit.

The alarm output is conducted (ON) while the alarm output indicator is not lit.

High limit alarm (when Energized is set)



High limit alarm (when Deenergized is set)



5.6 Auto/Manual control function

Name, Functions	
Auto/Manual control function	<ul style="list-style-type: none"> • If Auto/Manual control function is selected in the OUT/OFF key function selection, Automatic or Manual control function can be switched by pressing the ① key in the PV/SV display mode. If control action is switched from automatic to manual or vice versa, balanceless-bumpless function works to prevent sudden change of manipulated variable. When automatic control is switched to manual control, the 1st dot from the right on the SV display flashes, and the output manipulated variable (MV) can be increased or decreased by pressing \triangle or ∇ key to perform the control. By pressing the ① key again, the mode reverts to the PV/SV display mode (automatic control). (Whenever the power to the controller is turned on, automatic control starts.)

5.7 Control output OFF function

Character	Name, Functions
<i>OFF</i>	Control output OFF function <ul style="list-style-type: none"> • 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. [<i>OFF</i>] is indicated on the PV display while the function is working. • 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 the function, press the ① key again for approx. 1 second.

5.8 Output manipulated variable (MV) indication

Name, functions	
Output manipulated variable indication	<ul style="list-style-type: none"> • In the PV/SV display mode, press the ② key for approx. 3 seconds. Keep pressing the ② key until the output manipulated variable appears, though the main setting mode appears temporarily during the process. (The SV display indicates output manipulated variable and the decimal point flashes at a cycle of every 0.5 second). If the ② key is pressed again, the mode reverts to the PV/SV display.

6. Running

After the controller has been mounted to the control panel and wiring is completed, it can be started in the following manner.

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

Switch power supply to the JCS-33A ON.

- For approx. 3s after the power is switched ON, the sensor input character and the temperature unit are indicated on the PV display and input range high limit value is indicated on the SV display. See (Table 5-1). (If any other value has been set in the scaling high limit setting, the set value is indicated on the SV display.) During this time, all outputs and LED indicators are in OFF status.
- After that, control starts indicating input value on the PV display, and main setting value on the SV display.
- While the Control output OFF function is working, *OFF* is indicated on the PV display.

(2) Input each setting value. Input each setting value, referring to "5. Setup".

(3) Turn the load circuit power ON.

Starts the control action so as to keep the controlled object at the main setting value.

7. Action explanation

7.1 OUT1 action

	Heating (Reverse) action	Cooling (Direct) action
Control action		
Relay contact output		
Non-contact voltage output		
DC current output		
Indication (OUT1) Green		

part : Acts ON or OFF.

7.2 EVT (Heater burnout alarm) action

Alarm action		Output	
	Small ← Load current → Large	Indication	

7.3 OUT1 ON/OFF action

	Heating (Reverse) action	Cooling (Direct) action
Control action		
Relay contact output		
Non-contact voltage output		
DC current output		
Indication (OUT1) Green		

part: Acts ON or OFF.

7.4 Temperature alarm action

	High limit alarm	Low limit alarm	High/Low limits alarm
Alarm action			
Alarm action	High/Low limit range alarm	Process high alarm	Process low alarm
Alarm action			
Alarm action	High limit alarm with standby	Low limit alarm with standby	High/Low limit alarm with standby
Alarm action			

: Standby functions in this section.

