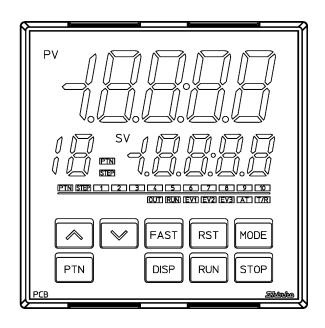
PROGRAMMABLE CONTROLLER PCB1 INSTRUCTION MANUAL





Preface

Thank you for purchasing our programmable controller PCB1. This manual contains instructions for the mounting, functions, operations and notes when operating the PCB1. To prevent accidents arising from the misuse of this controller, please ensure the operator receives this manual.

Abbreviations used in this manual

Abbreviation	Term
PV	Process variable
SV	Desired value
MV	Output manipulated variable
OUT1	Control output OUT1
OUT2	Control output OUT2
AT	Auto-tuning

Characters used in this manual (::: No character is indicated)

Indication	7			ď	3	4	5	5	7	8	9	[÷
Number, °ℂ/℉	-1	0	1	2	3	4	5	6	7	8	9	°C	°F
Indication	Я	ь	Ē	ď	E	F	<u> </u>	H	}	ı,	는	Ŀ	31
Alphabet	Α	В	С	D	Е	F	G	Н	I	J	K	L	М
Indication	п	٥	P	9	,-	5	;	U	ㅂ	- L	Ä	님	111
Alphabet	N	0	Р	Q	R	S	Т	U	V	W	Х	Υ	Z

Notes

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

Safety Precautions (Be sure to read these precautions before using our products.)

The safety precautions are classified into categories: "Warning" and "Caution". Depending on circumstances, procedures indicated by \triangle Caution may result in serious consequences, so be sure to follow the directions for usage.



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



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



🗥 Warning

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



Safety Precautions

- To ensure safe and correct use, thoroughly read and understand this manual before using this instrument.
- This instrument is intended to be used for industrial machinery, machine tools and measuring equipment. Verify correct usage after purpose-of-use consultation with our agency or main office. (Never use this instrument for medical purposes with which human lives are involved.)
- External protection devices such as protective equipment against excessive temperature rise, etc. must be installed, as malfunction of this product could result in serious damage to the system or injury to personnel. Proper periodic maintenance is also 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.

Warning on Model Label



Caution

Failure to handle this instrument properly may result in minor or moderate injury or property damage due to fire, malfunction, malfunction, or electric shock. Please read this manual before using the product to ensure that you fully understand the product.



(1) 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.

1. Installation Precautions



Caution

This instrument is intended to be used under the following environmental conditions (IEC61010-1): Overvoltage category $\ \mathbb{I}$, 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
- · No mechanical vibrations or shocks
- No exposure to direct sunlight, an ambient temperature of -10 to 55°C (14 to 131°F) that does not change rapidly, and no icing
- An ambient non-condensing humidity of 35 to 85 %RH
- No large capacity electromagnetic switches or cables through which large current is flowing
- No water, oil or chemicals or where the vapors of these substances can come into direct contact with the unit
- Please note that the ambient temperature of this unit not the ambient temperature of the control panel must not exceed 55°C (131°F) if mounted through the face of a control panel, otherwise the life of the electronic components (especially electrolytic capacitors) may be shortened.

Note: Avoid setting this instrument directly on or near flammable material even though the case of this instrument is made of flame-resistant resin.

2. Wiring Precautions



Caution

- Do not leave wire remnants in the instrument, as they could cause a fire or malfunction.
- Use the solderless terminal with an insulation sleeve in which the M3 screw fits when wiring the instrument.
- The terminal block of this instrument is designed to be wired from the left side. The lead wire must be inserted from the left side of the terminal, and fastened with the terminal screw.
- Tighten the terminal screw using the specified torque. If excessive force is applied to the screw when tightening, the terminal screw or case may be damaged.
- Do not pull or bend the lead wire on the terminal side when wiring or after wiring, as it could cause malfunction.
- This instrument does not have a built-in power switch, circuit breaker and fuse. It is necessary to install a-power switch, circuit breaker and fuse near the controller.

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

- For a 24 V AC/DC power source, do not confuse polarity when using direct current (DC).
- Do not apply a commercial power source to the sensor which is connected to the input terminal nor allow the power source to come into contact with the sensor.
- Use a thermocouple and compensating lead wire according to the sensor input specifications of this controller.
- Use the 3-wire RTD according to the sensor input specifications of this controller.
- For DC voltage input, (+) side input terminal number of 0 to 5 V DC, 1 to 5 V DC, 0 to 10 V DC differs from that of 0 to 1 V DC.

Terminal Number	DC Voltage Input
21	(+) side of 0 to 5 V DC, 1 to 5 V DC, 0 to 10 V DC
22	(+) side of 0 to 1 V 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 the AC power sources or load wires.

3. Operation and Maintenance Precautions



Caution

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

4. Compliance with Safety Standards



Caution

- · Always install the recommended fuse described in this manual externally.
- If the instrument is used in a manner not specified by the manufacturer, the protection provided by the instrument may be impaired.
- Use a device with reinforced insulation or double insulation for the external circuit connected to this product.
- When using this product as a UL certified product, use a power supply conforming to Class 2 or LIM for the external circuit connected to the product.

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1. Model

1.1 Model

PCB1			0-						
Control	R					Relay contact ou	utput		
output	S					Non-contact voltage output			
OUT1	Α					Direct current output			
Power sup	ply	0				100 to 240 V AC			
voltage		1				24 V AC/DC			
Input			0			Multi-range			
				0			Option 1 not needed.		
				1		EV(2/DD) (#4)	Event output EV2, or Heating/Cooling		
				ı		EV2(DR) (*1)	control output OUT2 Relay contact output		
				2		DS	Heating/Cooling control output OUT2		
						טט	Non-contact voltage output		
				3		DA	Heating/Cooling control output OUT2		
				3		DA	Direct current output		
Option 1				4		P24	Insulated power output		
						EV3(DR)	Event output EV3 + Event output EV2, or		
				5		` ′	Heating/Cooling control output OUT2		
					(*1), (*2)	(1), (2)	Relay contact output		
			6		EV3DS (*2)	Event output EV3 + Heating/Cooling control			
				0		L V 3 D 3 (2)	output OUT2 Non-contact voltage output		
				7		EV3DA (*2)	Event output EV3 + Heating/Cooling control		
				'		LV3DA (2)	output OUT2 Direct current output		
					0		Option 2 not needed.		
					1	C5W(20A) (*3)	Serial communication + Heater burnout		
					1 0300(C3VV(20A) (3)	alarm output + Event input (*4)		
					2 C5	C5W(100A) (*3)	Serial communication + Heater burnout		
						C3VV(100A) (3)	alarm output + Event input (*4)		
					3	EIW(20A) (*3)	Event input + Heater burnout alarm output		
Option 2					4	EIW(100A) (*3)	Event input + Heater burnout alarm output		
Option 2	Option 2				5	EIT (*2)	Event input + Transmission output (4 – 20		
					3	LII (2)	mA DC)		
				6	C5	Serial communication RS-485 + Event			
			O	CS	input (*4)				
				7	W(20A) (*3)	Heater burnout alarm output			
			8	W(100A) (*3) Heater burnout alarm output					
					9	EI	Event input + Event output EV3		

^(*1) When 'Heating/Cooling control Relay contact output' is selected in [Event output EV2 allocation], it works as the DR option.

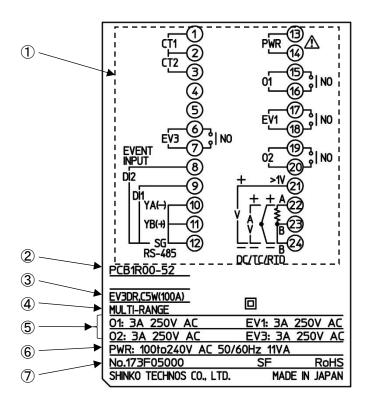
^(*2) The EV3D□ option and EIT option cannot be ordered together.

^(*3) When control output OUT1 is Relay contact output or Non-contact voltage output, the C5W, EIW or W option can be ordered.

^{(*4) &#}x27;SV digital transmission' or 'SV digital reception' can be selected in [Communication protocol].

1.2 How to Read the Model Label

The model label is attached to the right side of the case.



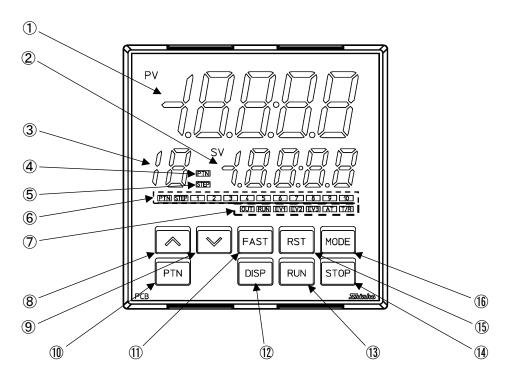
(Fig. 1.2-1)

No.	Description	Example
1	Terminal arrangement	Terminal arrangement of PCB1R00-52 (*1)
2	Model	PCB1R00-52
3	Option	EV3DR (Event output EV3 + Event output EV2, or
		Heating/Cooling control output OUT2 Relay contact
		output)
		C5W(100A) [Serial communication + Heater burnout
		alarm output (100 A) + Event input] (*2)
4	Input	MULTI-RANGE (Multi-range input)
5	Control output,	O1: 3 A 250 V AC (Control output OUT1)
	Event output	EV1: 3 A 250 V AC (Event output EV1)
		O2: 3 A 250 V AC (Control output OUT2)
		EV3: 3 A 250 V AC (Event output EV3)
6	Power supply,	100 to 240 V AC 50/60 Hz,
	Power consumption	11 VA
7	Serial number	No. 173F05000

^(*1) Terminal arrangement diagram differs depending on the model.

^(*2) For Heater burnout alarm output (C5W, EIW, W options), CT rated current is entered in bracket ().

2. Names and Functions of Controller



(Fig. 2-1)

Display, Indicator

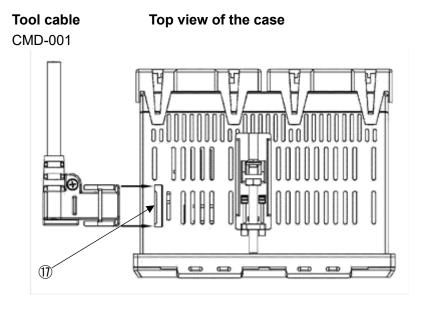
No.	Name	Description
1	PV Display	Indicates process variable (PV) in RUN mode.
	(Red)	Indicates setting characters in Setting mode.
		Flashes during Wait action or program control HOLD in program
		control.
2	SV Display	Indicates the desired value (SV), Output manipulated variable (MV),
	(Green)	or Remaining time (TIME) in RUN mode.
		Retains display indication at power OFF.
		Indicates the set values in setting mode.
3	PTN/STEP Display	Indicates the pattern number or step number.
	(Orange)	Each time the DISP key is pressed, the PTN/STEP Display (③),
		and the PTN/STEP indicator (⑥) alternately indicate the pattern
		number and step number.
		Flashes during Wait action or when the step number is indicated.
		If 'SV digital reception' is selected in [Communication protocol],
		r is indicated.
4	PTN indicator	Lights up when the pattern number is indicated on the PTN/STEP
	(Orange)	Display.
5	STEP indicator	Lights up when the step number is indicated on the PTN/STEP
	(Orange)	Display.
6	PTN/STEP indicator	LED for the pattern number or step number lights up.
	(Green)	If the PTN/STEP Display (③) indicates the pattern number, the
		PTN/STEP indicator (⑥) lights up its step number. If the PTN/STEP
		Display indicates the step number, the PTN/STEP indicator lights
		up its pattern number.
		Each time the DISP key is pressed, the PTN/STEP indicator and the
		PTN/STEP Display alternately indicate the pattern number and step
		number.

Action Indicator

No.	Name	Description
7	OUT (Green)	Lights up when control output OUT1 is ON.
	, ,	For direct current output, flashes corresponding to the MV in 125 ms
		cycles.
	RUN (Orange)	Lights up during program control RUN.
	, ,	Flashes during program control HOLD or Fixed value control.
	EV1 (Red)	Lights up when Event output EV1 is ON.
	EV2 (Red)	Lights up when Event output EV2 [(EV2, EV3(DR) options] is ON.
		Lights up when control output OUT2 [Cooling output (EV2, DS, DA or
		EV3D option)] is ON.
		For direct current output (DA, EV3DA options), flashes corresponding to
		the MV in 125 ms cycles.
	EV3 (Red)	Lights up when Event output EV3 (EV3D , EI options) is ON.
	AT (Orange)	Flashes while AT is performing.
	T/R (Orange)	Lights up during Serial communication (C5W, C5 options)
	, 0,	TX (transmitting) output.

Key

No.	Name	Description
8	UP key	In setting mode, increases the numerical value.
		By pressing for approx. 1 second during program control RUN, time
		progress pauses, and Fixed value control continues with the step SV at
		that time (program control HOLD function).
9	DOWN key	In setting mode, decreases the numerical value.
10	PTN key	During program control STOP (in Standby), selects program pattern
	(Pattern key)	number to perform or to set.
		By pressing during program control RUN, moves to Monitor mode.
		In Monitor mode, switches the indication items.
11)	FAST key	In setting mode, makes the numeric value change faster.
		During program control RUN, makes step time progress 60 times faster.
12	DISP key	During RUN mode, the PTN/STEP display and PTN/STEP
	(Display key)	indicator alternately indicates the pattern number and step number.
		In setting mode, registers the setting data, and moves back to the
		previous setting item.
13	RUN key	Performs program control, or cancels program control HOLD while
		program control is held.
		By pressing for approx. 1 second during program control RUN, stops
		performing step, and proceeds to the next step (Advance function).
14)	STOP key	Stops program control by pressing for approx. 1 second during program
		control RUN.
		Cancels pattern end output.
15)	RST key	In setting mode, registers the setting data, and moves to RUN mode.
	(Reset key)	
16	MODE key	In setting mode, registers the setting data, and moves to the next setting
		item.



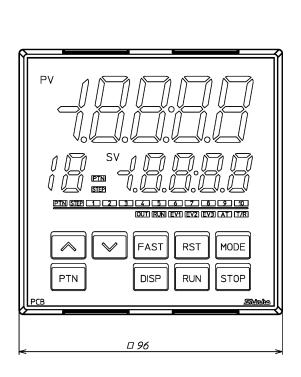
(Fig. 2-2)

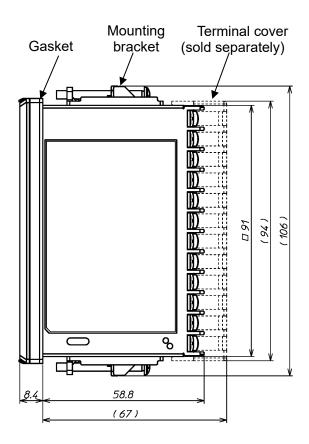
Connector

No.	Name	Description
17)	Console connector	By connecting the Tool cable (CMD-001, sold separately), the following
		operations can be conducted from an external computer, using the
		Console software SWC-PCB101M.
		Console connector is at the top of the instrument.
		• Reading and writing of step SV, step time, PID and various set values
		Reading of PV and action status
		• Function change

3. Mounting to the Control Panel

3.1 External Dimensions (Scale: mm)





(): Size when mounting brackets or terminal cover (sold separately) are mounted.

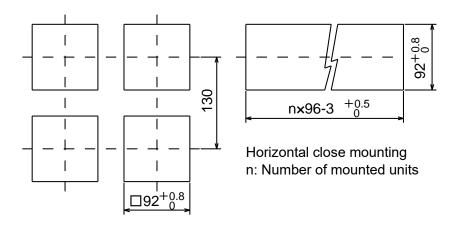
(Fig. 3.1-1)

3.2 Panel Cutout (Scale: mm)



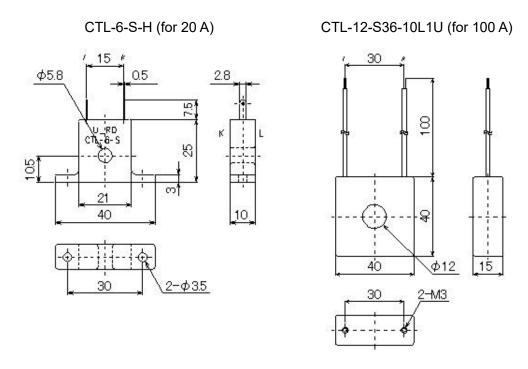
Caution

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



(Fig. 3.2-1)

3.3 CT (Current Transformer) External Dimensions (Scale: mm)



3.4 Mounting to, and Removal from, the Control Panel



Caution

As the case of the PCB1 is made of resin, do not use excessive force while tightening screws, or the case and mounting brackets could be damaged.

The torque should be 0.1 N·m.

3.4.1 How to Mount the Unit

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

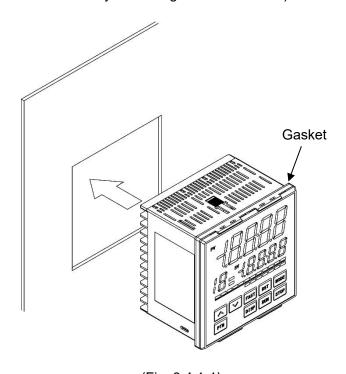
If the horizontal close mounting is used for the controller, IP66 specification (Drip-proof/Dust-proof) may be compromised, and all warranties will be invalidated.

Mountable panel thickness: 1 to 7 mm

(1) Insert the controller from the front side of the control panel. (Fig. 3.4.1-1)

If the Drip-proof/Dust-proof specification (IP66) is not necessary, the gasket may be removed.

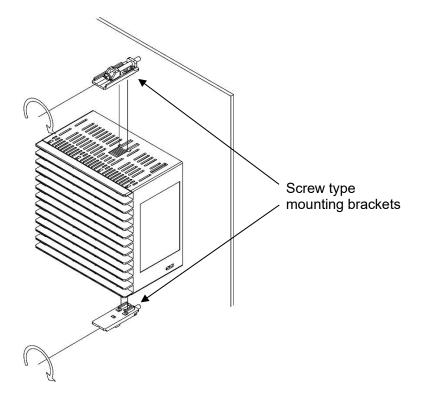
(Please keep in mind the warranty is void if gasket is removed).



(Fig. 3.4.1-1)

(2) Attach the mounting brackets into the slots at the top and bottom of the case, and secure the controller in place with the screws. (Fig. 3.4.1-2)

The torque is 0.1 N•m.



(Fig. 3.4.1-2)

3.4.2 How to Remove the Mounting Brackets and Unit

- (1) Turn the power to the unit OFF, and disconnect all wires before removing the unit.
- (2) Loosen the screws of the mounting brackets, and remove the mounting brackets.
- (3) Pull the unit out from the front of the control panel.

4. Wiring



🚹 Warning

Turn the power supply to the instrument off before wiring or checking.

Working on or touching the terminal with the power switched on may result in severe injury or death due to electrical shock.



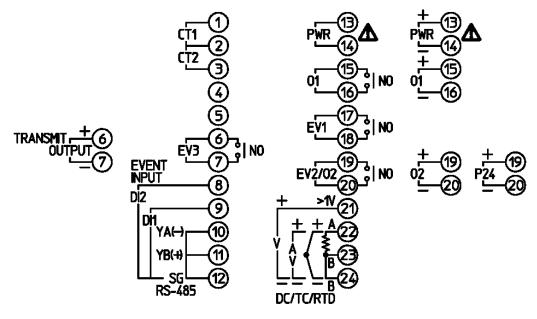
⚠ Caution

- Do not leave wire remnants in the instrument, as they could cause a fire or malfunction.
- Use the solderless terminal with an insulation sleeve in which the M3 screw fits when wiring the instrument.
- The terminal block of this instrument is designed to be wired from the left side. The lead wire must be inserted from the left side of the terminal, and fastened with the terminal screw.
- Tighten the terminal screw using the specified torque. If excessive force is applied to the screw when tightening, the terminal screw or case may be damaged.
- Do not pull or bend the lead wire on the terminal side when wiring or after wiring, as it could cause malfunction.
- This instrument does not have a built-in power switch, circuit breaker and fuse. It is necessary to install a-power switch, circuit breaker and fuse near the controller.
- (Recommended fuse: Time-lag fuse, rated voltage 250 V AC, rated current 2 A)
- For a 24 V AC/DC power source, do not confuse polarity when using direct current (DC).
- Do not apply a commercial power source to the sensor which is connected to the input terminal nor allow the power source to come into contact with the sensor.
- · Use a thermocouple and compensating lead wire according to the sensor input specifications of this controller.
- Use the 3-wire RTD according to the sensor input specifications of this controller.
- For DC voltage input, (+) side input terminal number of 0 to 5 V DC, 1 to 5 V DC, 0 to 10 V DC differs from that of 0 to 1 V DC.

Terminal Number	DC Voltage Input
21	(+) side of 0 to 5 V DC, 1 to 5 V DC, 0 to 10 V DC
22	(+) side of 0 to 1 V 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 the AC power sources or load wires.