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

7.5 OUT2 (Heating/Cooling control) action

Control action												
Relay contact output (OUT1)												
Non-contact voltage output (OUT1)	<table border="0"> <tr> <td>+ ⑥</td> <td>+ ⑥</td> <td>+ ⑥</td> </tr> <tr> <td>12V DC</td> <td>12/0V DC</td> <td>0V DC</td> </tr> <tr> <td>- ⑦</td> <td>- ⑦</td> <td>- ⑦</td> </tr> </table> <p>Cycle action is performed according to deviation.</p>			+ ⑥	+ ⑥	+ ⑥	12V DC	12/0V DC	0V DC	- ⑦	- ⑦	- ⑦
+ ⑥	+ ⑥	+ ⑥										
12V DC	12/0V DC	0V DC										
- ⑦	- ⑦	- ⑦										
DC current output (OUT1)	<table border="0"> <tr> <td>+ ⑥</td> <td>+ ⑥</td> <td>+ ⑥</td> </tr> <tr> <td>20mA DC</td> <td>20 to 4mA DC</td> <td>4mA DC</td> </tr> <tr> <td>- ⑦</td> <td>- ⑦</td> <td>- ⑦</td> </tr> </table> <p>Changes continuously according to deviation.</p>			+ ⑥	+ ⑥	+ ⑥	20mA DC	20 to 4mA DC	4mA DC	- ⑦	- ⑦	- ⑦
+ ⑥	+ ⑥	+ ⑥										
20mA DC	20 to 4mA DC	4mA DC										
- ⑦	- ⑦	- ⑦										
Non-contact relay output (OUT2)												
Indication (OUT1) Green												
Indication (OUT2) Yellow												

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

————— : Represents Heating control action.

- - - - - : Represents Cooling control action.

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

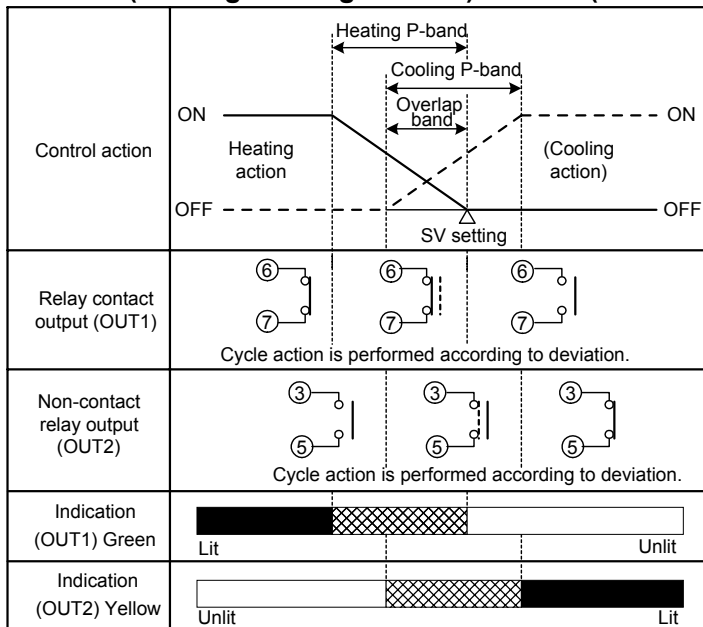
Control action												
Relay contact output (OUT1)												
Non-contact voltage output (OUT1)	<table border="0"> <tr> <td>+ ⑥</td> <td>+ ⑥</td> <td>+ ⑥</td> </tr> <tr> <td>12V DC</td> <td>12/0V DC</td> <td>0V DC</td> </tr> <tr> <td>- ⑦</td> <td>- ⑦</td> <td>- ⑦</td> </tr> </table> <p>Cycle action is performed according to deviation.</p>			+ ⑥	+ ⑥	+ ⑥	12V DC	12/0V DC	0V DC	- ⑦	- ⑦	- ⑦
+ ⑥	+ ⑥	+ ⑥										
12V DC	12/0V DC	0V DC										
- ⑦	- ⑦	- ⑦										
DC current output (OUT1)	<table border="0"> <tr> <td>+ ⑥</td> <td>+ ⑥</td> <td>+ ⑥</td> </tr> <tr> <td>20mA DC</td> <td>20 to 4mA DC</td> <td>4mA DC</td> </tr> <tr> <td>- ⑦</td> <td>- ⑦</td> <td>- ⑦</td> </tr> </table> <p>Changes continuously according to deviation.</p>			+ ⑥	+ ⑥	+ ⑥	20mA DC	20 to 4mA DC	4mA DC	- ⑦	- ⑦	- ⑦
+ ⑥	+ ⑥	+ ⑥										
20mA DC	20 to 4mA DC	4mA DC										
- ⑦	- ⑦	- ⑦										
Non-contact relay output (OUT2)												
Indication (OUT1) Green												
Indication (OUT2) Yellow												

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

————— : Represents Heating control action.