4.1 Terminal Arrangement



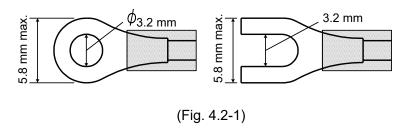
(Fig. 4.1-1)

Terminal Code	Description
PWR	Supply voltage 100 to 240 V AC or 24 V AC/DC
	(For 24 V DC, ensure polarity is correct.)
01	Control output OUT1
EV1	Event output EV1
EV2	Event output EV2 [EV2, EV3(DR) options]
O2	Control output OUT2 (EV2, DS, DA, EV3D□ options)
P24	Insulated power output 24 V DC (P24 option)
TC	Thermocouple input
RTD	RTD input
DC	Direct current, DC voltage input
CT1	CT (current transformer) input 1 (C5W, EIW, W options)
CT2	CT (current transformer) input 2 (C5W, EIW, W options)
RS-485	Serial communication RS-485 (C5W, C5 options)
EVENT INPUT	Event input DI1 (C5W, EIW, EIT, C5, El options)
	Event input DI2 (C5W, EIW, EIT, C5, EI options)
EV3	Event output EV3 (EV3D□, EI options)
TRANSMIT OUTPUT	Transmission output (EIT option)

4.2 Lead Wire Solderless Terminal

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

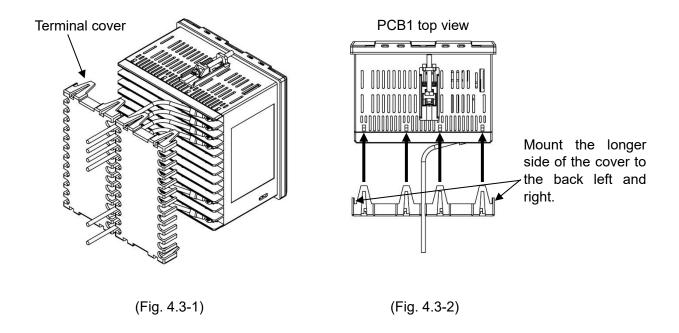
Solderless Terminal	Manufacturer	Model	Tightening Torque
Y-type	NICHIFU TERMINAL INDUSTRIES CO., LTD.	TMEX1.25Y-3	
r-type	J.S.T.MFG.CO.,LTD.	VD1.25-B3A	0.62 N. m
Ding type	NICHIFU TERMINAL INDUSTRIES CO., LTD.	TMEX1.25-3	0.63 N·m
Ring-type	J.S.T.MFG.CO.,LTD.	V1.25-3	



4.3 When Using a Terminal Cover

When using a terminal cover (sold separately), make sure the longer side is on the back left and right side of the case.

Pass the wires from terminal numbers 13 to 24 between terminal covers.



4.4 Wiring

For the terminal arrangement, refer to Section '4.1 Terminal Arrangement' (p.17).

4.4.1 Power Supply

Power supply voltage is 100 to 240 V AC or 24 V AC/DC.

For a 24 V AC/DC power source, ensure polarity is correct when using direct current (DC).

100 to 240 V AC, 24 V AC	24 V DC
PWR 13/14	19 H

4.4.2 Control Output OUT1 and OUT2

When EV2, DS, DA or EV3D□ option is ordered, control output OUT2 is available. Specifications of Control output OUT1 and OUT2 are shown below.

Relay contact	1a			
	Control capacity: 3 A 250 V AC (resistive load),			
	1 A 250 V AC (inductive load $\cos\phi$ =0.4)			
	Electrical life: 100,000 cycles			
	Minimum applicable load: 10 mA 5 V DC			
Non-contact voltage	12 V DC±15%			
(for SSR drive)	Max. 40 mA (short circuit protected)			
Direct current	4 to 20 mA DC			
	Load resistance: Max. 550 Ω			

Relay contact	Non-contact voltage, Direct current
01 NO	+
EV2/02/9 NO	+

Number of Shinko SSR units when connected in parallel (for Non-contact voltage output):

SA-400 series: 5 unitsSA-500 series: 2 units

4.4.3 Input

Each input wiring is shown below.

Note: For DC voltage input, (+) side input terminal number of 0 to 5 V DC, 1 to 5 V DC, 0 to 10 V DC differs from that of 0 to 1 V DC.

Thermocouple	RTD	Direct current, DC voltage (0 to 1 V)	DC voltage (0 to 5 V, 1 to 5 V, 0 to 10 V)
†@ @ _@ TC	AW BW BW RID	+@ * @ -@ oc	+@

4.4.4 Event Output EV1, EV2 and EV3

Event output EV1 is a standard feature.

Event output EV2 is available when EV2 or EV3(DR) option is ordered.

Event output EV3 is available when EV3D or EI option is ordered.

Specifications of Event output EV1, EV2 and EV3 are shown below.

Relay contact	1a	
	Control capacity: 3 A 250 V AC (resistive load)	
	1 A 250 V AC (inductive load $\cos\phi$ =0.4)	
	Electrical life: 100,000 cycles	
	Minimum applicable load: 10 mA 5 V DC	

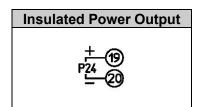
Event Output EV1	Event Output EV2	Event Output EV3
EV1 NO	EV2/02/20 3 NO	EV3 7 NO

4.4.5 Insulated Power Output

If P24 option is ordered, the Insulated power output is available.

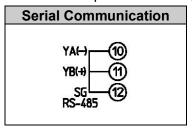
Specifications of Insulated power output are shown below.

Output voltage	24±3 V DC (When load current is 30 mA DC)		
Ripple voltage	Within 200 mV DC (When load current is 30 mA DC)		
Max. load current	30 mA DC		



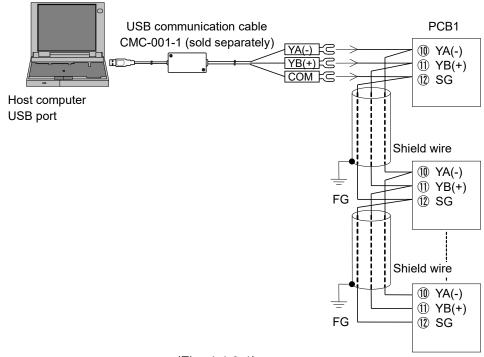
4.4.6 Serial Communication

If the C5W or C5 option is ordered, Serial communication is available.



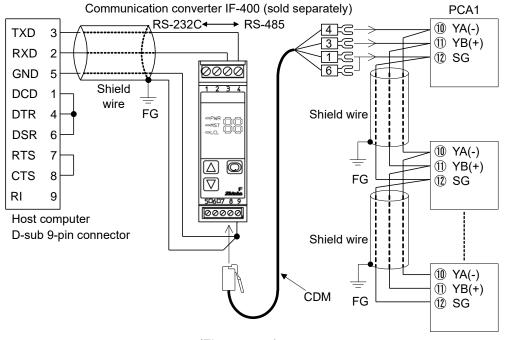
(1) Serial Communication

• When using USB communication cable CMC-001-1 (sold separately)



(Fig. 4.4.6-1)

• When using communication converter IF-400 (sold separately)



(Fig. 4.4.6-2)

(2) SV digital transmission

If 'SV digital transmission' is selected in [Communication protocol]:

Step SV can be digitally transmitted to the connected Shinko indicating controllers with the communication function (C5 option).

If 'SV digital reception' is selected in [Communication protocol]:

Step SV can be received via SVTC command from the connected Shinko programmable controllers PCA1 or PCB1 (on which 'SV digital transmission' should be selected in [Communication protocol]).

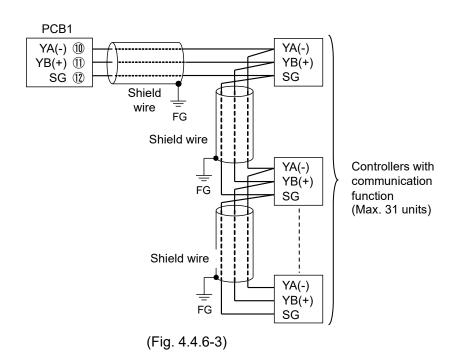
Update cycle: 250 ms

Wiring

For the PCB1 and controllers with the communication function, connect YA (-) to YA (-), YB (+) to YB (+), SG to SG terminal respectively.

Up to 31 units can be connected.

Wiring example of PCB1 and controllers with communication function



Shield wire

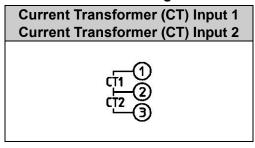
Connect only one end of the shield to the FG to avoid a ground loop. If both ends of the shield wire are connected to the FG, the circuit will be closed, resulting in a ground loop. This may cause noise. Be sure to ground the FG.

Recommended cable: OTSC-VB 2PX0.5SQ (made by Onamba Co., Ltd.) or equivalent (Use a twisted pair cable.)

4.4.7 CT Input 1 and CT Input 2

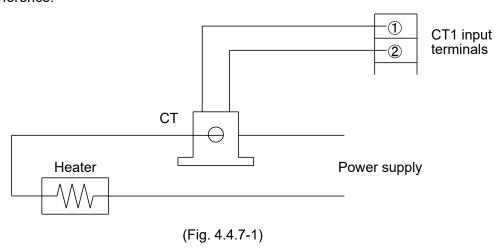
Current Transformer (CT) input is available when Heater burnout alarm output (C5W, EIW, W options) is ordered.

Cannot be used for detecting heater current under phase control.

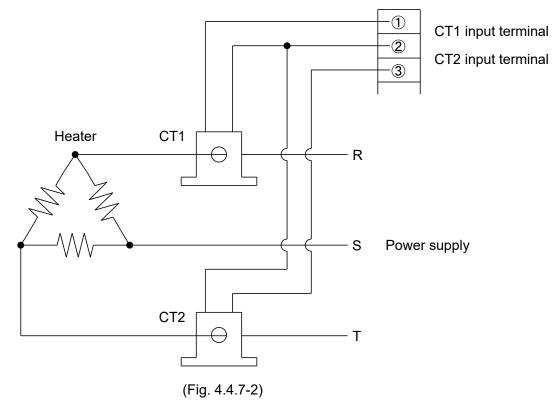


Use the CT (current transformer) provided, and pass one lead wire of the heater circuit into the hole of the CT. (Fig. 4.4.7-1)

When wiring, keep the CT wire away from AC sources or load wires to avoid the external interference.



When using 3-phase, pass any 2 lead wires of R, S, T into the CT, and connect them to CT1 (①-②) and CT2 (②-③) terminals. (Fig. 4.4.7-2)

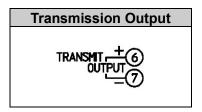


4.4.8 Transmission Output

If the EIT option is ordered, Transmission output is available.

Specifications of Transmission output are shown below.

Resolution	12000	
Output	4 to 20 mA DC	
Output	Load resistance: Max. 550 Ω	
Output accuracy	Within ±0.3% of Transmission output span	
Response time	400 ms + Input sampling period (0%→90%)	



Converting the value (PV, SV or MV transmission) to analog signal every 125 ms,

outputs the value in current. (Factory default: PV transmission)

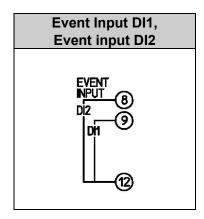
Outputs Transmission output low limit value if Transmission output high limit and low limit value are the same.

If SV or MV transmission is selected, 4 mA is output while in program control STOP (in Standby).

4.4.9 Event Input DI1 and DI2

When C5W, EIW, EIT, C5 or EI option is ordered, Event input DI1 or Event input DI2 is available. Specifications of Event input are shown below.





Signal edge action from OFF to ON / ON to OFF is engaged. However, when the power is turned ON, level action is used except the Program control Advance function.

If the same item – except 'Pattern number selection' – is selected in [Event input DI1 allocation] and [Event input DI2 allocation], OR calculation [if any one is ON (Closed), the function activates] begins.

An action changed by Event input DI□ has priority.

If 'Pattern number selection' is selected in [Event input DI1/DI2 allocation], Patterns 2 to 4 can be selected by ON (Closed) or OFF (Open) status of Event input DI1 and DI2.

Pattern numbers selected by Event input have priority over pattern numbers selected by keypad operation.

To select pattern numbers by keypad, make sure all Event inputs are in OFF (Open) status.

• When 'Pattern number selection' is selected only for Event input DI1:

Pattern number	*	2
Event input DI1	OFF (Open)	ON (Closed)

^{*} This number will be selected by keypad operation.

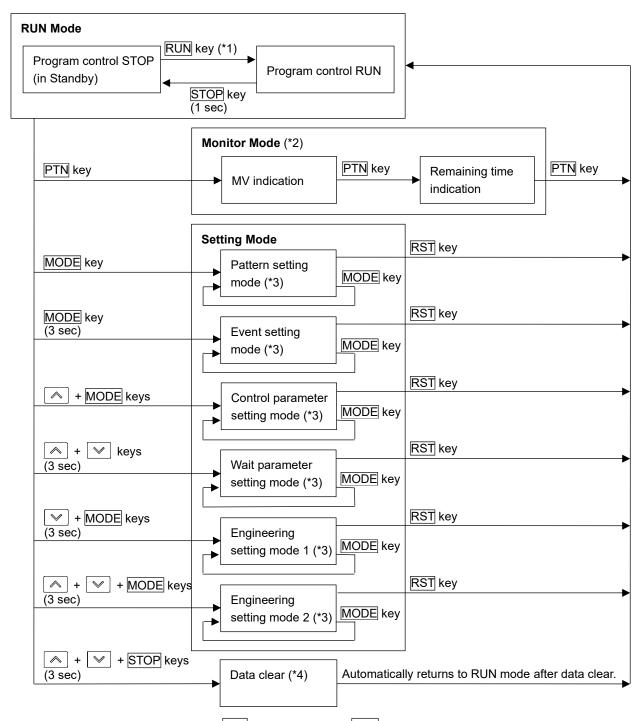
• When 'Pattern number selection' is selected for both Event input DI1 and DI2:

Pattern number	*	2	3	4
Event input DI1	OFF (Open)	ON (Closed)	OFF (Open)	ON (Closed)
Event input DI2	OFF (Open)	OFF (Open)	ON (Closed)	ON (Closed)

^{*} This number will be selected by keypad operation.

5. Outline of Key Operation and Each Mode

5.1 Outline of Key Operation



- (*1) Select a pattern number with the PTN key, and press the RUN key. Program control will start.
- (*2) Effective during Program control RUN.
- (*3) If the MODE key is pressed, settings or selections are registered, and moves to the next setting item.

 If the MODE key is pressed at the last setting item in each setting mode, the unit returns to the 1st setting item.

 If the DISP key is pressed, settings or selections are registered, and moves back to the previous setting item.

 If the DISP key is pressed at the 1st setting item in each setting mode, the unit moves back to the last setting item.
- (*4) Effective during program control STOP (in Standby).

(Fig. 5.1-1)

Modes

Mode	Description		
RUN mode	If power is turned ON, the unit enters RUN mode.		
	Starts from program control STOP (in Standby) or Program control RUN,		
	depending on the status at power OFF. Indication differs depending on the status below.		
	Program control	The PV Display indicates PV.	
	STOP (in Standby)	When the PTN indicator and STEP of the PTN/STEP indicator is lit, the PTN/STEP Display indicates the pattern number.	
		While the PTN of the PTN/STEP indicator is lit, the PTN indicator, the STEP indicator and the PTN/STEP Display are unlit.	
		Other Displays and indicators are unlit.	
	Program control	The PV Display indicates PV.	
	RUN	The SV Display indicates SV, MV or remaining time. The PTN indicator or STEP indicator lights up. While the PTN indicator is lit, the PTN/STEP Display indicates the pattern number. STEP of the PTN/STEP indicator lights up.	
		While the STEP indicator is lit, the PTN/STEP Display indicates the step number. PTN of the PTN/STEP indicator lights up. Action indicators light up depending on the operation	
		status.	
Monitor mode	By pressing the PTN key during program control RUN, the unit enters Monitor mode. The PV Display indicates PV, and the SV Display indicates MV. Each time the PTN key is pressed, SV, MV or remaining time is indicated.		
Satting made		Sets the following:	
Setting mode	Pattern setting mode	Step SV, Step time, PID block number, number of repetitions, pattern link.	
	Event setting mode	Sets the following:	
	3	EV alarm value, Time signal TS1 output OFF time, Time signal TS1 output ON time	
	Control parameter	Sets the following:	
	setting mode	AT Perform/Cancel, OUT1 proportional band, Integral time, Derivative time, ARW, OUT2 proportional band (When EV2, DS, DA or EV3D□ option is ordered),	
		Direct/Reverse action, Loop break alarm, etc.	
	Wait parameter	Sets the following:	
	setting mode	Wait value, Wait function Enabled/Disabled for each step	
	Engineering	Sets the following:	
	setting mode 1	Set value lock, Sensor correction, PV filter time	
		constant, Communication parameters (When C5W or C5 option is ordered)	
	Engineering	Sets the following:	
	setting mode 2	Input type, Scaling high limit, Scaling low limit, Event	
		output EV□ allocation, Step time unit, Power restore action, etc.	
Data clear	By pressing the,	and STOP keys (in that order) together for approx. 3	
		am control STOP (in Standby), Data clear Yes/No appears.	
	To clear data, select YES, and press the MODE key. The PV Display indicates		
	_	seconds, and all data reverts to their factory default values.	

5.2 Registering Settings and Selections

· How to increase/decrease setting values

To increase or decrease the set value (numeric value), use the or key.

If the or we key is pressed with the FAST key simultaneously, makes the numeric value change faster.

To switch the selection items, use the or key.

· How to register setting data or selection data

To register the settings or selections, use the MODE or DISP key.

If the MODE key is pressed, the set values (numerical values) or selected item are registered, and moves to the next setting item.

If the MODE key is pressed at the last setting item, the unit returns to the 1st setting item.

If the DISP key is pressed, the set values (numerical values) or selected item are registered, and moves back to the previous setting item.

If the DISP key is pressed at the 1st setting item, the unit moves back to the last setting item.

How to return to RUN mode

To return to RUN mode, use the RST key.

If the RST key is pressed, the set values (numerical values) or selected item will be registered, and the unit will revert to RUN mode.

5.3 How to Read Setting Items

Step 1 SV will be used for the explanation.

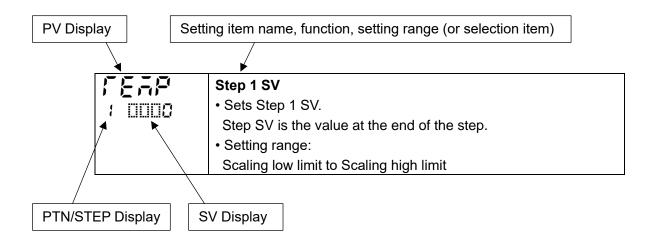
Explanation of setting items:

- Upper left: PV Display: Indicates setting characters.
- Lower left: PTN/STEP Display, SV Display

The PTN/STEP Display indicates the pattern number or step number. Indication differs depending on the setting item.

The SV Display indicates factory default value.

 Right side: Indicates the setting item or selection item, explanation of its function and setting range (or selection items).



6. Initial Settings

Setup (setting the Input type, Scaling high limit, Scaling low limit, Event output EV1 allocation, Step time unit, Power restore action, Direct/Reverse action, etc.) should be done before using this controller, according to the user's conditions.

Perform setup (or initial settings) in Engineering setting mode 2 and Control parameter setting mode.

Initial setting items and their factory default values are shown below in (Table 6-1).

If the user's specification is the same as the factory default value of this instrument, or if user's instrument has already been installed in a system after initial settings are finished, initial settings are not necessary.

Proceed to Section "7. Basic Settings and Operation" (p.38).

(Table 6-1)

Initial Catting Itana	Factors Default
Initial Setting Item	Factory Default
Engineering setting mode 2	
Input type	K -200 to 1370°C
Scaling high limit	1370℃
Scaling low limit	-200 ℃
Decimal point place	No decimal point
Event output EV1 allocation	No event
Step time unit	Hours : Minutes
Power restore action	Stops after power is restored.
Step SV when program control starts	0 °C
Program control start type	PV start
Control parameter setting mode	
OUT1 proportional cycle	Relay contact output: 30 sec
	Non-contact voltage output: 3 sec
Direct/Reverse action	Reverse action

The following shows the procedure for initial settings.

(1) Enter Engineering setting mode 2.

In RUN mode, press , wand MODE keys (in that order) together for approx. 3 seconds. The unit will enter Engineering setting mode 2.

Characters, Factory Default		Setting Item, Function, Setting Range	
56-5 0 6000	 Input type Selects an input type from thermocouple (10 types), RTD (2 types), direct current (2 types) and DC voltage (4 type), and the unit °C/°F. 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 break. When changing an input type, refer to Section "9.6 Items to be Initialized by Changing Settings" (p.109). 		
	• Selection	K -200 to 1370 °C	
	EUUE	K -200.0 to 400.0 °C	

Characters,			
Factory Default	Setting Item, Function, Setting Range		
-	JUUE	J	-200 to 1000 ℃
		R	0 to 1760 ℃
	SUUC	S	0 to 1760 °ℂ
	6000	В	0 to 1820 ℃
	EUUC	E	-200 to 800 ℃
	7000	Т	-200.0 to 400.0 °C
	~UUE	N	-200 to 1300 ℃
	PL 20	PL-II	0 to 1390 °C
	c	C(W/Re5-26)	0 to 2315 °C
	PFILE	Pt100	-200.0 to 850.0 °C
	_::P::: <u>:</u>	JPt100	-200.0 to 500.0 °C
	PTOE	Pt100	-200 to 850 ℃
		JPt100	-200 to 500 ℃
	EUUF	K	-328 to 2498 °F
	EUUF	K	-328.0 to 752.0 °F
	JUUF	J	-328 to 1832 °F
	- IIIF	R	32 to 3200 °F
	SUUF	S	32 to 3200 °F
	600F	В	32 to 3308 °F
	EUUF	E	-328 to 1472 °F
	TIME	Т	-328.0 to 752.0 °F
	nIIIF	N	-328 to 2372 °F
	PL 2F	PL-II	32 to 2534 °F
	culf	C(W/Re5-26)	32 to 4199 °F
	PTOF	Pt100	-328.0 to 1562.0 °F
		JPt100	-328.0 to 932.0 °F
	PTOF	Pt100	-328 to 1562 °F
	71512E	JPt100	-328 to 932 °F
	42 <u>0</u> 8	4 to 20 mA	-2000 to 10000
	0208	0 to 20 mA	-2000 to 10000
	00 18	0 to 1 V	-2000 to 10000
	0058	0 to 5 V	-2000 to 10000
	1058	1 to 5 V	-2000 to 10000
	0 108	0 to 10 V	-2000 to 10000
<u>5</u> <u> </u>	Scaling high limit • Sets scaling high limit value.		
□ :370			
	_	Setting range: Scaling low limit to Input range high limit	
	DC voltag	e, current inputs	s: -2000 to 10000 (The placement of the decimal
,-,-, ,	Cooling	point follows the selection.)	
5711	Scaling low limit • Sets scaling low limit value.		
□ -200	Setting range: Input range low limit to Scaling high limit		
	DC voltage, current inputs: -2000 to 10000 (The placement of the decimal		
		<u> </u>	point follows the selection.)

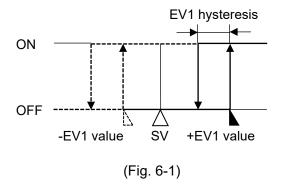
ractory Delault		
UTU:::: Decimal point place	Setting Item, Function, Setting Range	
/_1 /	Decimal point place	
• Selects decimal point place.		
Selection item:		
No decimal point		
1 digit after decimal point		
□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□		
□□□□□ 3 digits after decimal point		
Available only when DC voltage or current input is selected in [[Input type].	
Event output EV1 allocation		
• Selects Event output EV1 from the table below.		
• If Event output EV1 is changed, some setting items will be initia	lized. Refer to	
Section "9.6 Items to be Initialized by Changing Settings" (p.10	9).	
Selection item:		
□000 No event		
□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□		
□□□□□□ Alarm output, Low limit alarm		
Alarm output, High/Low limits alarm		
Alarm output, High/Low limits independent alarm		
Alarm output, High/Low limit range alarm		
Alarm output, High/Low limit range independent aları	m	
Alarm output, Process high alarm		
Alarm output, Process low alarm		
Alarm output, High limit with standby alarm		
Alarm output, Low limit with standby alarm		
Alarm output, High/Low limits with standby alarm		
Alarm output, High/Low limits with standby independ	lent alarm	
Heater burnout alarm output (when C5W, EIW or W		
	option is	
ordered):	ormor) and	
Detects load current value with CT (current transforturns ON if it is lower than heater burnout alarm value)	, -	
	alue.	
Sets Loop break alarm time and band.		
About the Loop break alarm:		
When the control action is Reverse (Heating) co	ontrol:	
If the PV does not reach the Loop break alarm bar	nd setting within	
the time allotted to assess the Loop break alarm (a	after the MV has	
reached 100% or the OUT1 high limit value), the a	alarm output will	
be turned ON.		
Likewise, if the PV does not drop to the Loop broad	eak alarm band	
setting within the time allotted to assess the Loop br	eak alarm (after	
the MV has reached 0% or the OUT1 low limit va	alue), the alarm	
output will be turned ON.		
When the control action is Direct (Cooling) control	trol:	
If the PV does not drop to the Loop break alarm bar		
the time allotted to assess the Loop break alarm (a	•	
reached 100% or the OUT1 high limit value), the a		
be turned ON.	Jacpat IIII	

Characters, Factory Default	Setting Item, Function, Setting Range	
. dotory belault		Likewise, if the PV does not reach the Loop break alarm band setting within the time allotted to assess the Loop break alarm (after the MV has reached 0% or the OUT1 low limit value), the alarm output will be turned ON.
		• When EV2 option (If "☐☐☐☐ Heating/Cooling control output" is selected in [Event output EV2 allocation]) is ordered, or when DS, DA or EV3D□ option is ordered.
		When the control action is Reverse (Heating) control: After OUT1 MV has reached 100% or the OUT1 high limit value, or after OUT2 MV has reached 0% or -(OUT2 low limit value), if the PV does not reach the Loop break alarm band setting within the time allotted to assess the Loop break alarm, the alarm output will be turned ON. Likewise, after OUT1 MV has reached 0% or the OUT1 low limit value, or after OUT2 MV has reached -100% or -(OUT2 high limit value), if the PV does not drop to the Loop break alarm band setting within the time allotted to assess the Loop break alarm, the alarm output will be turned ON.
		When the control action is Direct (Cooling) control: After OUT1 MV has reached 100% or the OUT1 high limit value, or after OUT2 MV has reached 0% or -(OUT2 low limit value), if the PV does not drop to the Loop break alarm band setting within the time allotted to assess the Loop break alarm, the alarm output will be turned ON. Likewise, after OUT1 MV has reached 0% or the OUT1 low limit value, or after OUT2 MV has reached -100% or -(OUT2 high limit value), if the PV does not reach the Loop break alarm band setting within the time allotted to assess the Loop break alarm, the alarm
	00 /5	output will be turned ON.
	:.:D (3	Time signal output: Turns ON during program control RUN, by setting Time signal output OFF time and ON time within total time in one pattern.
	00 15	Output during AT: Turns ON during AT.
		Pattern end output: Turns ON after Program control ends, and remains ON during the time set in [Pattern end output time].
	OO 18	Output by communication command: Communication command 8004H B0 EV1 output 0: OFF, 1: ON B1 EV2 output 0: OFF, 1: ON B2 EV3 output 0: OFF, 1: ON
	OD 19	RUN output: Turns ON during program control RUN.
	ାନୁ ∤5ୁ (Time When ାନୁ ∤ୁ	Heater burnout alarm output) are selected, each output is common to multiple (RUN output) are selected, each output is common to multiple (RUN output) are selected, each output is common to multiple selected.

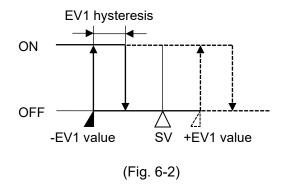
Alarm output

EV1 alarm output actions are shown below.

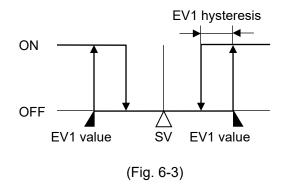
• High limit alarm



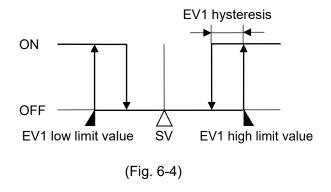
Low limit alarm



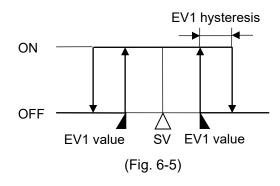
High/Low limits alarm



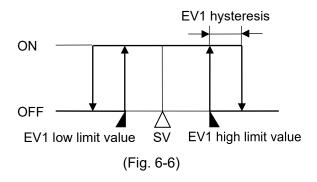
High/Low limits independent alarm



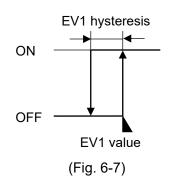
• High/Low limit range alarm



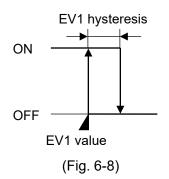
• High/Low limit range independent alarm



Process high alarm



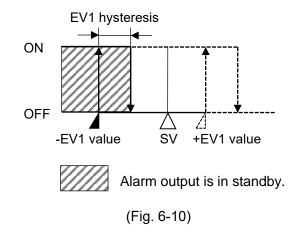
Process low alarm



. High limit with standby alarm

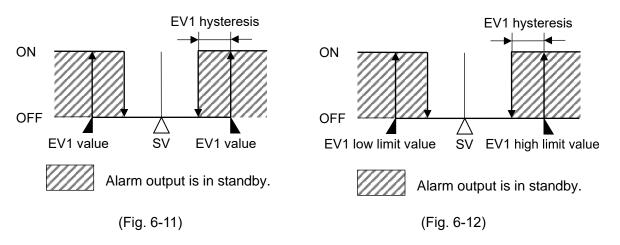
ON OFF -EV1 value SV +EV1 value Alarm output is in standby. (Fig. 6-9)

Low limit with standby alarm



• High/Low limits with standby alarm

High/Low limits with standby independent alarm



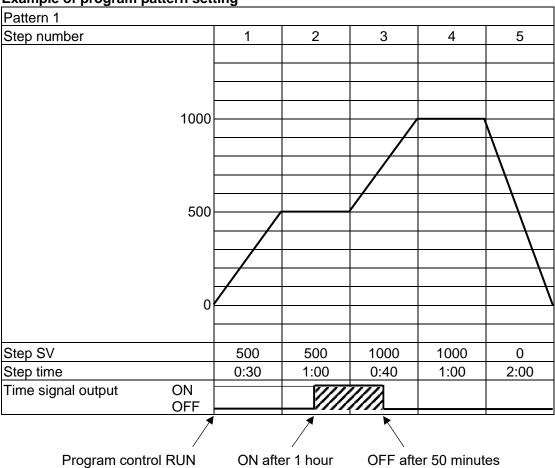
• Time signal output

Time signal output OFF time and Time signal output ON time are set within total time in one pattern. After program control starts, Time signal output turns ON during Time signal output ON time after Time signal output OFF time has elapsed.

During Wait action or program control HOLD, progress time of Time signal output stops.

When step time is changed during program control RUN, Time signal output timing is re-calculated using the changed pattern time.

Example of program pattern setting



(e.g.) Time signal output setting

Time signal output OFF time: 1 hour Time signal output ON time: 50 minutes

(Fig. 6-13)

Explanation of Time signal output

In the above program pattern example, Time signal output turns ON one hour after program control RUN starts (30 minutes after the unit entered Step 2). Time signal output turns OFF 50 minutes after Time signal output turned ON (20 minutes after the unit entered Step 3).

Characters, Factory Default	Setting Item, Function, Setting Range	
Press the MODE key multiple times until the following characters appear.		
A_5	Step time unit	
□ āt n□	Selects the Step time unit.	
	Selection item:	
	Al A	Hours: Minutes
	58c.II	Minutes : Seconds

Characters,		Setting Item, Function, Setting Range	
Factory Default			
PHES	Power restore action		
0 55oP	• If the power fails during program control RUN, the controller can be operated		
	depending on the selection in [Power restore action].		
	Selection item:		
	Srop	Stops after power is restored:	
		After power is restored, stops current program control, and returns	
	,-	to the program control STOP (in Standby).	
	conf	Continues after power is restored:	
		After power is restored, continues (resumes) previous program control.	
	Hold	Suspends after power is restored	
		After power is restored, suspends (on hold) current program	
		control, and performs Fixed value control using the step SV at the	
		time of suspension.	
		Pressing the RUN key cancels suspension, and Program control	
		resumes.	
5_58	Step SV when program control starts		
	Sets step SV when program control starts.		
	Setting range:		
	Scaling low limit to Scaling high limit (The placement of the decimal point		
		follows the selection.)	
5_51	_	ontrol start type	
0 P800	Program control start type can be selected.		
	・Selection		
	Г <u>Б</u> іі іі	PV start	
		Only when program control starts, the step SV and step time are	
	PH-II	advanced to the PV, then program control starts.	
	, <u>, , , , , , , , , , , , , , , , , , </u>	PVR start	
		When program control starts and in pattern repeating, the step	
		SV and step time are advanced to the PV, then program control	
	,— , ,	starts.	
	5800	SV start	
		Program control starts from the value set in [Step SV when	
		program control starts].	
Press the RST ke	Press the RST key. The unit returns to RUN mode.		

(2) Enter Control parameter setting mode.

In RUN mode, press the And MODE keys (in that order) together. The unit enters Control parameter setting mode.

Characters, Factory Default	Setting Item, Function, Setting Range
	AT Perform/Cancel Do not perform AT during initial settings.

Characters, Factory Default	Setting Item, Function, Setting Range		
	key multiple times until the following characters appear.		
	 OUT1 proportional cycle Sets OUT1 proportional cycle. For the relay contact output type, if the proportional cycle time is decreased, the frequency of the relay action increases, and the life of the relay contact is 		
	shortened. Factory default value differs depending on the output type as follows: Relay contact output type: 30 seconds Non-contact voltage output type: 3 seconds Direct current output type: Not available		
Press the MODE	Setting range: 0.5, 1 to 120 seconds Available when OUT1 is relay contact output or non-contact voltage output. key multiple times until the following characters appear.		
EDAT	Direct/Reverse action • Selects either Direct (Cooling) or Reverse (Heating) control action. Direct action: In Direct action, MV is increased when PV is higher than SV (positive deviation). Refrigerators perform Direct action. MV 100% CFig. 6-14)		
	Reverse action: In Reverse action, MV is increased when SV is higher than PV (negative deviation). Electric furnaces perform Reverse action. $MV = \frac{MV}{100\%} = \frac{MV}{Low} + \frac{\Delta}{\Delta} \rightarrow \frac{A}{SV} + \frac{A}{B} = \frac{A}{B} + \frac{A}{B} \frac{A}{B} +$		

At this stage, the initial settings are complete.

Selection item:

cool

Press the RST key. The unit returns to RUN mode.

Refer to Sections '7. Basic Settings and Operation (p.38)' and '8. Explanation of Setting Items (p.44)'.

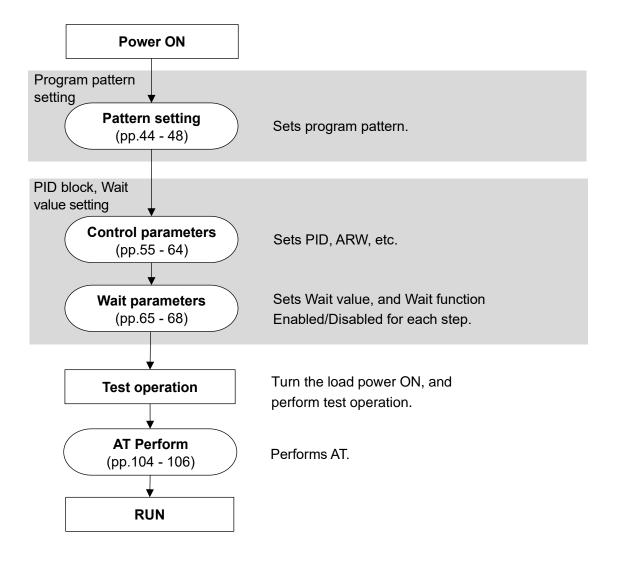
(Fig. 6-15)

Reverse action

Direct action

7. Basic Settings and Operation

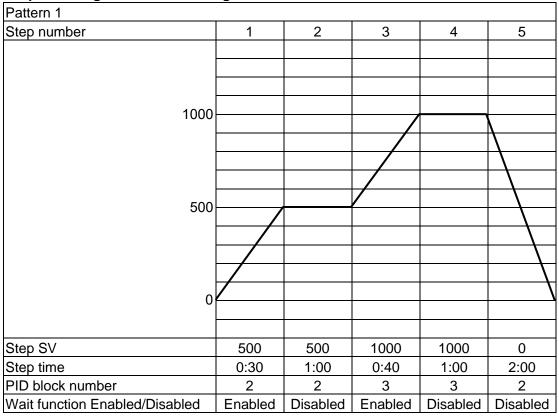
7.1 Procedure of Basic Settings and Operation



(Fig. 7.1-1)

7.2 Program Pattern Setting

Example of Program Pattern Setting



(Fig. 7.2-1)

Explanation of Program Pattern

- Step 1: After program control starts, control is performed so that SV gradually rises from 0°C to 500°C in 30 minutes.
- Step 2: Control is performed to keep the SV at 500°C for 1 hour.
- Step 3: Control is performed so that SV gradually rises from 500°C to 1000°C for 40 minutes.
- Step 4: Control is performed to keep the SV at 1000°C for 1 hour.
- Step 5: Control is performed so that SV gradually falls from 1000°C to 0°C in 2 hours.

Example of PID Block Setting

If program pattern is not set for a step, its PID block number becomes 1 (factory default). We highly recommend that you leave the factory defaults of PID block 1 as they are, and set the values from Block 2.

Control parameters such as PID, ARW are common to all patterns.

Block number	OUT1 proportional band	Integral time	Derivative time	ARW	OUT2 proportional band
1	10℃	200 sec	50 sec	50%	10℃
2	10°C (*)	200 sec (*)	50 sec (*)	50% (*)	10℃ (*)
3	10°C (*)	200 sec (*)	50 sec (*)	50% (*)	10℃ (*)

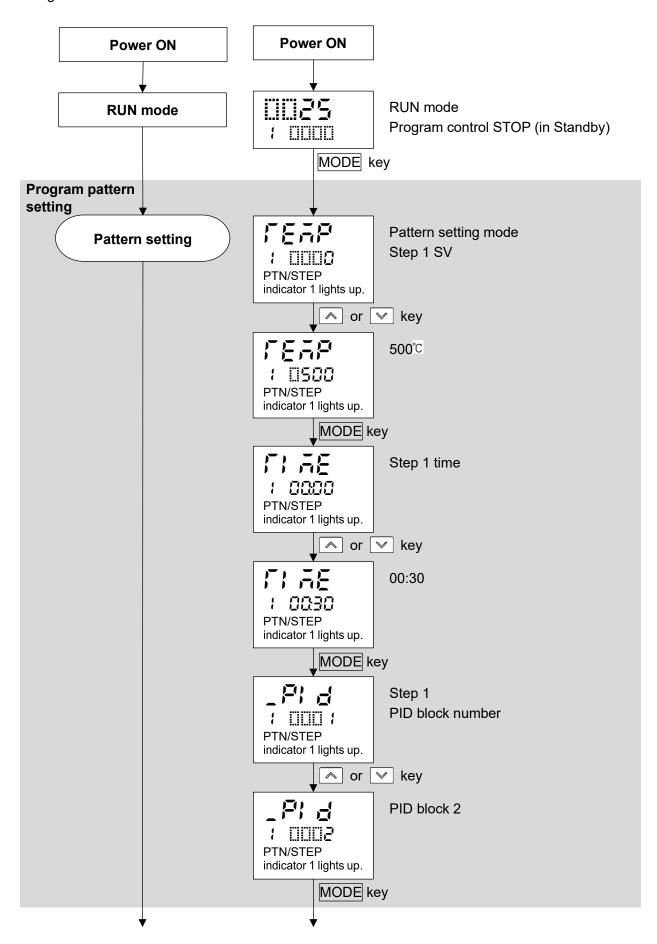
^(*) Setting items in PID block are determined after performing AT. So, they are currently factory default values.

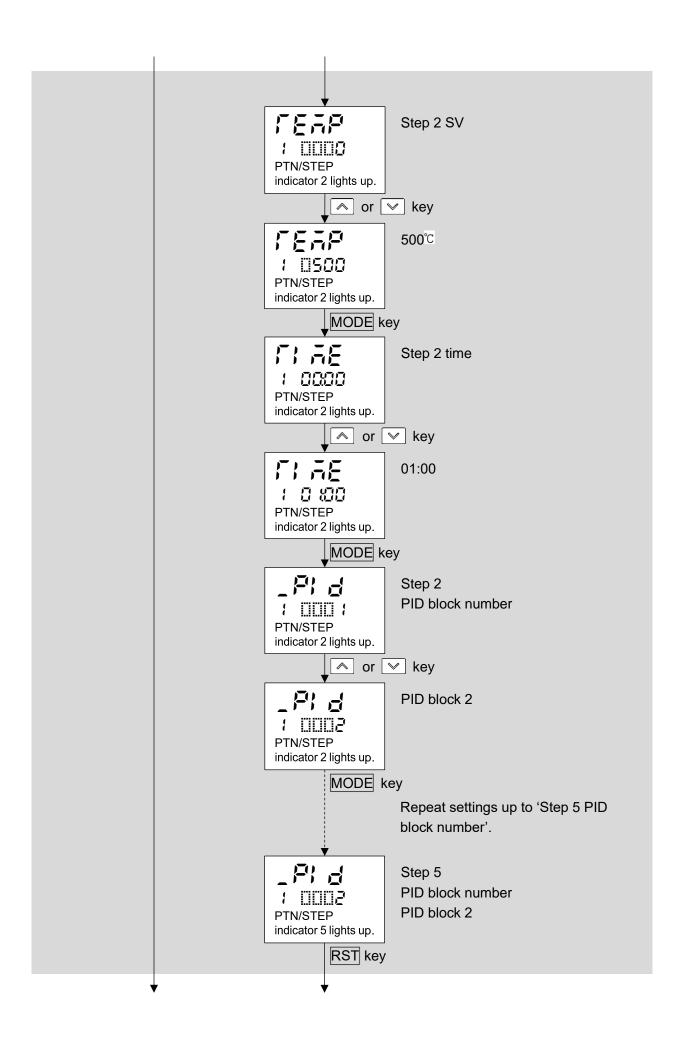
Example of Wait Value Setting

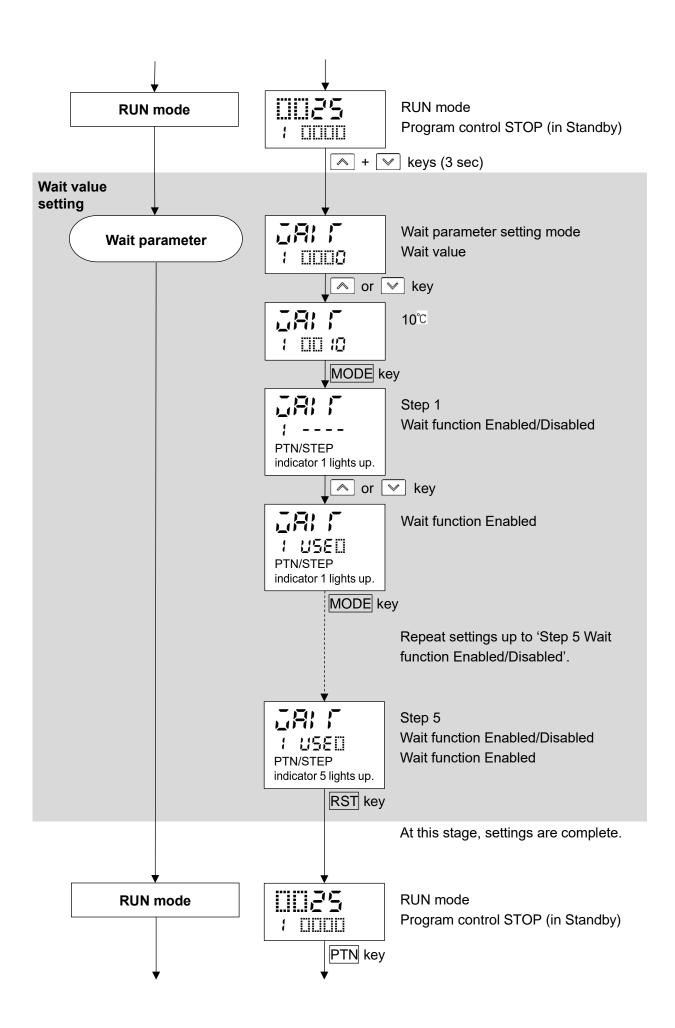
Wait value: 10°C

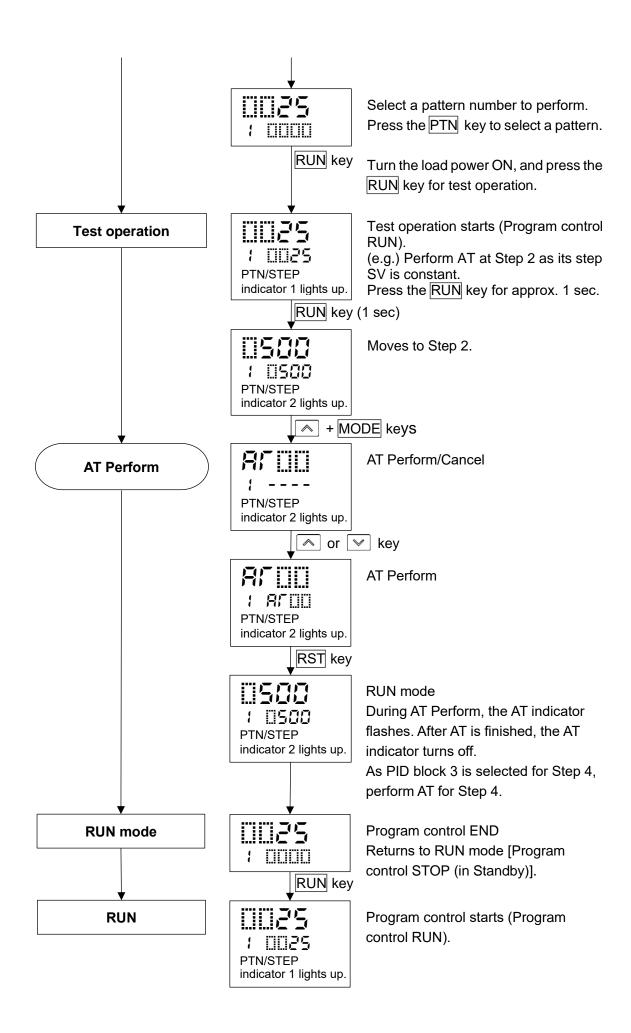
Wait value is common to all steps of each pattern.