- - - - - : Represents Cooling control action.

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



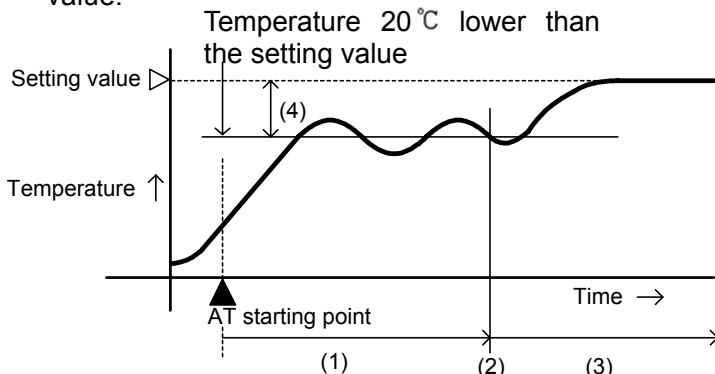
: Acts ON (lit) or OFF (unlit).
 — : Represents Heating control action.
 - - - : Represents Cooling control action.

8. PID 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.

(1) In the case of a large difference between the setting value and processing temperature as the temperature is rising

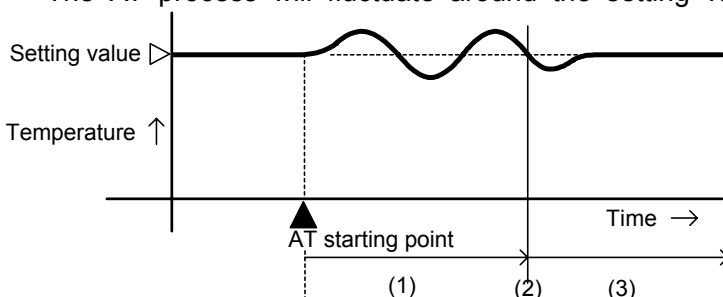
When AT bias is set to 20°C, the AT process will fluctuate at the temperature 20°C lower than the setting value.



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

(2) When the control is stable or when control temperature is within ±20°C of setting value.

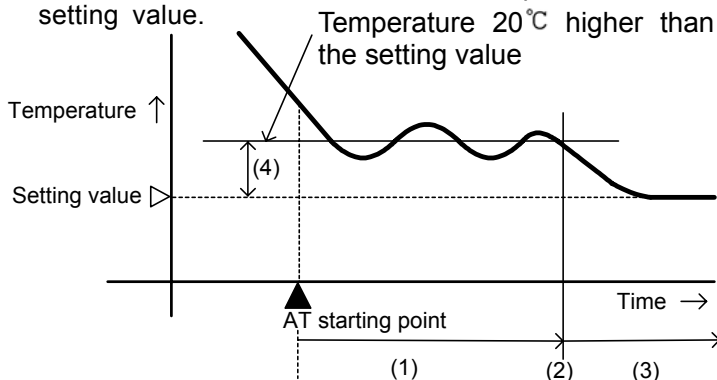
The AT process will fluctuate around the setting value.



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

(3) In the case of a large difference between the setting value and processing temperature as the temperature is falling

When AT bias is set to 20°C, the AT process will fluctuate at the temperature 20°C higher than the setting value.



- (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 method** : Flush
Setting method : 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 $\pm 0.2\%$ of each input span ± 1 digit, or within $\pm 2^\circ\text{C}$ (4°F), whichever is greater
 However R, S inputs, 0 to 200°C (400°F): Within $\pm 6^\circ\text{C}$ (12°F)
 B input, 0 to 300°C (600°F): Accuracy is not guaranteed
 K, J, E, T, N inputs, less than 0°C (32°F): Within $\pm 0.4\%$ of input span ± 1 digit
 RTD : Within $\pm 0.1\%$ of each input span ± 1 digit, or within $\pm 1^\circ\text{C}$ (2°F), whichever is greater
 DC current : Within $\pm 0.2\%$ of each input span ± 1 digit
 DC voltage : Within $\pm 0.2\%$ of each input span ± 1 digit
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 ($1\text{M}\Omega$ or greater)
 Allowable input voltage (5V or less)
 Allowable signal source resistance ($2\text{k}\Omega$ or less)
 : 0 to 5V DC, 1 to 5V DC, 0 to 10V DC Input impedance ($100\text{k}\Omega$ or greater)
 Allowable input voltage (15V 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 $\cos\phi=0.4$)
 Electrical life, 100,000 times
 Non-contact voltage (For SSR drive): 12°V DC maximum 40mA (short-circuit protected)
 DC current : 4 to 20mA DC, Load resistance, maximum 550Ω

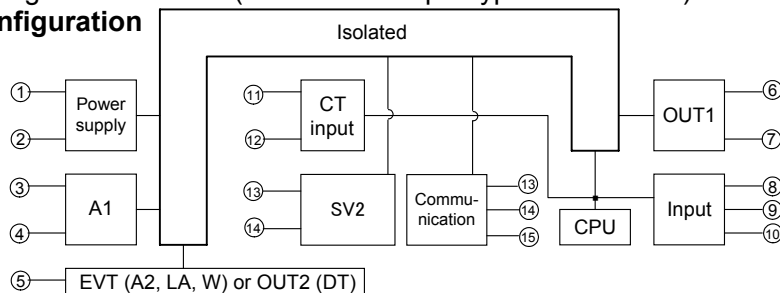
A1 output

- Action : ON/OFF action
 Hysteresis : 0.1 to 100.0°C ($^\circ\text{F}$), 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°C (2000°F), 0.0 to 999.9°C ($^\circ\text{F}$) or 0.0 to 100.0% (ON/OFF action when set to 0 or 0.0)
 Integral time : 0 to 1000s (OFF when set to 0)
 Derivative time : 0 to 300s (OFF when set to 0)
 OUT1 proportional cycle: 1 to 120s (Not available for DC current output type)
 ARW : 0 to 100%
 OUT1 ON/OFF action hysteresis: 0.1 to 100.0°C ($^\circ\text{F}$), 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 isolation configuration



When OUT1 is non-contact voltage output or DC current output, OUT1 and Communication are not isolated, and OUT1 and SV2 are not isolated, and isolation test **must not** be carried out between them.

- Isolation resistance** : 10MΩ or greater 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°C (32 to 122°F)
- Ambient humidity** : 35 to 85%RH (no condensation)
- Weight** : Approx. 200g
- External dimension** : 48 x 48 x 95mm (W x H x D)
- Material** : Flame resistant resin (Case)
- Color** : Light gray (Case)
- Attached functions** : **[Setting value lock], [Sensor correction], [Auto/manual control selection], [Input abnormality indication]**

		Output status			
Output status selection when input abnormal	Contents and Indication	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	OFF (4mA) or OUT1 low limit value	OFF or OUT2 low limit value	ON or OUT2 high limit value
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	ON or OUT2 high limit value	OFF or OUT2 low limit value
off			OFF (4mA) or OUT1 low limit value	OFF or OUT2 low limit value	

Only for DC input and DC current output type, [Output status selection when input abnormal] is available. For other inputs and outputs except for DC input and 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.

Thermocouple and RTD input

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

Indication range and Control range for thermocouple inputs other than the above:
Input range low limit value -50°C (100°F) to Input range high limit value +50°C (100°F)

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 corresponding value with which 0mA or 0V is inputted.

[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 when any 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 at the same status as when the reference junction is located at 0°C (32°F).

[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 rated scale 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 bracket 1 set,

Instruction manual 1 copy

CT (Current transformer) CTL-6S 1 piece(for rating 5A, 10A, 20A)

CTL-12-S36-10L1 1 piece (for rating 50A)

9.2 Optional specifications**Alarm 2 (A2) (Option code: A2)**

The output terminals are common for options [W], [LA] and [A2].

Action : ON/OFF action

Hysteresis: 0.1 to 100.0°C (°F), 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.

The output terminals are common for options [W], [A2] and [LA].

Setting range : Loop break alarm action time, 0 to 200minutes

Loop break alarm action span, 0 to 150°C(°F), 0.0 to 150.0°C(°F), 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.