The operation method is described below, based on the program pattern, PID block and wait value settings.









8. Explanation of Setting Items

Setting items for the following mode will be described:

Pattern setting mode, Event setting mode, Control parameter setting mode, Wait parameter setting mode, Engineering setting mode 1, Engineering setting mode 2.

8.1 Setting Items in Pattern Setting Mode

In Pattern setting mode, the following items are set:

Step SV, Step time, PID block number, Number of repetitions, pattern link

Settings are performed for the pattern selected at the time of entering Pattern setting mode. During program control RUN, settings are possible only for the currently performing pattern. If 'Pattern link Enabled' is selected in [Pattern link]: Even if the performing pattern is changed from 1 to 2 during pattern setting mode, Pattern 1 will be remained, and the pattern number will not be updated until the unit reverts to RUN mode.

Before entering Pattern setting mode

Select a pattern number with the PTN key before entering Pattern setting mode.

• To enter Pattern setting mode

In RUN mode, press the MODE key. The unit enters Pattern setting mode.

Pattern 1 is used for the explanation of setting items in Pattern setting mode.

Characters, Factory Default	Setting Item, Function, Setting Range
FERP	Step 1 SV
	Sets Step 1 SV.
PTN/STEP	Step SV is a value (SV) at the end of the step.
indicator 1	Setting range:
lights up.	Scaling low limit to Scaling high limit
[] AE	Step 1 time
+ 0000	Sets Step 1 time.
PTN/STEP	Step time is the processing time of the step.
indicator 1	Setting range:
lights up.	, 00:00 to 99.59 (Time unit follows the selection in [Step time unit].)
	If the w key is pressed at 00:00, will appear.
	If is set, Fixed value control will be performed using Step 1 SV.
- 	Step 1 PID block number
	Selects PID block number used for Step 1.
PTN/STEP	Selection item:
indicator 1	1 to 10
lights up.	
	Step 2 SV
	Sets Step 2 SV.
PTN/STEP	Step SV is a value (SV) at the end of the step.
indicator 2	Setting range:
lights up.	Scaling low limit to Scaling high limit

Characters, Factory Default	Setting Item, Function, Setting Range
TI AE	Step 2 time
	• Sets Step 2 time.
PTN/STEP	Step time is the processing time of the step.
indicator 2	Setting range:
lights up.	
	, 00:00 to 99.59 (Time unit follows the selection in [Step time unit].)
	If the key is pressed at 00:00, will appear.
1 −0 0	If is set, Fixed value control will be performed using Step 2 SV.
_	Step 2 PID block number
	Selects PID block number used for Step 2.
PTN/STEP	Selection item:
indicator 2 lights up.	1 to 10
	Step 3 SV
	• Sets Step 3 SV.
PTN/STEP	Step SV is a value (SV) at the end of the step.
indicator 3	• Setting range:
lights up.	Scaling low limit to Scaling high limit
)T)	Step 3 time
	• Sets Step 3 time.
PTN/STEP	Step time is the processing time of the step.
indicator 3	Setting range:
lights up.	
	, 00:00 to 99.59 (Time unit follows the selection in [Step time unit].)
	If the key is pressed at 00:00, will appear.
771	If is set, Fixed value control will be performed using Step 3 SV.
_P; d	Step 3 PID block number
1 000 1	Selects PID block number used for Step 3.
PTN/STEP indicator 3	Selection item:
lights up.	1 to 10
řeap	Step 4 SV
	Sets Step 4 SV.
PTN/STEP	Step SV is a value (SV) at the end of the step.
indicator 4	Setting range:
lights up.	Scaling low limit to Scaling high limit
: : : : : : : : : : : : : : : : : : :	Step 4 time
1 0000	• Sets Step 4 time.
PTN/STEP	Step time is the processing time of the step.
indicator 4	• Setting range:
lights up.	, 00:00 to 99.59 (Time unit follows the selection in [Step time unit].)
	If the w key is pressed at 00:00, will appear.
	If is set, Fixed value control will be performed using Step 4 SV.
	ii is set, rixeu value control will be periormed using step 4 SV.

Characters,	Setting Item, Function, Setting Range
Factory Default	
_P; d	Step 4 PID block number
{ LILILI }	Selects PID block number used for Step 4.
PTN/STEP indicator 4	Selection item:
lights up.	1 to 10
řeap	Step 5 SV
	Sets Step 5 SV.
PTN/STEP	Step SV is a value (SV) at the end of the step.
indicator 5	Setting range:
lights up.	Scaling low limit to Scaling high limit
T: 55	Step 5 time
: 0000	Sets Step 5 time.
PTN/STEP	Step time is the processing time of the step.
indicator 5	Setting range:
lights up.	, 00:00 to 99.59 (Time unit follows the selection in [Step time unit].)
	If the key is pressed at 00:00, will appear.
	If is set, Fixed value control will be performed using Step 5 SV.
	Step 5 PID block number
	Selects PID block number used for Step 5.
PTN/STEP	Selection item:
indicator 5	1 to 10
lights up.	
reap	Step 6 SV
: 0008	Sets Step 6 SV.
PTN/STEP	Step SV is a value (SV) at the end of the step.
indicator 6	Setting range:
lights up.	Scaling low limit to Scaling high limit
[] AE	Step 6 time
: 00:00	Sets Step 6 time.
PTN/STEP	Step time is the processing time of the step.
indicator 6	Setting range:
lights up.	, 00:00 to 99.59 (Time unit follows the selection in [Step time unit].)
	If the ☑ key is pressed at 00:00, will appear.
	If is set, Fixed value control will be performed using Step 6 SV.
_P; d	Step 6 PID block number
1 000 1	Selects PID block number used for Step 6.
PTN/STEP	Selection item:
indicator 6	1 to 10
lights up.	Step 7 SV
	• Sets Step 7 SV.
PTN/STEP	Step SV is a value (SV) at the end of the step.
indicator 7	· · · · · · · · · · · · · · · · · · ·
lights up.	Setting range: Seeling low limit to Seeling high limit.
	Scaling low limit to Scaling high limit

Characters,	Setting Item, Function, Setting Range
Factory Default	
	Step 7 time
: 8888	Sets Step 7 time.
PTN/STEP	Step time is the processing time of the step.
indicator 7	Setting range:
lights up.	, 00:00 to 99.59 (Time unit follows the selection in [Step time unit].)
	If the ☑ key is pressed at 00:00, will appear.
	If is set, Fixed value control will be performed using Step 7 SV.
_F; d	Step 7 PID block number
7 0001	Selects PID block number used for Step 7.
PTN/STEP	Selection item:
indicator 7	1 to 10
lights up.	04a
reap	Step 8 SV
	• Sets Step 8 SV.
PTN/STEP indicator 8	Step SV is a value (SV) at the end of the step.
lights up.	Setting range:
, -, -,-	Scaling low limit to Scaling high limit
	Step 8 time
: 00:00	• Sets Step 8 time.
PTN/STEP	Step time is the processing time of the step.
indicator 8 lights up.	Setting range:
iiginio ap.	, 00:00 to 99.59 (Time unit follows the selection in [Step time unit].)
	If the ☑ key is pressed at 00:00, will appear.
	If is set, Fixed value control will be performed using Step 8 SV.
<u> P d</u>	Step 8 PID block number
1 000 1	Selects PID block number used for Step 8.
PTN/STEP	Selection item:
indicator 8	1 to 10
lights up.	Step 9 SV
	• Sets Step 9
PTN/STEP	SV.
indicator 9	Step SV is a value (SV) at the end of the step.
lights up.	• Setting range:
	Scaling low limit to Scaling high limit
)T)	Step 9 time
	• Sets Step 9 time.
PTN/STEP	Step time is the processing time of the step.
indicator 9	Setting range:
lights up.	
	, 00:00 to 99.59 (Time unit follows the selection in [Step time unit].)
	If the w key is pressed at 00:00, will appear.
	If is set, Fixed value control will be performed using Step 9 SV.

Characters, Factory Default	Setting Item, Function, Setting Range		
_P: d	Step 9 PID block number		
	Selects PID block number used for Step 9.		
PTN/STEP	Selection item:		
indicator 9	1 to 10		
lights up.			
I SEAP	Step 10 SV		
: 0000	Sets Step 10 SV.		
PTN/STEP	Step SV is a value (SV) at the end of the step.		
indicator 10	Setting range:		
lights up.	Scaling low limit to Scaling high limit		
11 AE	Step 10 time		
1 0000	Sets Step 10 time.		
PTN/STEP	Step time is the processing time of the step.		
indicator 10	Setting range:		
lights up.	, 00:00 to 99.59 (Time unit follows the selection in [Step time unit].)		
	If the ☑ key is pressed at 00:00, will appear.		
	If is set, Fixed value control will be performed using Step 10 SV.		
_F; d	Step 10 PID block number		
	Selects PID block number used for Step 10.		
PTN/STEP	Selection item:		
indicator 10	1 to 10		
lights up.	-		
-EPC	Number of repetitions		
: 0008	Sets the number of repetitions for the selected Pattern 1		
PTN/STEP	Setting range:		
indicator turns off.	0 to 10000		
cHi n	Pattern link		
;	Selects whether to link Pattern 2 to currently selected pattern 1.		
PTN/STEP	If Pattern 10 is selected, Pattern 1 can be linked, and selects whether to link		
indicator turns off.	Pattern 1.		
	Randomly selected pattern numbers (Pattern 1 and Pattern 5) cannot be		
	linked.		
	For repetitions of linked pattern, the whole linked pattern will be repeated as		
	many times as set in [Number of repetitions].		
	(e.g.) If patterns 1 and 2 are linked, and if the number of repetitions of pattern		
	1 is set to 2 times, the whole linked pattern (Patterns 1 and 2) will be		
	repeated twice.		
	Selection item:		
	Pattern link Disabled		
	E∺ □ Pattern link Enabled		

At this stage, settings for Pattern setting mode are complete.

Press the $\overline{\mbox{RST}}$ key. The unit reverts to RUN mode.

8.2 Setting Items in Event Setting Mode

Setting items in Event Setting Mode differs depending on the selection in [Event output EV allocation]. If 001 (High limit alarm) to 012 (High/Low limits alarm with standby independent alarm) are selected in [Event output EV allocation], EV alarm value will be set.

If 015 (Time signal output) is selected in [Event output EV□ allocation], TS□ output OFF time and TS□ output ON time can be set.

Settings are performed for the pattern number selected at the time of entering Event setting mode. Setting values are common to all steps in each pattern.

During program control RUN, only the performing pattern can be set.

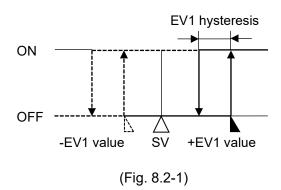
If 'Pattern link Enabled' is selected in [Pattern link]: Even if the performing pattern is changed from 1 to 2 during Event setting mode, Pattern 1 will be remained, and pattern number will not be updated until the unit reverts to RUN mode.

Alarm output

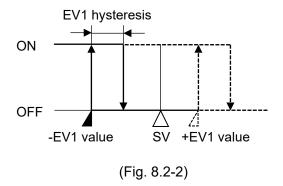
EV1 alarm output actions are shown below.

EV1 alarm output will be substituted by EV2 or EV3 alarm output.

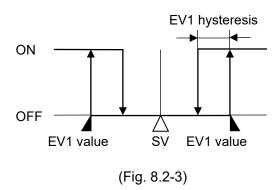
High limit alarm



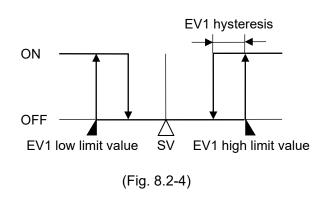
Low limit alarm



High/Low limits alarm



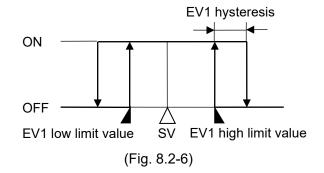
High/Low limits independent alarm



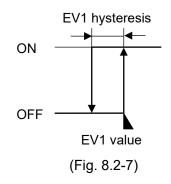
• High/Low limit range alarm

ON OFF EV1 hysteresis EV1 hysteresis EV1 value (Fig. 8.2-5)

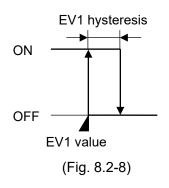
• High/Low limit range independent alarm



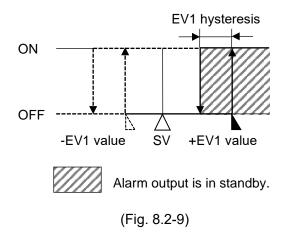
• Process high alarm



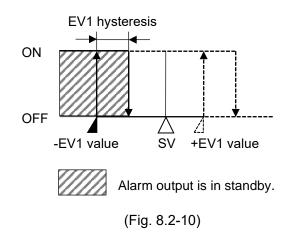
Process low alarm



· High limit with standby alarm



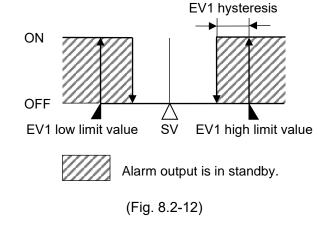
• Low limit with standby alarm



• High/Low limits with standby alarm

ON OFF EV1 value SV EV1 value Alarm output is in standby.

• High/Low limits with standby independent alarm



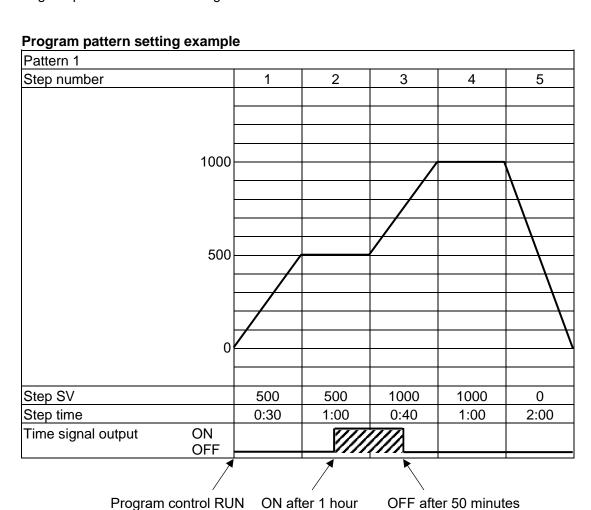
(Fig. 8.2-11)

Time signal output

Time signal output OFF time and Time signal output ON time are set within one pattern total time. After program control starts, Time signal output activates during Time signal output ON time after Time signal output OFF time has elapsed.

During Wait action or program control HOLD, progress time of Time signal output stops.

When Step time is changed during program control RUN, Time signal output timing is re-calculated using the pattern time after change.



(e.g.) Time signal output setting

Time signal output OFF time: 1 hour Time signal output ON time: 50 minutes

(Fig. 8.2-13)

Explanation of Time signal output

In the above program pattern example, Time signal output turns ON one hour after program control RUN starts (30 minutes after the unit entered Step 2). Time signal output turns OFF 50 minutes after Time signal output turned ON (20 minutes after the unit entered Step 3).

• Before entering Event setting mode

Select a pattern number with the PTN key before entering Event setting mode.

• How to enter Event setting mode

In RUN mode, press the $\boxed{\text{MODE}}$ key for approx. 3 seconds to enter Event setting mode.

Setting items in Event Setting mode are shown below.

Characters,				
Factory Default	Setting Item, Function, Setting Range			
8 :	EV1 alarm value			
	Sets EV1 alarm value.			
	EV1 alarm value matches EV1 low limit alarm value in the following cases:			
	When 004 (High/Low limits independent alarm), 006 (High/Low limit range			
	independent alarm) or 012 (High/Low limits with standby independent alarm)			
	is selected in [Event output EV1 allocation].			
	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 limits independent alarm: 0 to Input span (*1)			
	High/Low limit range alarm: 0 to Input span (*1)			
	High/Low limit range independent alarm: 0 to Input span (*1)			
	Process high alarm: Input range low limit to Input range high limit (*2)			
	Process low alarm: Input range low limit to Input range high limit (*2)			
	High limit with standby alarm: -(Input span) to Input span (*1)			
	Low limit with standby alarm: -(Input span) to Input span (*1)			
	High/Low limits with standby alarm: 0 to Input span (*1)			
	High/Low limits with standby independent alarm: 0 to Input span (*1)			
	(*1) For DC voltage, current inputs, the input span is the same as the scaling span. (The placement of the decimal point follows the selection.)			
	(*2) For DC voltage, current inputs, input range low (or high) limit value is the same as			
	scaling low (or high) limit value. (The placement of the decimal point follows the			
	selection.)			
	Available when 🗓 🗓 (High limit alarm) to 🗓 🖟 (High/Low limits with standby			
	independent alarm) is selected in [Event output EV1 allocation].			
8 88	EV1 high limit alarm value			
	Sets EV1 high limit alarm value.			
'	Setting range: Same as those of EV1 alarm value.			
	Available when 🗓◘◘Ч (High/Low limits independent alarm), 🗒◘◘률 (High/Low limit range			
	independent alarm) or 🗓 🗗 🔁 (High/Low limits with standby independent alarm) is selected			
	in [Event output EV1 allocation].			
15 to F	TS1 output OFF time			
1 0000	Sets TS1 output OFF time.			
	Setting range:			
	00:00 to 99:59 (Time unit follows the selection in [Step time unit].)			
	Available when 🗓 🗸 (Time signal output) is selected in [Event output EV1 allocation].			

Characters, Factory Default	Setting Item, Function, Setting Range
i ign	TS1 output ON time
1 0000	Sets TS1 output ON time.
	Setting range:
	00:00 to 99:59 (Time unit follows the selection in [Step time unit].)
	Available when 🗓 7 (Time signal output) is selected in [Event output EV1 allocation].
A2UU	EV2 alarm value
: 0000	Sets EV2 alarm value.
	EV2 alarm value matches EV2 low limit alarm value in the following cases:
	When 004 (High/Low limits independent alarm), 006 (High/Low limit range
	independent alarm) or 012 (High/Low limits with standby independent alarm)
	is selected in [Event output EV2 allocation].
	• Setting range: Same as those of EV1 alarm value. Available when IIII (High limit alarm) to III II (High/Low limits with standby
	independent alarm) is selected in [Event output EV2 allocation].
	EV2 high limit alarm value
#2# :	• Sets EV2 high limit alarm value.
} LILILI	Setting range: Same as those of EV1 alarm value.
	Available when 🎞־🎞 (High/Low limits independent alarm), 🗓 🗸 🗗 (High/Low limit range
	independent alarm) or 🗓 🖟 (High/Low limits with standby independent alarm) is selected
	in [Event output EV2 allocation].
rear	TS2 output OFF time
: 00:00	• Sets TS2 output OFF time.
	• Setting range:
	00:00 to 99:59 (Time unit follows the selection in [Step time unit].) Available when 🗒 '5 (Time signal output) is selected in [Event output EV2 allocation].
/ Jan	TS2 output ON time
	• Sets TS2 output ON time.
1 81600	• Setting range:
	00:00 to 99:59 (Time unit follows the selection in [Step time unit].)
	Available when 🗓 🗓 15 (Time signal output) is selected in [Event output EV2 allocation].
8300	EV3 alarm value
	Sets EV3 alarm value.
	EV3 alarm value matches EV3 low limit alarm value in the following cases:
	When 004 (High/Low limits independent alarm), 006 (High/Low limit range
	independent alarm) or 012 (High/Low limits with standby independent alarm)
	is selected in [Event output EV3 allocation].
	• Setting range: Same as those of EV1 alarm value.
	Available when 🗓 🗓 (High limit alarm) to 🗓 🗗 (High/Low limits with standby
5 5 1 1 1 1 1 1 1 1 1 1	independent alarm) is selected in [Event output EV3 allocation]. EV3 high limit alarm value
ABHII	Sets EV3 high limit alarm value.
	Setting range: Same as those of EV1 alarm value.
	Available when IIDDH (High/Low limits independent alarm), IIDD5 (High/Low limit range
	independent alarm) or 🗓 🗓 🞜 (High/Low limits with standby independent alarm) is selected
	in [Event output EV3 allocation].

Characters, Factory Default	Setting Item, Function, Setting Range
[] - F	TS3 output OFF time
	Sets TS3 output OFF time.
	Setting range:
	00:00 to 99:59 (Time unit follows the selection in [Step time unit].)
	Available when 🗓 🗗 (Time signal output) is selected in [Event output EV3 allocation].
[]an	TS3 output ON time
1 0000	Sets TS3 output ON time.
	Setting range:
	00:00 to 99:59 (Time unit follows the selection in [Step time unit].)
	Available when 🗓 🗘 (Time signal output) is selected in [Event output EV3 allocation].

At this stage, settings for Event setting mode are complete.

Press the $\ensuremath{\overline{\text{RST}}}$ key. The unit reverts to RUN mode.

8.3 Setting Items in Control Parameter Setting Mode

In Control parameter setting mode, the following setting items can be set:

AT Perform/Cancel, OUT1 proportional band, Integral time, derivative time, ARW, OUT2 proportional band (when EV2, DS, DA or EV3D□ option is ordered), Direct/Reverse action, Loop break alarm, etc. Setting data is common to all patterns.

• How to enter Control parameter setting mode

In RUN mode, press the and MODE keys (in that order) together. The unit enters Control parameter setting mode.

Setting items in Control parameter setting mode are shown below.

Characters,	Setting Item, Function, Setting Range
Factory Default	Setting item, Function, Setting Kange
	AT Perform/Cancel
	Selects AT (auto-tuning) Perform/Cancel.
ii	AT will work only during program control RUN.
	After AT starts, and if AT has not been completed within 4 hours, or if input
	errors have occurred, ਵਿਸਟੋਊ will be indicated on the PV Display, and AT will
	be forced to stop.
	Selection item:
	AT Cancel
	AT Perform
产品。	PID block number
	Selects a PID block number from 1 to 10 for the following settings:
	OUT1 proportional band, Integral time, Derivative time, ARW,
	OUT2 proportional band [EV2(DR), DS, DA, EV3D□ options]
	Refer to recommended usage of block numbers as follows:
	Block 1: For Fixed value control
	Block 2: For low temperature program control
	Block 3: For medium temperature program control
	Block 4: For high temperature program control
	Selection item:
	1 to 10

Characters,	Setting Item, Function, Setting Range
Factory Default	
	 OUT1 proportional band Sets OUT1 proportional band for the PID block number selected in [PID block number].
	The PTN/STEP Display indicates the PID block number selected in [PID block number].
	OUT1 becomes ON/OFF control when set to 0 or 0.0.
	OUT1 proportional band ON
	OFF SV
	(Fig. 8.3-1)
	• Setting range: Thermocouple, RTD input without decimal point: 0 to input span°C (°F) Thermocouple, RTD input with decimal point: 0.0 to input span°C (°F) DC voltage, current inputs: 0.0 to 1000.0%
: [] [] []	Integral time
: D200	Sets the integral time of the PID block number selected in [PID block number].
	The PTN/STEP Display indicates the PID block number selected in [PID block number].
	Setting range: 0 to 3600 seconds
d	Derivative time
1 0050	Sets the derivative time of the PID block number selected in [PID block
	number].
	The PTN/STEP Display indicates the PID block number selected in [PID block
	number]. • Setting range: 0 to 1800 seconds
A-J	ARW
; 0050	Sets the ARW (anti-reset windup) of the PID block number selected in [PID
	block number]. The PTN/STEP Display indicates the PID block number selected in [PID block
	number].
	• Setting range: 0 to 100%

Characters,	Sotting Itom Function Sotting Pango
Factory Default	Setting Item, Function, Setting Range
□	OUT1 proportional cycle
0 0003	Sets OUT1 proportional cycle.
	For relay contact output, if the proportional cycle time is decreased, the
	frequency of the relay action increases, and the life of the relay contact is
	shortened.
	Factory default value is different depending on the output type.
	Relay contact output: 30 seconds
	Non-contact voltage output: 3 seconds
	Direct current output: Not available
	Setting range:
	0.5, 1 to 120 seconds
	Available when OUT1 is relay contact output or non-contact voltage output type.
HY5	OUT1 ON/OFF hysteresis
	Sets ON/OFF hysteresis for OUT1.
	Hysteresis
	→
	ON T
	OFF — The state of
	OUT1 SV
	hysteresis
	(F: 0.0.0)
	(Fig. 8.3-2)
	0.41.
	• Setting range:
	0.1 to 1000.0℃ (℉)
	DC voltage, current inputs: 1 to 10000 (The placement of the decimal point
1 1 (:":	follows the selection.)
ol HII	OUT1 high limit
	• Sets OUT1 high limit value.
	Setting range: OUT4 law limit to 4000/
	OUT1 low limit to 100%
, , :":	Direct current output type: OUT1 low limit to 105%
oll	OUT1 low limit
	Sets OUT1 low limit value. Setting range:
	Setting range: OW to OUT1 high limit.
	0% to OUT1 high limit
	Direct current output type: -5% to OUT1 high limit

Characters, Factory Default	Setting Item, Function, Setting Range
5-A; 0 0000	 OUT1 rate-of-change Sets changing value of OUT1 MV for 1 second. Setting the value to 0 disables this function. About OUT1 rate-of-change: For Heating control, if PV is lower than SV, OUT1 MV is generally turned from OFF to ON as shown in (Fig. 8.3-3). If OUT1 rate-of-change is set, OUT1 MV can be changed by the rate-of-change as shown in (Fig. 8.3-4). This control is suitable for high temperature heaters (which are made from molybdenum, tungsten or platinum, etc., and used at approx. 1500 to 1800°C) which are easily burnt out from turning on electricity rapidly. Setting range: 0 to 100 %/second Not available if OUT1 is in ON/OFF control.
	ON (100%) OFF (0%) (Fig. 8.3-3)
	ON (100%) OFF (0%) 1 sec 5 sec 10 sec (Fig. 8.3-4)
	Setting range: 0 to 100 %/second

Characters,	
Factory Default	Setting Item, Function, Setting Range
<u>cAcl</u>	OUT2 cooling method
	Selects OUT2 cooling method from air, oil or water cooling.
	OUT2 proportional band
	→
	Air cooling
	Oil cooling
	Water cooling
	- Water coming
	SV
	(Fig. 8.3-5)
	,
	Selection item:
	Air cooling (Linear characteristics)
	oil cooling (1.5th power of the linear characteristics)
	☑ੳ기□ Water cooling (2nd power of the linear characteristics)
	Available when EV2 option (if "LDCC Heating/Cooling control output" is selected in [Event
177 h :"":	output EV2 allocation]) is ordered, or when DS, DA or EV3D□ option is ordered.
P_60	OUT2 proportional band
	• Sets the OUT2 proportional band of the PID block number selected in [PID block number].
	The PTN/STEP Display indicates the PID block number selected in [PID block
	number].
	When set to 0 or 0.0, OUT2 becomes ON/OFF control, and the action selected
	in [OUT2 cooling method] will be disabled.
	Setting range:
	Thermocouple, RTD input without decimal point: 0 to Input span [℃] (℉)
	Thermocouple, RTD input with decimal point: 0.0 to Input span [℃] (F)
	DC voltage, current inputs: 0.0 to 1000.0%
	Available when EV2 option (if " Lating/Cooling control output" is selected in
) :":	[Event output EV2 allocation]) is ordered, or when DS, DA or EV3D option is ordered.
c_b_	OUT2 proportional cycle • Sets OUT2 proportional cycle.
	For relay contact output, if the proportional cycle time is decreased, the
	frequency of the relay action increases, and the life of the relay contact is
	shortened.
	Factory default value is different depending on the output type as follows:
	Relay contact output [EV2, EV3(DR)]: 30 seconds
	Non-contact voltage output (DS, EV3DS): 3 seconds
	Direct current output (DA, EV3DA): Not available
	• Setting range: 0.5, 1 to 120 seconds
	Available when EV2 option (When "LLDED Heating/Cooling control output" is selected in
	[Event output EV2 allocation]) is ordered, or when DS, EV3(DR), EV3DS option is
	ordered.

Characters, Factory Default	Setting Item, Function, Setting Range
	OUT2 ON/OFF hysteresis
H455	• Sets OUT2 ON/OFF hysteresis.
	Sets OU12 ON/OLL Hysteresis.
	Hysteresis
	ON —
	OFF — X
	\triangle \square
	SV OUT2
	hysteresis
	(Fig. 8.3-6)
	• Setting range: 0.1 to 1000.0℃ (℉)
	DC voltage, current inputs: 1 to 10000 (The placement of the decimal point
	follows the selection.)
	Available when EV2 option (if "🗓 🖫 Heating/Cooling control output" is selected in
	[Event output EV2 allocation]) is ordered, or when DS, DA or EV3D□ option is ordered.
	OUT2 high limit
00:00	Sets OUT2 high limit value.
	Setting range: OUT2 low limit value to 100%
	Direct current output type (DA, EV3DA options): OUT2 low limit value to 105%
	Available when EV2 option (if "ロラマム Heating/Cooling control output" is selected in
	[Event output EV2 allocation]) is ordered, or when DS, DA or EV3D□ option is ordered.
	OUT2 low limit
	Sets OUT2 low limit value.
	Setting range: 0% to OUT2 high limit value
	Direct current output type (DA, EV3DA options): -5% to OUT2 high limit value
	Available when EV2 option (if "ロロール Heating/Cooling control output" is selected in
	[Event output EV2 allocation]) is ordered, or when DS, DA or EV3D□ option is ordered.

Characters, Factory Default	Setting Item, Function, Setting Range
db	Overlap/Dead band
	Sets the overlap band or dead band.
	+ Set value: Dead band
	– Set value: Overlap band
	Overlap band (When OUT1 and OUT2 are in PID control)
	OUT1 proportional band
	OUT2 proportional band
	→ Disportional band
	Overlap band
	ONON
	OUT1 OUT2
	055
	OFF OFF
	SV
	(Fig. 8.3-7)
	Dead band (When OUT1 and OUT2 are in PID control)
	OUT1 P-band OUT2 P-band
	Dead band
	ONON
	OUT1 OUT2
	OFF OFF
	SV
	(Fig. 8.3-8)
	(3. 5.5 5)
	Overlap band (When OUT1 is in PID control, OUT2 is in ON/OFF control)
	OUT1 _{proportional} band
	Hysteresis
	Trysteresis
	Overlap band
	ONON
	OUT1 OUT2
	OFF
	SV SIT
	(Fig. 8.3-9)

Characters,	
Factory Default	Setting Item, Function, Setting Range
	Dead band (When OUT1 is in PID control, OUT2 is in ON/OFF control)
	OUT1 proportional band
	← →
	Hysteresis →
	Dead band
	ONON
	OUT1 OUT2
	OFF OFF
	sv
	(Fig. 8.3-10)
	, G
	Setting range:
	-200.0 to 200.0℃ (℉)
	DC voltage, current inputs: -2000 to 2000 (The placement of the decimal point follows the selection.)
	Available when EV2 option (if "IDED Heating/Cooling control output" is selected in
	[Event output EV2 allocation]) is ordered, or when DS, DA or EV3D option is ordered.
gani	Direct/Reverse action
<u> HEAF</u>	Selects either Direct (Cooling) or Reverse (Heating) control action.
	• Selection range:
	HER Reverse (Heating) action □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□
<u> </u>	Heater burnout alarm 1 value
)	Sets the detecting current value for Heater burnout alarm 1.
HILL and CT1	When setting to 0.0, Heater burnout alarm 1 is disabled.
current value are	Characters 🖁 🛄 and CT1 current value are indicated alternately on the PV
alternately indicated.	Display.
indicated.	When OUT1 is ON, the CT1 current value is updated.
	When OUT1 is OFF, the unit memorizes the previous value when OUT1 was ON.
	Upon returning to set limits, the alarm will stop.
	• Setting range:
	20 A: 0.0 to 20.0 A
	100 A: 0.0 to 100.0 A
	Available when C5W, EIW, W option is ordered, and when OUT1 is relay contact output or
	non-contact voltage output type.
HZ	 Heater burnout alarm 2 value Sets the detecting current value for Heater burnout alarm 2.
	Available only when using 3-phase.
HELLE and CT2 current value are	When setting to 0.0, Heater burnout alarm 2 is disabled.
alternately	Characters HELL and CT2 current value are indicated alternately on the PV
indicated.	Display.
	When OUT1 is ON, the CT2 current value is updated.

Characters	
Characters, Factory Default	Setting Item, Function, Setting Range
. actory Donaum	When OUT1 is OFF, the unit memorizes the previous value when OUT1 was ON.
	Upon returning to set limits, the alarm will stop.
	Setting range:
	20 A: 0.0 to 20.0 A
	100 A: 0.0 to 100.0 A
	Available when C5W, EIW, W option is ordered, and when OUT1 is relay contact output or non-contact voltage output type.
	Loop break alarm time
	Sets the time to assess the Loop break alarm.
	Setting to 0 (zero) disables the alarm.
	About the Loop break alarm:
	When the control action is Reverse (Heating) control: If the PV does not reach the Loop break alarm band setting within the time allotted to assess the Loop break alarm (after the MV has reached 100% or the OUT1 high limit value), the alarm output will be turned ON. Likewise, if the PV does not drop to the Loop break alarm band setting within the time allotted to assess the Loop break alarm (after the MV has reached 0% or the OUT1 low limit value), the alarm output will be turned ON.
	When the control action is Direct (Cooling) control:
	If the PV does not drop to the Loop break alarm band setting within the time allotted to assess the Loop break alarm (after the MV has reached 100% or the OUT1 high limit value), the alarm output will be turned ON. Likewise, if the PV does not reach the Loop break alarm band setting within the time allotted to assess the Loop break alarm (after the MV has reached 0% or the OUT1 low limit value), the alarm output will be turned ON.
	• When EV2 option (if "☐☐☐☐ Heating/Cooling control output" is selected in [Event output EV2 allocation]) is ordered, or when DS, DA or EV3D□ option is ordered.
	When the control action is Reverse (Heating) control: After OUT1 MV has reached 100% or the OUT1 high limit value, or after OUT2 MV has reached 0% or -(OUT2 low limit value), if the PV does not reach the Loop break alarm band setting within the time allotted to assess the Loop break alarm, the alarm output will be turned ON. Likewise, after OUT1 MV has reached 0% or the OUT1 low limit value, or after
	OUT2 MV has reached -100% or -(OUT2 high limit value), if the PV does not drop to the Loop break alarm band setting within the time allotted to assess the Loop break alarm, the alarm output will be turned ON.
	When the control action is Direct (Cooling) control: After OUT1 MV has reached 100% or the OUT1 high limit value, or after OUT2 MV has reached 0% or -(OUT2 low limit value), if the PV does not drop to the Loop break alarm band setting within the time allotted to assess the Loop break alarm, the alarm output will be turned ON.

Characters, Factory Default	Setting Item, Function, Setting Range
	Likewise, after OUT1 MV has reached 0% or the OUT1 low limit value, or after OUT2 MV has reached -100% or -(OUT2 high limit value), if the PV does not reach the Loop break alarm band setting within the time allotted to assess the Loop break alarm, the alarm output will be turned ON.
	Setting range: 0 to 200 minutes
LP_H	Loop break alarm band
	Sets the action band to assess the Loop break alarm.
	Setting range:
	Thermocouple, RTD input without decimal point: 0 to 150℃ (℉)
	Thermocouple, RTD input with decimal point: 0.0 to 150.0℃ (℉)
	DC voltage, current inputs: 0 to 1500 (The placement of the decimal point
	follows the selection.)

At this stage, settings for Control parameter setting mode are complete.

Press the RST key. The unit reverts to RUN mode.

8.4 Setting Items in Wait Parameter Setting Mode

In Wait parameter setting mode, the following setting items can be set:

Wait value, Wait function Enabled/Disabled for each step

Settings are performed for the pattern number selected at the time of entering Wait parameter setting mode.

During program control RUN, only the performing pattern can be set.

If 'Pattern link Enabled' is selected in [Pattern link]: Even if the performing pattern is changed from 1 to 2 during Wait parameter setting mode, Pattern 1 will remain, and the pattern number will not be updated until the unit reverts to RUN mode.

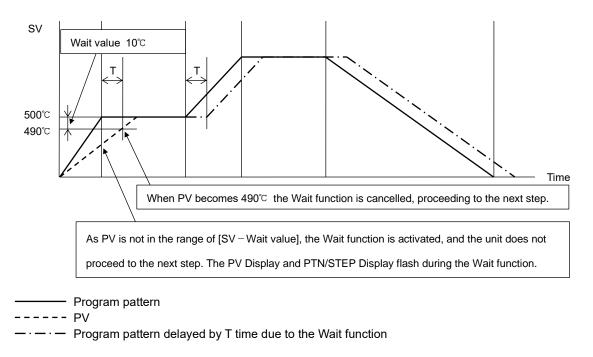
Wait function

During program control RUN, the program does not proceed to the next step until the deviation between PV and SV enters SV±Wait value at the end of step.

The PV Display and PTN/STEP Display flash while the Wait function is activated.

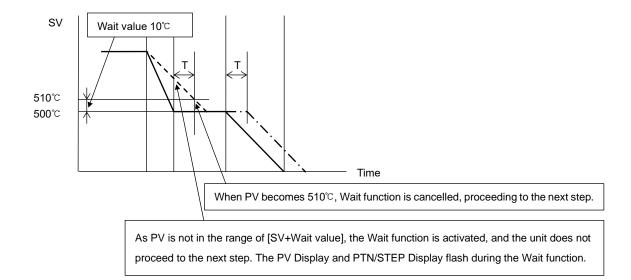
• Explanation of Wait Function

Program pattern rising step:



(Fig. 8.4-1)

• Program pattern falling step:



----- Program pattern

---- PV

— · — · — Program pattern delayed by T time due to the Wait function

(Fig. 8.4-2)

· How to cancel the Wait function

Press the RUN key for approx. 1 second to cancel the Wait function.

· Before entering Wait parameter setting mode

Select a pattern number with the PTN key before entering Wait parameter setting mode.

• How to enter Wait parameter setting mode

In RUN mode, press the <a> and <a> keys (in that order) together for approx. 3 seconds.

The unit enters Wait parameter setting mode.

Setting items in Wait parameter setting mode are shown below.

Characters, Factory Default	Setting Item, Function, Setting Range
	Wait value
: 0008	Sets the Wait value.
	Wait value is common to all steps for each pattern.
	When set to 0 or 0.0, the Wait function is disabled.
	Setting range: 0 to 20% of input span (*)
	(*) DC voltage, current inputs: 0 to 20% of scaling span (The placement of the decimal point
	follows the selection.)

Characters, Factory Default	Setting Item, Function, Setting Range
	Step 1 wait function Enabled/Disabled
!	Selects the wait function Enabled or Disabled at Step 1, based on the wait
PTN/STEP	value set in [Wait value].
indicator 1	Selection item:
lights up.	Disabled
	USEII Enabled
	Not available if wait value is set to 0 or 0.0.
	Step 2 wait function Enabled/Disabled
}	Selects the wait function Enabled or Disabled at Step 2, based on the wait
PTN/STEP	value set in [Wait value].
indicator 2	Selection item:
lights up.	Disabled
	₩55E Enabled
	Not available if wait value is set to 0 or 0.0.
	Step 3 wait function Enabled/Disabled
1	Selects the wait function Enabled or Disabled at Step 3, based on the wait
PTN/STEP	value set in [Wait value].
indicator 3	Selection item:
lights up.	Disabled
	USEII Enabled
	Not available if wait value is set to 0 or 0.0.
	Step 4 wait function Enabled/Disabled
;	Selects the wait function Enabled or Disabled at Step 4, based on the wait
PTN/STEP	value set in [Wait value].
indicator 4	Selection item:
lights up.	Disabled
	USE Enabled
	Not available if wait value is set to 0 or 0.0.
	Step 5 wait function Enabled/Disabled
{	Selects the wait function Enabled or Disabled at Step 5, based on the wait
PTN/STEP	value set in [Wait value].
indicator 5	• Selection item:
lights up.	Disabled
	USE Enabled
- 171 17	Not available if wait value is set to 0 or 0.0.
JAET	Step 6 wait function Enabled/Disabled
1	• Selects the wait function Enabled or Disabled at Step 6, based on the wait
PTN/STEP	value set in [Wait value].
indicator 6 lights up.	• Selection item:
g	
	1
	Not available if wait value is set to 0 or 0.0.