The output terminals are common for options [LA], [A2] and [W].

This option cannot be applied to DC current output type.

Rating : 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 $\pm 5\%$ 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

Overlap band/Dead band setting range:

Thermocouple, RTD input: -100.0 to 100.0°C (°F)

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 operation.

Serial communication (Option code: C5)

When this option is added, the option [SM] cannot be added with it.

The following operations can be carried out from the external computer.

(1) Reading and setting of the main setting value, PID values and each setting value

(2) Reading of the input value 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 greater on one side.)

Communication interface : Based on EIA RS-485

Communication method : Half-duplex communication start-stop synchronous

Communication speed : 2400, 4800, 9600, 19200bps (Selectable by keypad)

Parity : Even, Odd and No (Selectable by keypad)

Stop bit : 1 and 2 (Selectable by key)

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 option SVTC) can be digitally transmitted to the JCS-33A (with the option C5).

(The Setting 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 former value.

The control desired value adds SVTC bias value to the value received by the SVTC command.

Shinko communication converter IF-300-C5 is not available for Modbus protocol.

SV1/SV2 external selection (Option code: SM)

SV1 or SV2 can be selected by the external contact.

When this option is added, the option [C5] cannot be added with it.

Contact Open between 13-14: SV1, Contact Closed between 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].	<ul style="list-style-type: none"> Control output OFF function is working. Press the  key for approx. 1 second to release the function.
[----] is flashing on the PV display.	<ul style="list-style-type: none"> Thermocouple, RTD or DC voltage (0 to 1V DC) is burnt out. Change each sensor. <p>How to check whether the sensor is burnt out</p> <p>[Thermocouple] If the input terminal of the instrument is 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.</p> <p>[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°C (32°F) is indicated, the instrument is likely to be operating normally, however, the sensor may be burnt out.</p> <p>[DC voltage (0 to 1V DC)] If the input terminal of the instrument is shorted, and if scaling low limit value is indicated, the instrument is likely to be operating normally, however, the signal wire may be burnt out.</p> Check whether the input terminals of thermocouple, RTD or DC voltage (0 to 1V DC) are securely mounted to the instrument input terminal. Connect the sensor terminals to the instrument input terminals securely.
[----] is flashing on the PV display.	<ul style="list-style-type: none"> Check whether input signal source for DC voltage (1 to 5V DC) or DC current (4 to 20mA DC) is disconnected. <p>How to check whether the input signal wire is disconnected</p> <p>[DC voltage (1 to 5V DC)] If the input to the input terminals of the instrument is 1V DC and if scaling low limit value is indicated, the instrument is likely to be operating normally, however, the signal wire may be disconnected.</p> <p>[DC current (4 to 20mA DC)] If the input to the input terminals of the instrument is 4mA DC and if scaling low limit value is indicated, the instrument is likely to be operating normally, however, the signal wire may be disconnected.</p> 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.	<ul style="list-style-type: none"> • 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 1V DC and if the value corresponding to 1V DC 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 1mA DC and if the value corresponding to 1mA DC 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.	<ul style="list-style-type: none"> • Check whether sensor input or temperature unit (°C or °F) is correct. Select the sensor input and temperature unit (°C or °F) 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].	<ul style="list-style-type: none"> • Internal memory is defective. Contact our agency or us.

10.2 Key operation

Problem	Presumed cause and solution
<ul style="list-style-type: none"> • Unable to set the SV, P, I, D, proportional cycle or alarm setting • The values do not change by \triangle, ∇ keys. 	<ul style="list-style-type: none"> • Setting value lock (Lock 1 or Lock 2) is designated. Release the lock designation. • During PID auto-tuning or auto-reset. In the case of PID 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 \triangle , ∇ keys are pressed, and unable to set the value.	<ul style="list-style-type: none"> • 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 the Auxiliary function setting mode 1.

10.3 Control

Problem	Presumed cause and solution
Temperature does not rise.	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • OUT1 or OUT2 low limit value is set to 100% or greater in Auxiliary function setting mode 2. Set it to a suitable value.
The control output remains in an OFF status.	<ul style="list-style-type: none"> • 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 shop where you purchased the unit.

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