Characters, Factory Default	Setting Item, Function, Setting Range			
JAST	Step 7 wait function Enabled/Disabled			
	Selects the wait function Enabled or Disabled at Step 7, based on the wait			
PTN/STEP	value set in [Wait value].			
indicator 7	Selection item:			
lights up.	Disabled			
	USE Enabled			
	Not available if wait value is set to 0 or 0.0.			
JALI	Step 8 wait function Enabled/Disabled			
!	Selects the wait function Enabled or Disabled at Step 8, based on the wait			
PTN/STEP	value set in [Wait value].			
indicator 8	Selection item:			
lights up.	Disabled			
	#5E. Enabled			
	Not available if wait value is set to 0 or 0.0.			
	Step 9 wait function Enabled/Disabled			
{	Selects the wait function Enabled or Disabled at Step 9, based on the wait			
PTN/STEP	value set in [Wait value].			
indicator 9	Selection item:			
lights up.	Disabled			
	มริธิม Enabled			
	Not available if wait value is set to 0 or 0.0.			
	Step 10 wait function Enabled/Disabled			
{	Selects the wait function Enabled or Disabled at Step 10, based on the wait			
PTN/STEP	value set in [Wait value].			
indicator 10	Selection item:			
lights up.	Disabled			
	U5E□ Enabled			
	Not available if wait value is set to 0 or 0.0.			

At this stage, settings for Wait parameter setting mode are complete.

Press the $\ensuremath{\overline{\text{RST}}}$ key. The unit reverts to RUN mode.

8.5 Setting Items in Engineering Setting Mode 1

In Engeering setting mode 1, the following setting items can be set:

Set value lock, Sensor correction, PV filter time constant, Communication parameters (When C5W or C5 option is ordered)

Setting data is common to all patterns.

• How to enter Engineering setting mode 1

In RUN mode, press the and MODE keys (in that order) together for approx. 3 seconds to enter Engeering setting mode 1.

Setting items in Engeering setting mode 1 are shown below.

Characters,	Setting Item, Function, Setting Range				
Factory Default	Set value lock				
Lock	Locks the set values to prevent setting errors.				
□	The setting item to be locked depends on the selection.				
	Selection item:				
	Colcollori	ltem.	Change via Keypad	Change via Software Communication	
		Unlock	All set values can be	All set values can be	
			changed.	changed.	
	Loci	Lock 1	Only 'Set value lock' can		
			be changed. Other setting		
			items cannot be changed.		
	Locd	Lock 2	Setting items selected in		
			[Changeable in Set value		
			lock] can be changed.		
			'Set value lock' can be		
			changed. Other setting		
			items cannot be changed.		
	Loc3	Lock 3	All set values can be	Setting items – except	
			changed.	Input type – can be	
	Loc4	Lock 4	Only 'Set value lock' can	changed temporarily via	
			be changed. Other setting	software communication.	
			items cannot be changed.	However, if power is turned	
	LocS	Lock 5	Setting items selected in	ON again, the set values	
			[Changeable in Set value	revert to the values before	
			lock] can be changed.	Lock 3, 4 or 5 was	
			'Set value lock' can be	selected.	
			changed. Other setting		
			items cannot be changed.		
Lo5E	Changeab				
0 5800	• When Lock 2) or Lock 5) is selected in [Set value lock], the				
	_		oe changed.		
	• Selection				
	5800	· ·	and Step time can be changed		
	5868	Step SV,	Step time and EV□ alarm value	ue can be changed.	

Characters, Factory Default	Setting Item, Function, Setting Range				
Soti	Sensor correction coefficient				
II 1000	Sets sensor correction coefficient.				
	Sets slope of input value from a sensor.				
	750°C				
	340°C X' 300°C X Corrected from 300°C to 340°C.				
	300℃ 750℃				
	— — — . Slope before correction				
	Slope after correction				
	$\frac{Y'-X'}{Y-X}$ = Sensor correction coefficient				
	(Fig. 8.5-1) PV after sensor correction= Current PV x (Sensor correction coefficient) +				
	(Sensor correction value)				
	Refer to Section '9.5 Input Value Correction' (pp.107, 108).				
	• Setting range: -10.000 to 10.000				
5,5,1111	Sensor correction				
	 This corrects the input value from the sensor. When a sensor cannot be set at the exact location where control is desired, the sensor-measured temperature may deviate from the temperature in the controlled location. When using multiple controllers, sometimes the measured temperatures 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's only effective within the input rating range regardless of the sensor correction value. PV after sensor correction= Current PV x (Sensor correction coefficient) + (Sensor correction value) Refer to Section '9.5 Input Value Correction' (pp.107, 108). Setting range: -1000.0 to 1000.0°C (°F) DC voltage, current inputs: -10000 to 10000 (The placement of the decimal point follows the selection.) 				

Characters, Factory Default	Setting Item, Function, Setting Range		
	PV filter time constant • Sets PV filter time constant. If the value is set too high, it affects control results due to the delay of response. About PV filter time constant: This is a filter function on the software, which has the same effect as a CR filter. By calculating first-order lag of PV, this suppresses input fluctuation caused by noise. When the input value changes as shown in (Fig. 8.5-2), this function makes the input change slow as shown in (Fig. 8.5-3). T (PV filter time constant) is the time when input change reaches 63% of the desired PV.		
	(Fig. 8.5-2) 100% 63% (Fig. 8.5-3) • Setting range: 0.0 to 10.0 seconds		
eāāl D noāl	Communication protocol Selects communication protocol. Selection item: Selection item: Shinko protocol SV digital transmission (Shinko protocol) SV digital reception (Shinko protocol) Modbus ASCII mode Modbus RTU mode Available when C5W or C5 option is ordered.		
	Instrument number • Sets the instrument number. The instrument numbers should be set one by one when multiple instruments are connected in Serial communication, otherwise communication is impossible. • Setting range: 0 to 95 Available when C5W or C5 option is ordered.		

Characters,		Setting Item, Function, Setting Range			
Factory Default					
	Communication speed				
0 0098	Selects a communication speed equal to that of the host computer.				
	• Selection item:				
	0095 9600 bps				
	II 192	19200 bps			
	38 4	38400 bps			
	Available v	when C5W or C5 option is ordered.			
	Data bit/Pa	arity			
<u> 788</u> -	Selects da	ata bit and parity equal to those of the host computer.			
	 Selection 	item:			
	8000	8 bits/No parity			
	Jaga	7 bits/No parity			
		8 bits/Even			
	7585	7 bits/Even			
	8000	8 bits/Odd			
	Todd	7 bits/Odd			
	Available wh	en C5W or C5 option is ordered.			
<u> </u>	Stop bit				
	Selects the stop bit equal to that of the host computer.				
	• Selection item:				
		TITE ! 1 bit			
	5000	DDD2 2 bits			
	Available v	when C5W or C5 option is ordered.			
chd'd	-	delay time			
	 Response 	e from the controller can be delayed after receiving command from			
	the host c	·			
	If Respons	se delay time is changed via software communication, the changed			
	-	will be reflected from that response data.			
	•	nge: 0 to 1000 ms			
		nen C5W or C5 option is ordered.			
58_6	SVTC bias				
		SVTC bias value to the value received by the SVTC command.			
	• Setting range: ±20% of input span				
	DC voltag	e, current inputs: ±20% of scaling span (The placement of the			
		decimal point follows the selection.)			
		nen C5W, C5 option is ordered, and when 55% [SV digital reception (Shinko			
	protocol)] is	selected in [Communication protocol].			

At this stage, settings for Engineering setting mode 1 are complete.

Press the $\ensuremath{\overline{\text{RST}}}$ key. The unit reverts to RUN mode.

8.6 Setting Items in Engineering Setting Mode 2

In Engeering setting mode 2, the following setting items can be set:

Input type, Scaling high limit, Scaling low limit, Event output $EV\square$ allocation, Step time unit, Power restore action, etc.

Setting data is common to all patterns.

• How to enter Engineering setting mode 2

In RUN mode, press the , w and MODE keys (in that order) together for approx. 3 seconds to enter Engeering setting mode 2.

Setting items in Engeering setting mode 2 are shown below.

Characters, Factory Default	Setting Item, Function, Setting Range			
55,5	Input type			
	Selects an input type from thermocouple (10 types), RTD (2 types), direct			
	current (2 types) and DC voltage (4 type), and the unit °C/°F.			
	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 break.			
		• When changing an input type, refer to Section "9.6 Items to be Initialized by Changing Settings" (p.109).		
		• Selection item:		
	EUUC	K	-200 to 1370 ℃	
	FUUC	K	-200.0 to 400.0 ℃	
		J	-200 to 1000 ℃	
	- IIII [R	0 to 1760 ℃	
	5000	S 0 to 1760 ℃ B 0 to 1820 ℃		
	600C			
	EUUC	E -200 to 800 ℃		
	7000	Т	-200.0 to 400.0 ℃	
	n000	N	-200 to 1300 ℃	
	PL 20	PL-II	0 to 1390 ℃	
	c	C(W/Re5-26) 0 to 2315 °C		
	PTOE	Pt100	-200.0 to 850.0 ℃	
		JPt100	-200.0 to 500.0 ℃	
	PFOE	Pt100	-200 to 850 ℃	
		JPt100	-200 to 500 ℃	
	LUF	K -328 to 2498 °F		
	EUUF	K	-328.0 to 752.0 °F	
	JULE	J	-328 to 1832 °F	
	-00F	R	32 to 3200 °F	
	500F	S	32 to 3200 °F	
	600F come	В	32 to 3308 °F	
	EUUF	E	-328 to 1472 °F	

Characters,					
Factory Default	Setting Item, Function, Setting Range				
	ruuf	T -328.0 to 752.0 °F			
	n F	N -328 to 2372 °F			
	PL 2F	PL-II 32 to 2534 °F			
	cour	C(W/Re5-26) 32 to 4199 °F			
	PT UF	Pt100 -328.0 to 1562.0 °F			
	<u> </u>	JPt100 -328.0 to 932.0 °F			
	PTOF	Pt100 -328 to 1562 °F			
		JPt100 -328 to 932 °F			
	4208	4 - 20 mA -2000 to 10000			
	888	0 - 20 mA -2000 to 10000			
	00 18	0 - 1 V -2000 to 10000			
	0058	0 - 5 V -2000 to 10000			
	:058	1 - 5 V -2000 to 10000			
	0 108	0 - 10 V -2000 to 10000			
57 <u>1</u> 8	Scaling hi	gh limit			
מרפֿו שוֹ	 Sets scali 	ng high limit value.			
	_	nge: Scaling low limit to Input range high limit			
	DC voltag	e, current inputs: -2000 to 10000 (The placement of the decimal			
		point follows the selection.)			
5711	_	caling low limit			
W -200	Sets scaling low limit value.Setting range: Input range low limit to Scaling high limit				
	_	ge, current inputs: -2000 to 10000 (The placement of the decimal			
		point follows the selection.)			
	Decimal p	l point place			
	Selects d	ecimal point place.			
	 Selection 				
		No decimal point			
		1 digit after decimal point			
		2 digits after decimal point			
	0000	3 digits after decimal point			
_	Available	when DC voltage or current input is selected in [Input type].			
E80	-	out EV1 allocation			
II II000		vent output EV1 from the table below.			
		hanging Event output EV1, refer to Section "9.6 Items to be Initialized			
	Selection	ging Settings" (p.109).			
		No event			
	000 :				
	1002	Alarm output, High limit alarm Alarm output, Low limit alarm			
	0003	Alarm output, High/Low limits alarm			
	0004	Alarm output, High/Low limits alarm Alarm output, High/Low limits independent alarm			
	0005	Alarm output, High/Low limits independent alarm			
	'~'~'	Addition Salpac, Fingin Low millicratings alami			

Characters,		Setting Item, Function, Setting Range
Factory Default	IDDS Alarm output, High/Low limit range independent alarm	
	0007	Alarm output, Process high alarm
	0008	Alarm output, Process low alarm
	0009	Alarm output, High limit with standby alarm
	00 10	Alarm output, Low limit with standby alarm
		Alarm output, High/Low limits with standby alarm
	IIO 12	Alarm output, High/Low limits with standby independent alarm
	IIO 13	Heater burnout alarm output (When C5W, EIW or W option is
		ordered):
		Detects load current value with CT (current transformer), and if it is
		lower than heater burnout alarm value, Heater burnout alarm
		output is turned ON.
		Loop break alarm output:
		Sets Loop break alarm time and band.
		About the Loop break alarm:
		When the control action is Reverse (Heating) control: If the PV does not reach the Loop break alarm band setting within
		the time allotted to assess the Loop break alarm (after the MV has
		reached 100% or the OUT1 high limit value), the alarm output will be turned ON.
		Likewise, if the PV does not drop to the Loop break alarm band
		setting within the time allotted to assess the Loop break alarm
		(after the MV has reached 0% or the OUT1 low limit value), the
		alarm output will be turned ON.
		When the control action is Direct (Cooling) control:
		If the PV does not drop to the Loop break alarm band setting within
		the time allotted to assess the Loop break alarm (after the MV has reached 100% or the OUT1 high limit value), the alarm output will
		be turned ON.
		Likewise, if the PV does not reach the Loop break alarm band
		setting within the time allotted to assess the Loop break alarm
		(after the MV has reached 0% or the OUT1 low limit value), the
		alarm output will be turned ON.
		• When EV2 option (If "◘◘◘◘ Heating/Cooling control output"
		is selected in [Event output EV2 allocation]) is ordered, or DS,
		DA or EV3D□ option is ordered.
		When the control action is Reverse (Heating) control:
		After OUT1 MV has reached 100% or the OUT1 high limit value, or
		after OUT2 MV has reached 0% or -(OUT2 low limit value), if the
		PV does not reach the Loop break alarm band setting within the time allotted to assess the Loop break alarm, the alarm output will
		be turned ON.
		Likewise, after OUT1 MV has reached 0% or the OUT1 low limit
		value, or after OUT2 MV has reached -100% or -(OUT2 high limit
		value), if the PV does not drop to the Loop break alarm band setting
		within the time allotted to assess the Loop break alarm, the alarm
		output will be turned ON.

Characters, Factory Default		Setting Item, Function, Setting Range			
		When the control action is Direct (Cooling) control: After OUT1 MV has reached 100% or the OUT1 high limit value, or after OUT2 MV has reached 0% or -(OUT2 low limit value), if the PV does not drop to the Loop break alarm band setting within the time allotted to assess the Loop break alarm, the alarm output will be turned ON. Likewise, after OUT1 MV has reached 0% or the OUT1 low limit value, or after OUT2 MV has reached -100% or -(OUT2 high limit value), if the PV does not reach the Loop break alarm band setting within the time allotted to assess the Loop break alarm, the alarm output will be turned ON.			
	00 /S	Time signal output: Turns ON during program control RUN, by setting Time signal output OFF time and ON time within total time in one pattern.			
	IIO 15	Output during AT: Turns ON during AT.			
	<u> </u>	Pattern end output: Turns ON when Program control ends, and remains ON during the time set in [Pattern end output time].			
	EC 18	Output by communication command: Communication command 8004H B0 EV1 output 0: OFF, 1: ON B1 EV2 output 0: OFF, 1: ON			
	00 19	B2 EV3 output 0: OFF, 1: ON RUN output: Turns ON during program control RUN.			
	or [[[] /5 (When [[]]	[] {(High limit alarm) to []] { (High/Low limit with standby independent alarm) (Time signal output) is selected, one output can be set to one event output. [] {Heater burnout alarm output), [] [] {H}(Loop break alarm), and [] [] {E(Output to [] [] {H}(RUN output)) are selected, each output is common to multiple event			
A IEA		V1 alarm value 0 Enabled/Disabled When EV1 alarm value is 0 (zero), alarm action can be Enabled or Disabled.			
ii /OJiiii	• Selection				
	standby inde	Enabled hen any alarm from \$\textstyle{\textstyle{100}}\$ (High limit alarm) to \$\textstyle{100}\$ (High/Low limits with ependent alarm) is selected in [Event output EV1 allocation] - excluding \$\textstyle{100}\$ (process low alarm).			
0 00 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	EV1 alarm hysteresis Sets EV1 alarm hysteresis. Setting range: 0.1 to 1000.0℃ (℉), DC voltage, current inputs: 1 to 10000 (The placement of the decimal point follows the selection.) Available when any alarm from □□□□ (High limit alarm) to □□□□□ (High/Low limits with				
8 64	standby independent alarm) is selected in [Event output EV1 allocation]. EV1 alarm delay time				
	 Sets EV1 When setting is a Setting rational available with the setting is a setting in the setting is a setting in the setting in the setting in the setting is a setting in the setting	alarm action delay time. ting time has elapsed after PV enters the alarm output range, the			

Characters, Factory Default	Setting Item, Function, Setting Range				
A KA O noāl	EV1 alarm Energized/De-energized Selects Energized/De-energized status for EV1 alarm. When Energized is selected, and Event output EV1 is conductive (ON) while the EV1 indicator is lit. Event output EV1 is not conductive (OFF) while the EV1 indicator is not lit. When De-energized is selected, Event output EV1 is not conductive (OFF) while the EV1 indicator is lit. Event output EV1 is conductive (ON) while the EV1 indicator is not lit.				
	High limit alarm (Energized) High limit alarm (De-energized)				
	ON OFF SV +EV1 value SV +EV1 value				
	(Fig. 8.6-1) (Fig. 8.6-2)				
	Selection item:				
	noni Energized				
	r € 85 De-energized				
	Available when any alarm from 🗓 🛱 (High limit alarm) to 🗓 🛱 (High/Low limits with standby independent alarm) is selected in [Event output EV1 allocation].				
EHAA	Event output EV2 allocation				
	 Selects Event output EV2 from the table below. When changing Event output EV2, refer to Section "9.6 Items to be Initialized by Changing Settings" (p.109). Selection item: 				
	□□□□□ No event				
	□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□				
	Alarm output, Low limit alarm				
	□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□				
	ाँद्रिप्ते Alarm output, High/Low limits independent alarm				
	Alarm output, High/Low limit range alarm				
	Alarm output, High/Low limit range independent alarm				
	Alarm output, Process high alarm				
	Alarm output, Process low alarm				
	Alarm output, High limit with standby alarm				
	Alarm output, Low limit with standby alarm				
	Alarm output, High/Low limits with standby alarm				
	Alarm output, High/Low limits with standby independent alarm				

Characters, Factory Default		Setting Item, Function, Setting Range
,	IO 13	Heater burnout alarm output (When C5W, EIW or W option is ordered): Detects load current value with CT (current transformer), and if it is lower than heater burnout alarm value, Heater burnout alarm output is turned ON.
		Loop break alarm output: Sets Loop break alarm time and band.
		• About the Loop break alarm: When the control action is Reverse (Heating) control: If the PV does not reach the Loop break alarm band setting within the time allotted to assess the Loop break alarm (after the MV has reached 100% or the OUT1 high limit value), the alarm output will be turned ON. Likewise, if the PV does not drop to the Loop break alarm band setting within the time allotted to assess the Loop break alarm (after the MV has reached 0% or the OUT1 low limit value), the alarm output will be turned ON.
		When the control action is Direct (Cooling) control: If the PV does not drop to the Loop break alarm band setting within the time allotted to assess the Loop break alarm (after the MV has reached 100% or the OUT1 high limit value), the alarm output will be turned ON. Likewise, if the PV does not reach the Loop break alarm band setting within the time allotted to assess the Loop break alarm (after the MV has reached 0% or the OUT1 low limit value), the alarm output will be turned ON.
		• When EV2 option (If "☐☐☐☐ Heating/Cooling control output" is selected in [Event output EV2 allocation]) is ordered, or DS, DA or EV3D□ option is ordered.
		When the control action is Reverse (Heating) control: After OUT1 MV has reached 100% or the OUT1 high limit value, or after OUT2 MV has reached 0% or -(OUT2 low limit value), if the PV does not reach the Loop break alarm band setting within the time allotted to assess the Loop break alarm, the alarm output will be turned ON. Likewise, after OUT1 MV has reached 0% or the OUT1 low limit value, or after OUT2 MV has reached -100% or -(OUT2 high limit value), if the PV does not drop to the Loop break alarm band setting
		within the time allotted to assess the Loop break alarm, the alarm output will be turned ON.
		When the control action is Direct (Cooling) control: After OUT1 MV has reached 100% or the OUT1 high limit value, or after OUT2 MV has reached 0% or -(OUT2 low limit value), if the PV does not drop to the Loop break alarm band setting within the time allotted to assess the Loop break alarm, the alarm output will be turned ON. Likewise ofter OUT1 MV has reached 0% or the OUT1 low limit.
		Likewise, after OUT1 MV has reached 0% or the OUT1 low limit value, or after OUT2 MV has reached -100% or -(OUT2 high limit value), if the PV does not reach the Loop break alarm band setting within the time allotted to assess the Loop break alarm, the alarm output will be turned ON.

Characters,				
Factory Default		Setting Item, Function, S	etting Range	
	00 /5	Time signal output:		
	Turns ON during program control RUN, by setting Time sign output OFF time and ON time within total time in one pattern			
	Output during AT:			
	Turns ON during AT. Pattern end output:			
	ii)_(((Pattern end output:	anda and ramaina ON during	
		Turns ON when Program control on the time set in [Pattern end output	_	
	00 18	Output by communication commar	_	
	2 .2	Communication command 8004H	B0 EV1 output 0: OFF, 1: ON	
			B1 EV2 output 0: OFF, 1: ON	
			B2 EV3 output 0: OFF, 1: ON	
	OO 19	RUN output	·	
		Turns ON during program control	RUN.	
	0020	Heating/Cooling control output	L OLITO	
	When i'i''	Works as Heating/Cooling contro (High limit alarm) to ☐☐ (F (High/Low	•	
		Time signal output) is selected, one outpu		
	,	[급] (Heater burnout alarm output), [[급 1년 (Loop break alarm), and [[급 1등 (Output		
		o 🗓 🖁 (RUN output) are selected, each	n output is common to multiple event	
	outputs.			
, , , , , , ,		hen the EV2 or EV3(DR) option is ordered	d.	
A2:A		value 0 Enabled/Disabled	on one ha Franklad or Disabled	
O noOO	Selection	2 alarm value is 0 (zero), alarm acti	on can be Enabled or Disabled.	
	ng	Disabled		
	485U	Enabled		
		nen any alarm from 🗓 🗓 🕻 (High limit a	alarm) to 🖽 🕏 (High/Low limits with	
		ependent alarm) is selected in [Event out	, , ,	
		h alarm) and 🗓‡‡‡ (Process low alarm)		
AZHY	EV2 alarm	hysteresis		
		alarm hysteresis.		
		nge: 0.1 to 1000.0℃ (℉)		
	DC voltag	e, current inputs: 1 to 10000 (The p	•	
	A 11 1 1	follows the selecti	,	
	Available when any alarm from 🗓 🗓 ¼ (High limit alarm) to 🗓 ¼ ¼ (High/Low limits with standby independent alarm) is selected in [Event output EV2 allocation].			
		delay time	out EV2 allocation].	
8234		alarm action delay time.		
		ting time has elapsed after PV enter	rs the alarm output range, the	
	alarm is a	·	. 5	
		nge: 0 to 10000 seconds		
	Available w	hen any alarm from 🗓🖸 幕 (High limit ala	rm) to 🔟 🕏 (High/Low limits with	
	standby ind	ependent alarm) is selected in [Event outp	out EV2 allocation].	

Characters,				
Factory Default	Setting Item, Function, Setting Range			
AZLA O noñi	EV2 alarm Energized/De-energized Selects Energized/De-energized status for EV2 alarm. When Energized is selected, and Event output EV2 is conductive (ON) while the EV2 indicator is lit. Event output EV2 is not conductive (OFF) while the EV2 indicator is not lit. When De-energized is selected, Event output EV2 is not conductive (OFF) while the EV2 indicator is lit. Event output EV2 is conductive (ON) while the EV2 indicator is not lit.			
	High limit alarm (Energized) High limit alarm (De-energized)			
	ON OFF SV +EV2 value (Fig. 8.6-3) EV2 hysteresis EV2 hysteresis SV +EV2 value (Fig. 8.6-4)			
	Selection item: Description: Description: Description: Available when any alarm from 200 (High limit alarm) to 2012 (High/Low limits with standby independent alarm) is selected in [Event output EV2 allocation].			
E803	Event output EV3 allocation • Selects Event output EV3 from the table below. • When changing Event output EV3, refer to Section "9.6 Items to be Initialized by Changing Settings" (p.109). • Selection item:			

Characters, Factory Default		Setting Item, Function, Setting Range
	IIO 13	Heater burnout alarm output (When C5W, EIW or W option is ordered): Detects load current value with CT (current transformer), and if it is lower than heater burnout alarm value, Heater burnout alarm output is turned ON.
	II 14	Loop break alarm output: Sets Loop break alarm time and band.
		About the Loop break alarm:
		When the control action is Reverse (Heating) control: If the PV does not reach the Loop break alarm band setting within the time allotted to assess the Loop break alarm (after the MV has reached 100% or the OUT1 high limit value), the alarm output will be turned ON. Likewise, if the PV does not drop to the Loop break alarm band setting within the time allotted to assess the Loop break alarm (after
		the MV has reached 0% or the OUT1 low limit value), the alarm output will be turned ON.
		When the control action is Direct (Cooling) control: If the PV does not drop to the Loop break alarm band setting within the time allotted to assess the Loop break alarm (after the MV has reached 100% or the OUT1 high limit value), the alarm output will be turned ON. Likewise, if the PV does not reach the Loop break alarm band setting within the time allotted to assess the Loop break alarm (after the MV has reached 0% or the OUT1 low limit value), the alarm output will be turned ON.
		• When EV2 option (If "☐☐☐☐ Heating/Cooling control output" is selected in [Event output EV2 allocation]) is ordered, or DS, DA or EV3D☐ option is ordered.
		When the control action is Reverse (Heating) control: After OUT1 MV has reached 100% or the OUT1 high limit value, or after OUT2 MV has reached 0% or -(OUT2 low limit value), if the PV does not reach the Loop break alarm band setting within the time allotted to assess the Loop break alarm, the alarm output will be turned ON. Likewise, after OUT1 MV has reached 0% or the OUT1 low limit value, or after OUT2 MV has reached -100% or -(OUT2 high limit value), if the PV does not drop to the Loop break alarm band setting within the time allotted to assess the Loop break alarm, the
		alarm output will be turned ON. When the control action is Direct (Cooling) control:
		After OUT1 MV has reached 100% or the OUT1 high limit value, or after OUT2 MV has reached 0% or -(OUT2 low limit value), if the PV does not drop to the Loop break alarm band setting within the time allotted to assess the Loop break alarm, the alarm output will be turned ON.
		Likewise, after OUT1 MV has reached 0% or the OUT1 low limit value, or after OUT2 MV has reached -100% or -(OUT2 high limit value), if the PV does not reach the Loop break alarm band setting within the time allotted to assess the Loop break alarm, the alarm output will be turned ON.

Characters,		0.41 K E			
Factory Default					
	00 /5	Time signal output: Turns ON during program control RUN, by setting Time signal			
	:::::::::::::::::::::::::::::::::::::::	output OFF time and ON time within total time in one pattern.			
	00 16	Output during AT: Turns ON during AT.			
		Pattern end output: Turns ON when Program control ends, and remains ON during			
		the time set in [Pattern end output time].			
	EC 18	Output by communication command:			
		Communication command 8004H B0 EV1 output 0: OFF, 1: ON			
		B1 EV2 output 0: OFF, 1: ON			
	:::: O	B2 EV3 output 0: OFF, 1: ON			
	00 19	RUN output:			
	Mhan iiilii	Turns ON during program control RUN.			
	or 🖺 /5 (T When 📆 / during AT) to	{ (High limit alarm) to [[] {] (High/Low limit with standby independent alarm) ime signal output) is selected, one output can be set to one event output.] (Heater burnout alarm output), [[] {] (Loop break alarm), and [[] {] (Output b) [[] {] (RUN output) are selected, each output is common to multiple event			
	outputs.	en the EV3D□ or El option is ordered.			
ABEA	EV3 alarm	value 0 Enabled/Disabled			
O noOO		• When EV3 alarm value is 0 (zero), alarm action can be Enabled or Disabled.			
	• Selection				
	485II	Enabled			
		hen any alarm from \$\textstyle \mathbb{D} \textstyle \text{(High limit alarm) to \$\textstyle \mathbb{D} \textstyle \text{(High/Low limits with }			
		lependent alarm) is selected in [Event output EV3 allocation] - excluding 🗓 🗓 🗍			
	(Process hi	gh alarm) and 🗓🗸 (Process low alarm).			
ABHH		hysteresis			
		alarm hysteresis.			
	_	range: 0.1 to 1000.0°C (˚F),			
	DC voitag	e, current inputs: 1 to 10000 (The placement of the decimal point			
	Available w	follows the selection.) hen any alarm from 🗓 🗓 (High limit alarm) to 🗓 🖟 (High/Low limits with			
		ndependent alarm) is selected in [Event output EV3 allocation].			
원립러남	EV3 alarm	delay time			
		alarm action delay time.			
		When setting time has elapsed after PV enters the alarm output range, the			
	alarm is a	ctivated. nge: 0 to 10000 seconds			
	_	hen any alarm from ███ ┆ (High limit alarm) to ██ ਫੋ (High/Low limits with			
		ependent alarm) is selected in [Event output EV3 allocation].			

Characters,				
Factory Default	Setting Item, Function, Setting Range			
ABLA	EV3 alarm Energized/De-energized			
U nonk	Selects Er	nergized/De-energized st	atus for EV	3 alarm.
	When En	ergized is selected, and E	Event outpu	t EV3 is conductive (ON) while
		•	•	conductive (OFF) while the EV3
	indicator i	•		,
	When De	-energized is selected. E	vent output	EV3 is not conductive (OFF)
		•	•	B is conductive (ON) while the
		ator is not lit.	'	,
	High limit alarm (Energized) High limit alarm (De-energized)			
		EV3 hysteresis		EV3 hysteresis
	ON —	—	ON -	-
	ON	<u> </u>	ON	†
	OFF —		OFF -	
		SV +EV3 value		SV +EV3 value
		(Fig. 8.6-5)		(Fig. 8.6-6)
	Selection	item		
	noñL	Energized		
	-885	De-energized		
	Available wh	Available when any alarm from 🗓 🗗 (High limit alarm) to 🗓 🛱 (High/Low limits with		
	standby independent alarm) is selected in [Event output EV3 allocation].			

Characters, Factory Default		Setting Item, Function, Setting Range				
E81 1	Event input DI1 allocation Selects Event input DI1 from the table below.					
	Selection		Input Function	on	Input ON	Input OFF
	0000	No event	•		(Closed)	(Open)
	000 (ber selection		Refer to "Abou	Tevent input"
	1002	Direct/Rever			Direct action	Reverse action
	0003		ntrol RUN/STC)P	RUN	STOP
	0004	Program cor Holding/Not	ntrol		Holding	Not holding
	0005	Program cor	ntrol Advance	function	Advance function	Usual control
	Available v	when C5W, EIW	, EIT, C5 or EI o	ption is ord	ered.	
	turned ON, level action is engaged except [1005] (Program control Advance function). If the same item – except [100] (Pattern number selection) – is selected in [Event input DI1 allocation] and [Event input DI2 allocation], OR calculation [if any one is ON (Closed), the function activates] will begin. An action changed by Event input DI has priority. If [100] (Pattern number selection) is selected, Patterns 1 to 4 can be selected by ON (Closed) or OFF (Open) status of Event input DI1 and DI2. Pattern numbers selected by Event input have priority over pattern numbers selected by keypad operation. To select pattern numbers by keypad operation, make sure all Event inputs are in OFF (Open) status. When [100] (Pattern number selection) is selected only in [Event input]					
	DI1 allocation]					
	Pattern number * 2					
	Event input DI1 OFF(Open) ON(Closed)					
	* This number will be selected by keypad. When IDD (Pattern number selection) is selected only in [Event input DI2 allocation]					
	Patte	rn number	*	2		
	Event in	put DI2	OFF(Open)	ON(Clos	sed)	
	* This n	umber will be	selected by ke	eypad.		

When ☐☐☐ I (Pattern number selection) is selected in [Event input DI1 allocation] and [Event input DI2 allocation]

Pattern number	*	2	3	4
Event input DI1	OFF(Open)	ON(Closed)	OFF(Open)	ON(Closed)
Event input DI2	OFF(Open)	OFF(Open)	ON(Closed)	ON(Closed)

^{*} This number will be selected by keypad.

Characters, Factory Default		Setti	ing Item, Fun	ction, Se	tting Ran	ge	
EBIE	Event input DI2 allocation						
	Selects Event input DI2 from the table below.						
	 Selection 	• Selection item:					
		Event	Input Function	on	Input (Clos		Input OFF (Open)
		No event					
		Pattern num	ber selection		Refer to	"About	Event input".
		Direct/Rever	se action		Direct ac	ction	Reverse action
		Program cor	ntrol RUN/STC)P	RUN		STOP
	<u> </u>	Program cor Holding/Not			Holding		Not holding
	0005	Program cor	ntrol Advance	function	Advance function)	Usual control
	Available	when C5W, EIW	, EIT, C5 or EI o	ption is ord	ered.		
	function). If the sam [Event inp any one is An action If IIIII I selected b Pattern nu selected b	e item – exce but DI1 allocati s ON (Closed) changed by E (Pattern numb by ON (Closed umbers selectory keypad oper pattern number	, the function a event input DID per selection) i) or OFF (Ope ed by Event in	ttern num It input DI. activates] has prid s selected en) status put have	ber select 2 allocation will begind prity. d, Patterns of Event in priority over	tion) – i on], OR n. s 1 to 4 input D /er patte	s selected in calculation [if can be I1 and DI2. ern numbers
	Patter Event in	ation] rn number put DI1 is number will	* OFF(Open) be selected b	2 ON(Clos	sed)		[Event input
	DI2 alloca		*	2			- 1

Pattern number	*	2
Event input DI2	OFF(Open)	ON(Closed)

^{*} This number will be selected by keypad.

When $\Box\Box\Box$! (Pattern number selection) is selected in [Event input DI1, DI2 allocation]

Pattern number	*	2	3	4
Event input DI1	OFF(Open)	ON(Closed)	OFF(Open)	ON(Closed)
Event input DI2	OFF(Open)	OFF(Open)	ON(Closed)	ON(Closed)

^{*} This number will be selected by keypad.

Characters,	Setting Item, Function, Setting Range						
Factory Default							
5-65 0 P800	 Transmission output type Selects the transmission output type. Converting the value (PV, SV, MV transmission) to analog signal every 125 ms, outputs the value in current or voltage. When changing transmission output type, refer to Section "9.6 Items to be Initialized by Changing Settings" (p.109). 						
	• Selection item:						
	Pと ransmission						
	5800 SV transmission						
	ีลียี่∷ี่ MV transmission						
	Available when EIT option is ordered.						
[Transmission output high limit						
II 1370	Sets the Transmission output high limit value.						
	(This value correponds to 20 mA in direct current output.)						
	Outputs Transmission output low limit value if Transmission output high limit and low limit value are the same.						
	If SV or MV transmission is selected, 4 mA is output at the time of program control STOP (in Standby).						
	Setting range:						
	PV, SV transmission: Transmission output low limit to Input range high limit Direct current, voltage inputs: -2000 to 10000 (The placement of the decimal point follows the selection.)						
	MV transmission: Transmission output low limit to 105.0%						
_	Available when EIT option is ordered.						
	Transmission output low limit						
□ -200	Sets the Transmission output low limit value.						
	(This value correponds to 4 mA in direct current output.)						
	Outputs Transmission output low limit value if Transmission output high limit and low limit value are the same.						
	If SV or MV transmission is selected, 4 mA is output at the time of Program control STOP (in Standby).						
	• Setting range:						
	PV, SV transmission: Input range low limit to Transmission output high limit						
	Direct current, voltage inputs: -2000 to 10000 (The placement of the decimal point follows the selection.)						
	MV transmission: -5.0% to Transmission output high limit						
	Available when EIT option is ordered.						
A_50	Step time unit						
	Selects the Step time unit.						
, , , , , , , , , , , , , , , , ,	Selection item:						
	คือ คือ Hours : Minutes						
	5Ecii Minutes : Seconds						

Characters,	Setting Item, Function, Setting Range				
Factory Default					
P-E 5 0 5568	 Power restore action Selects the program status if a power failure occurs mid-program, and it is restored. 				
	• Selection item:				
	Stops after power is restored. After power is restored, stops current program control, and returns to the program control STOP (in Standby).				
	Continues (resumes) after power is restored. Continues (resumes) previous program control after power is restored.				
	HoLo Suspends after power is restored.				
	After power is restored. Suspends (on hold) current program, and performs Fixed value control using the step SV at the time of suspension. Pressing the RUN key cancels suspension, and program control resumes.				
5_58	Step SV when program control starts				
	• Sets the step SV when Program control starts.				
	 Setting range: Scaling low limit to Scaling high limit (The placement of the decimal point follows the selection.) 				
5_5 <u>L</u> 0 P800	Program control start typeSelects the Program control start type.Selection item:				
	PV start, PVR start				
	100 ℃				
	25°c Time				
	O:45 PV start point				
	When Program control starts, the step SV is advanced to the PV, then Program control starts.				
	(Fig. 8.6-7)				

Characters,	Cotting them Function Cotting Dance
Factory Default	Setting Item, Function, Setting Range
	SV start
	Time 1:00 Program control RUN starts. Program control starts from the Step SV set in [Step SV when Program start starts]. (Fig. 8.6-8) Selection item: PUI PV start: Only when Program control starts, the step SV and step time are advanced to the PV, then Program control starts. PUI PVR start: PVR start:
	When Program control starts and in pattern repeating, the step SV and step time are advanced to the PV, then the Program control starts.
	SV start: When Program control starts, the Program control starts from the step SV set in [Step SV when program control starts].
PECA 0 0000	• Sets Pattern end output retention time after program control is finished. If 'Pattern end output' is selected in [Event output EV□ allocation], pattern end output is turned ON after program control is finished, and the SV Display flashes PEnd. Setting the time to 0 (zero) seconds causes continuous output, until the STOP key is pressed for approx. 1 second, or until the power is turned OFF. By pressing the STOP key for approx. 1 second, Pattern end output is turned OFF, and the unit returns to program control STOP (in Standby). When setting the time to 1 to 10000 seconds: Pattern end output is automatically turned OFF after Pattern end output time has elapsed, and the unit returns to program control STOP (in Standby).
	ON OFF Pattern end output time Program control ends (Fig. 8.6-9) • Setting range: 0 to 10000 seconds

Characters,					
Factory Default	Setting Item, Function, Setting Range				
AC_b	AT bias				
	Sets bias value for the AT.				
	AT point is automatically determined by the deviation between PV and SV.				
	AT bias setting works only in Fixed value control.				
	Setting range:				
	Thermocouple, RTD inputs without decimal point: 0 to 50℃ (0 to 100℉)				
	Thermocouple, RTD inputs with decimal point: 0.0 to 50.0℃ (0.0 to 100.0℉)				
	Available when Thermocouple or RTD input is selected in [Input type].				
Eall	Output status when input errors occur				
□ oFFU	Selects the output status when input errors (overscale, underscale) occur.				
	Selection item:				
	□FF□ Output OFF				
	©⊓□□ Output ON				
	Available for direct current and voltage inputs, and direct current output.				
{ }	Indication time				
□ 0000	Sets time from no operation status until Displays are switched off.				
	Displays relight by pressing any key while in Display sleep mode.				
	When input errors (overscale, underscale) or burnout has occurred, Displays				
	light up, and error codes are displayed.				
	If errors are cancelled, Displays will turn off after indication time has passed				
	again.				
	• Setting range: 00:00 to 60:00 (Minutes : Seconds) When set to 00:00, Displays remain ON.				
F () F	Error indication				
EdiF					
	 Selects error code indication Enabled/Disabled when input errors occur. When 'Enabled' is selected, error codes below are indicated on the PV Display. 				
	Error Code Error Contents				
	PV has exceeded Input range high limit value (Scaling				
	high limit value for DC voltage, current inputs).				
	PV has dropped below Input range low limit value				
	(Scaling low limit value for DC voltage, current inputs).				
	Input burnout, or PV has exceeded, or dropped below				
	the Indication range and Control range.				
	See pages 129, 130.				
	Selection item:				
	no Disabled				
	₽85Ⅲ Enabled				

At this stage, settings for Engineering setting mode 2 are complete.

Press the $\boxed{\text{RST}}$ key. The unit reverts to RUN mode.

8.7 Clearing Data

If data is cleared, all data will revert to factory default values.

Data can be cleared only in program control STOP (in Standby).

Data cannot be cleared during program control RUN.



⚠ Caution

Once data clear is executed, initial settings and each setting should be set again. (Cleared data cannot be restored.)

In preparation for mistaken execution of data clear, please write down initial settings and other setting data in the data sheets at the end of this manual.

• To execute data clear

In RUN mode, and while in program control STOP (in Standby), if the _____, ___ and STOP keys (in that order) together are pressed for approx. 3 seconds, the unit enters [Data clear Yes/No].

Characters, Factory Default		Setting Item, Function, Setting Range			
-	Data clear	Yes/No			
	Selects if	data clear is executed or not.			
i.i. / ()	Select 'Da	Select 'Data clear No', and press the MODE key. Data will not be cleared, and			
	the unit will return to RUN mode.				
	Select 'Data clear Yes', and press the MODE key. The PV Display indicates				
	for approx. 3 seconds, and all data will return to factory default values.				
	After that the unit automatically reverts to RUN mode.				
	Selection item:				
	ngIII	Data clear No			
	4E5II	Data clear Yes			

9. Operation

9.1 Performing Program Control

9.1.1 Performing Program Control

(1) Before turning the power ON

Check Sections "3. Mounting to the Control Panel (pp.12 - 15)" and "4. Wiring (pp.16 - 25)" before turning the power ON.

(2) After turning the power ON

Set necessary setting items after turning the power ON.

Refer to Sections "5. Outline of Key Operation and Each Mode (pp.26 - 28)", "6. Initial Settings (pp. 29 - 37)", "7. Basic Settings and Operation (pp.38 - 43)" and "8. Explanation of Setting Items" (pp.44 - 90).

(3) Selecting a pattern number

There are 2 methods for selecting a pattern number:

Using the PTN key, or using Event input

Pattern numbers selected by Event input have priority over pattern numbers selected by the keypad.

To select pattern numbers by keypad, make sure all Event inputs are in OFF (Open) status.

• Using the PTN key

In program control STOP (in Standby), select a pattern from 1 - 10 with the \overline{PTN} key.

Using Event input

If III (Pattern number selection) is selected in [Event input DI1 allocation] and [Event input DI2 allocation]:

Select a pattern from 2 – 4, depending on ON (Closed) or OFF (Open) status between Event input DI1/DI2 terminal and SG terminal.

Select pattern 1 or a pattern from 5 – 10 with the PTN key.

Signal edge action is engaged. However, when power is turned ON, level action is engaged.

If [[] { (Pattern number selection) is selected only in [Event input DI1 allocation]: (e.g.) To select Pattern 2, close (ON) (9) and (12).

(Table 9.1.1-1)

Pattern number Terminal number	*	2	
9 Event input DI1	OFF (Open)	ON (Closed)	

^{*} This number will be selected by keypad.

If [[] (Pattern number selection) is selected only in [Event input DI2 allocation]: (e.g.) To select Pattern 2, close (ON) (8) and (12).

(Table 9.1.1-2)

Pattern number Terminal number	*	2
8 Event input DI2	OFF (Open)	ON (Closed)

^{*} This number will be selected by keypad.

If [[] [] (Pattern number selection) is selected in [Event input DI1 allocation] and [Event input DI2 allocation]:

(e.g.) To select Pattern 4, close (ON) 9 and 12, and close (ON) 8 and 12.

(Table 9.1.1-3)

Pattern number Terminal number	*	2	3	4
9 Event input DI1	OFF (Open)	ON (Closed)	OFF (Open)	ON (Closed)
8 Event input DI2	OFF (Open)	OFF (Open)	ON (Closed)	ON (Closed)

^{*} This number will be selected by keypad.

(4) Perform Program Control

There are 2 ways to start program control.

Using the RUN key, or using Event input.

• Using the RUN key

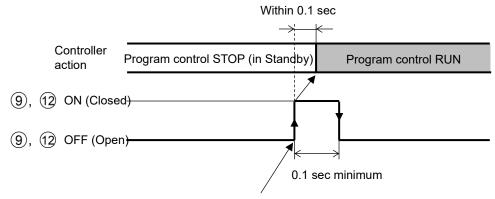
In program control STOP (in Standby), press the RUN key. Program control starts.

Using Event input

If ☐☐☐☐ (Program control RUN/STOP) is selected in [Event input DI☐ allocation], Program control RUN/STOP can be switched, depending on ON (Closed) or OFF (Open) status between Event input DI1 / DI2 terminal and SG terminal.

If [[] [] (Program control RUN/STOP) is selected in [Event input DI1 allocation], close (ON) (9) and (12).

Program control will start.



Program control performs by detecting rising signal edge action from OFF (Open) to ON (Closed) of terminals (9) and (12).

(Fig. 9.1.1-1)

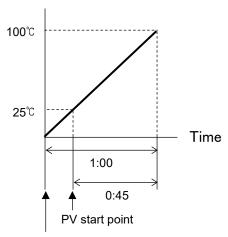
[Program control start type]

Program control start type can be selected in [Program control start type].

PV start:

Only when program control starts, step SV and step time are advanced to the PV, then program control starts.

However, if step SV set in [Step SV when program control starts] is higher than the PV (when PV start is initiated), then program control will start from the SV set in [Step SV when program control starts].



When program control starts, step SV is advanced to PV (25℃).

(Fig. 9.1.1-2)

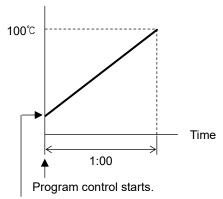
PVR start:

When program control starts and in pattern repeating, the step SV and step time are advanced to the PV, then the program control starts.

Action is the same as that of PV start. Refer to (Fig. 9.1.1-2).

SV start:

Program control starts from the value set in [Step SV when program control starts].



Program control starts from the value set in [Step SV when program control starts].

(Fig. 9.1.1-3)

[Power Restore Action]

If power fails during program control RUN, the controller can be operated depending on the selection in [Power restore action].

Progressing time error when power is restored: 1 minute or 1 second

• Stops after power is restored:

After power is restored, stops current program control, and returns to program control STOP (in Standby) status.

• Continues after power is restored:

After power is restored, continues (resumes) program control.

• Suspends after power is restored:

After power is restored, suspends (on hold) current program, and performs Fixed value control using the step SV at the time of suspension.

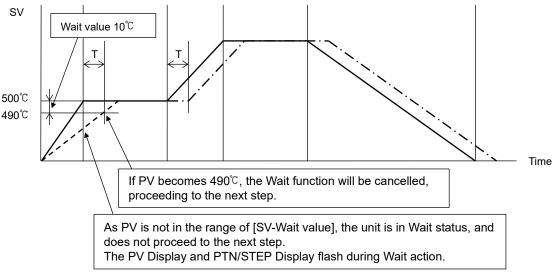
Pressing the RUN key cancels suspension, and program control resumes.

[Wait function]

While program control is running, the program does not proceed to the next step until the deviation between PV and SV enters SV±Wait value at the end of step. The PV Display and PTN/STEP Display flash while the Wait function is working.

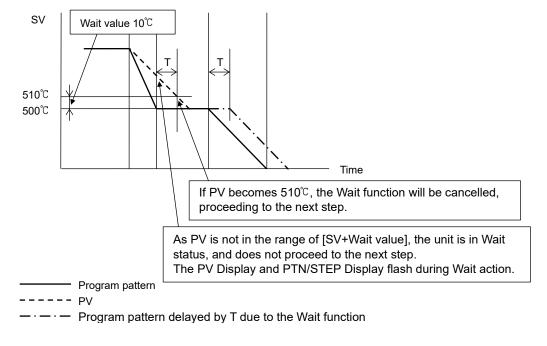
Explanation of Wait function

• When program pattern is rising:



(Fig. 9.1.1-4)

• When program pattern is falling:



(Fig. 9.1.1-5)

· How to cancel the Wait function

Press the RUN key for approx. 1 second to cancel the Wait function.

9.1.2 Stopping Program Control

There are 2 methods for stopping program control:
Using the STOP key, or using Event input

• Using the STOP key

Press the STOP key for approximately 1 second during Program control RUN.

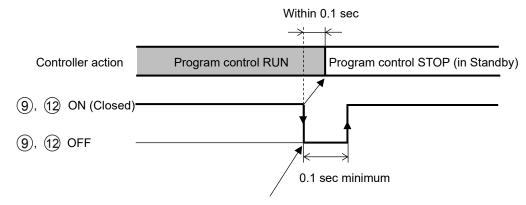
Program control will stop, and revert to program control STOP (in Standby) status.

Using Event input

If ☐☐☐☐ (Program control RUN/STOP) is selected in [Event input DI□ allocation], Program control RUN/STOP can be switched, depending on ON (Closed) or OFF (Open) status between Event input DI□ terminal and SG terminal.

If [[] [] (Program control RUN/STOP) is selected in [Event input DI1 allocation], open (OFF) (9) and (12).

Program control will stop, and the unit will revert to program control STOP (in Standby) status.



Program control stops by detecting falling signal edge action from ON to OFF of terminals 9 and 12.

(Fig. 9.1.2-1)

9.1.3 Suspending Program Control (Program Control HOLD Function)

During program control, progress of current step can be suspended (paused).

Fixed value control is performed using the step SV at the time of suspension.

Pressing the RUN key cancels suspension, and program control resumes.

To suspend program control, there are 2 methods:

Using the | \wedge | key, or using Event input

Using the key

During program control RUN, press the key for approx. 1 second.

Progress of current step is suspended, and then Fixed value control is performed using the step SV at the time of suspension.

The PV Display and RUN indicator flash.

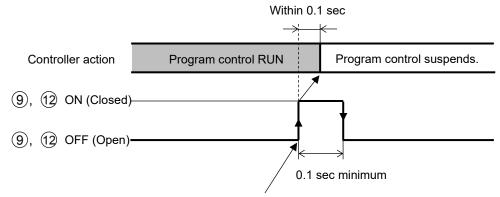
Using Event input

If ☐☐☐☐ (Program control Holding/Not holding) is selected in [Event input DI□ allocation], Program control Holding/Not holding can be switched, depending on ON (Closed) or OFF (Open) status between Event input DI□ terminal and SG terminal.

If [[] [] (Program control Holding/Not holding) is selected in [Event input DI1 allocation], close (ON) (9) and (12).

Progress of current step is suspended, and then Fixed value control is performed using the step SV at the time of suspension.

The PV Display and RUN indicator flash.



Program control suspends by detecting rising signal edge action from OFF (Open) to ON (Closed) of terminals (9) and (12).

(Fig. 9.1.3-1)

9.1.4 Advancing Program Step (Advance Function)

Interrupts current step while program control is running, and proceeds to the beginning of the next step.

If the Wait function is working, the Wait function will be cancelled, and will proceed to the beginning of the next step.

To advance program step, there are 2 methods:

Using the RUN key, or using Event input

• Using the RUN key

During program control RUN, press the RUN key for approx. 1 second.

Current step is stopped, and the unit proceeds to the beginning of the next step.

Each time the RUN key is pressed for approx. 1 second, the unit proceeds to the next step.

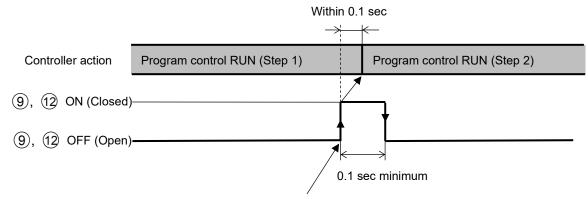
Using Event input

If [[]] (Program control Advance function) is selected in [Event input DI allocation], Program control Advance or usual control can be switched, depending on ON (Closed) or OFF (Open) status between Event input DI terminal and SG terminal.

If [[][5][5] (Program control Advance function) is selected in [Event input DI1 allocation], close (ON) (9) and (12).

Current step is stopped, and the unit proceeds to the beginning of the next step.

Each time terminals (9) and (12) are turned from OFF (Open) to ON (Closed), the unit proceeds to the next step.



Program control advances by detecting rising signal edge action from OFF (Open) to ON (Closed) of terminals (9) and (12).

(Fig. 9.1.4-1)

9.1.5 Speeding up Program Step Time (Step Time Speed-up Function)

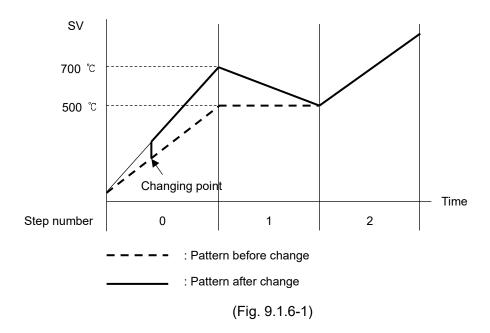
To make program step time progress faster, press the FAST key during program control RUN. While the FAST key is pressed, the step time progress is made 60 times faster.

If the Wait function is set, this function will be disabled as the Wait function has priority.

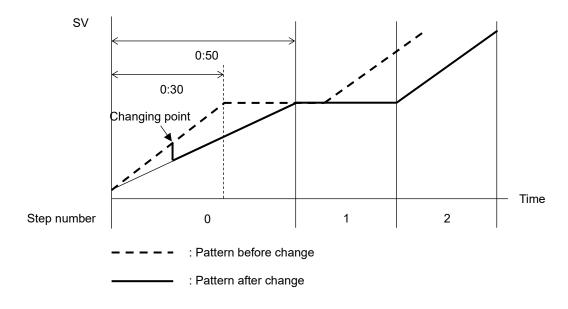
9.1.6 Changing Program Step SV and Step Time

When step SV and step time are changed during program control RUN, they will change as follows.

• When changing step SV from 500 to 700°C



• When changing step time from 0:30 to 0:50



(Fig. 9.1.6-2)

9.1.7 Ending Program (Pattern End Function)

By pressing the STOP key for approximately 1 second, Pattern end output is turned OFF, and the unit returns to program control STOP (in Standby).

If Pattern end output time is set, Pattern end output is automatically turned OFF after Pattern end output time has expired. And the unit returns to program control STOP (in Standby).

9.2 Performing Fixed Value Control

9.2.1 Performing Fixed Value Control

Fixed value control (control action that indicating controllers are performing) is performed using the preset step SV.

To perform Fixed value control, set the step time (of the desired step SV) to - - - -.

(e.g.) Set Pattern 1, Step 1 SV to 500° C, and set its step time to ---. Press the RUN key. Fixed value control is performed at 500° C.

(1) Before turning the power ON

Check Sections "3. Mounting to the Control Panel (pp.12 - 15)" and "4. Wiring (pp.16 - 25)" before turning the power ON.

(2) After turning the power ON

Set necessary items after turning the power ON.

Refer to Sections "5. Outline of Key Operation and Explanation of Each Mode (pp.26 - 28)", "6. Initial Settings (pp.29 - 37)", "7. Basic Settings and Operation (pp.38 - 43)" and "8. Explanation of Setting Items (pp.44 - 90)".

To perform Fixed value control. set the step SV and step time for the desired pattern. To set the step time, press the w key at 00:00. - - - will be selected. Select a PID block number.

(3) Selecting a pattern number to perform

There are 2 methods for selecting a pattern number:

Using the PTN key, or using Event input

Pattern numbers selected by Event input have priority over pattern numbers selected by the PTN key.

To select pattern numbers by keypad, make sure all Event inputs are in OFF (Open) status.

Using the PTN key

In program control STOP (in Standby), select a pattern (from 1 - 10) for which step time is set to - - - at (2), using the $\boxed{\text{PTN}}$ key.

Using Event input

If $\square\square\square$ (Pattern number selection) is selected in [Event input DI \square allocation], select a pattern from 2 – 4, depending on ON (Closed) or OFF (Open) status between Event input DI1 / DI2 terminal and SG terminal.

To select Pattern 1 or a pattern from 5 – 10, press the PTN key.

Edge action is used. However, when power is turned ON, level action is engaged.

If [(Pattern number selection) is selected only in [Event input DI1 allocation], (e.g.) To select Pattern 2, close (ON) (9) and (12).

(Table 9.2.1-1)

Pattern number Terminal number	*	2	
Event input DI1	OFF (Open)	ON (Closed)	

^{*} This number will be selected by keypad.

If [[] [] (Pattern number selection) is selected only in [Event input DI2 allocation], (e.g.) To select Pattern 2, close (ON) (8) and (12).

(Table 9.2.1-2)

Pattern number Terminal number	*	2	
8 Event input DI2	OFF (Open)	ON (Closed)	

^{*} This number will be selected by keypad.

If [[] [[Pattern number selection] is selected in [Event input DI1 allocation] and [Event input DI2 allocation]:

(e.g.) To select Pattern 4, close (ON) (9) and (12), and close (ON) (8) and (12).

(Table 9.2.1-3)

Pattern number Terminal number	*	2	3	4
Event input DI1	OFF (Open)	ON (Closed)	OFF (Open)	ON (Closed)
8 Event input DI2	OFF (Open)	OFF (Open)	ON (Closed)	ON (Closed)

^{*} This number will be selected by keypad.

(4) Executing Fixed Value Control

There are 2 ways to execute Fixed value control:

Using the RUN key, or using Event input

• Using the RUN key.

In program control STOP (in Standby), press the RUN key.

The step, for which step time is set to - - - at (2), is held, and Fixed value control is performed using the step SV.

The RUN indicator flashes during Fixed value control.

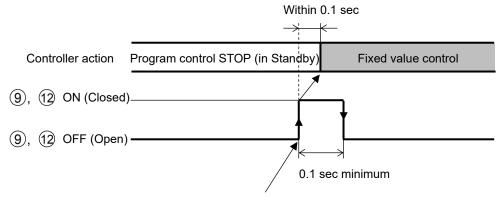
Using Event input

If □□□□∃ (Program control RUN/STOP) is selected in [Event input DI□ allocation],

Program control RUN/STOP can be switched, depending on ON (Closed) or OFF (Open) status between Event input DI1 / DI2 terminal and SG terminal.

The step, for which step time is set to - - - at (2), is held, and Fixed value control is performed using the step SV.

The RUN indicator flashes during Fixed value control.



Fixed value control is performed by detecting rising signal edge action from OFF (Open) to ON (Closed) of terminals (9) and (12).

9.2.2 Finishing Fixed Value Control

There are 2 ways to finish Fixed value control:
Using the STOP key, or using Event input

• Using the STOP key

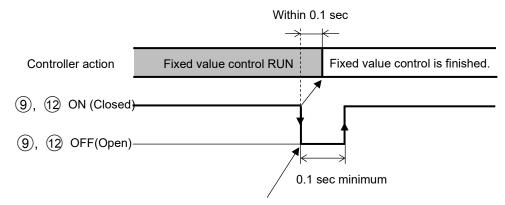
During Fixed value control, press the STOP key for approximately 1 second. Fixed value control will stop, and the unit will revert to program control STOP (in Standby).

Using Event input

If \(\tilde{\mathbb{U}}\)\(\tilde{\mathbb{U}}\)\(\tilde{\mathbb{U}}\) (Program control RUN/STOP) is selected in [Event input DI\) allocation], Program control RUN/STOP can be switched, depending on ON (Closed) or OFF (Open) status between Event input DI\) terminal and SG terminal.

If $\square \square \square \exists$ (Program control RUN/STOP) is selected in [Event input DI \square allocation], open (OFF) (9) and (12).

Fixed value control will stop, and the unit will return to program control STOP (in Standby).



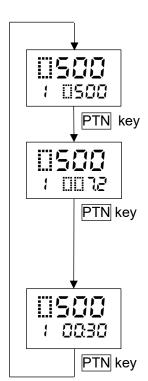
Fixed value control is finished by detecting falling signal edge action from ON (Closed) to OFF (Open) of terminals (9) and (12).

(Fig. 9.2.2-1)

9.3 Switching Indication of the SV Display

Press the PTN key to switch the indication of the SV Display.

Each time the PTN key is pressed, switches the indication as follows.



RUN mode

Step SV is indicated.

Monitor mode

Manipulated variable (MV) is indicated.

(e.g.) 7.2% (The decimal point flashes.)

When EV2 option (if "∷ 🗓 🗗 Heating/Cooling control output" is selected in [Event output EV2 allocation]) is ordered, or when DS, DA or EV3D□ option is ordered, OUT1 MV is a positive number (0.0 to 100.0%), OUT2 MV is a negative number (0.0 to -100.0%).

Monitor mode

Remaining time is indicated.

(e.g.) 00:30 [Colon flashes (in Hours:Minutes or Minutes:Seconds).] For Fixed value control, - - - - is displayed.

9.4 Performing AT

9.4.1 Notice when Performing AT



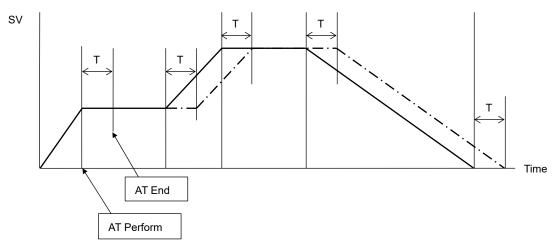
Notice

- Perform the AT during the test operation.
- During the AT, none of the setting items can be set.
- If power failure occurs during AT, AT will stop.
- If AT is cancelled during the process, P, I, D and ARW values will revert to the values before AT was performed.
- AT will be forced to stop if it has not been completed within 4 hours.
- Sometimes the AT process will not fluctuate if AT is performed at or near room temperature. Therefore, AT might not finish normally.

[Notice when performing AT during Program control RUN]

• If AT is performed, AT starts from the AT starting point, and step time does not progress until AT finishes.

After AT finishes, remaining step will be performed.



T: Time delay due to AT

: Program pattern before AT is performed.

---: Program pattern after AT is performed.

(Fig. 9.4.1-1)

9.4.2 AT Action

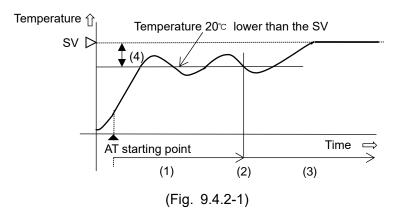
In order to set each value of P, I, D and ARW automatically, the AT process should be made to fluctuate to obtain an optimal value.

For DC voltage, current inputs, the AT process will fluctuate around the SV for conditions of [A], [B] and [C] below.

One of 3 types of fluctuation below is automatically selected depending on the deviation between SV and PV.

[A] If there is a large difference between the SV and PV as the temperature is rising

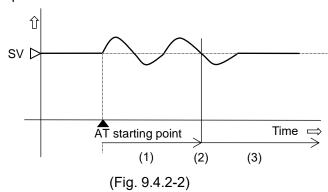
When AT bias is set to 20℃, AT process will fluctuate at the temperature 20℃ lower than the SV.



- (1) Calculates PID constants.
- (2) PID constants calculated
- (3) Controlled by the PID constants set by AT
- (4) AT bias value (Factory default: 20°C)

[B] When the control is stable

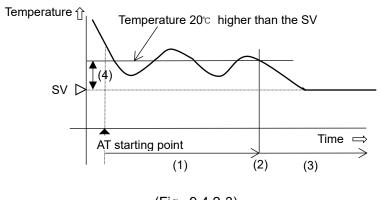
The AT process will fluctuate around the SV.



- (1) Calculates PID constants.
- (2) PID constants calculated
- (3) Controlled by the PID constants set by AT

[C] If there is a large difference between the SV and PV as the temperature is falling

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

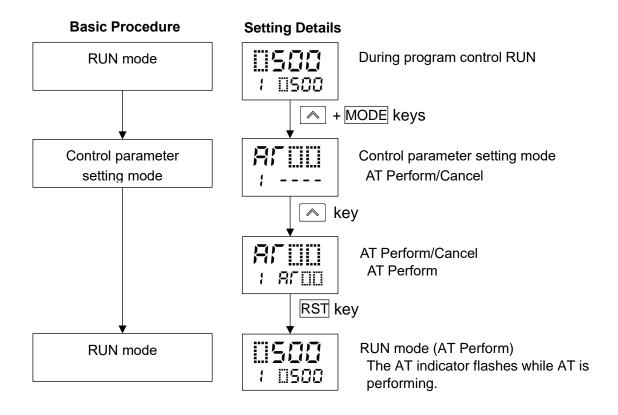


(Fig. 9.4.2-3)

- (1) Calculates PID constants.
- (2) PID constants calculated
- (3) Controlled by the PID constants set by AT
- (4) AT bias value (Factory default: 20°C)

9.4.3 Performing AT

To perform AT, select (AT Perform) in [AT Perform/Cancel] in Control parameter setting mode. And press the RST key.



9.5 Input Value Correction

Input value can be corrected in [Sensor correction coefficient] and [Sensor correction] in Engineering setting mode 1.

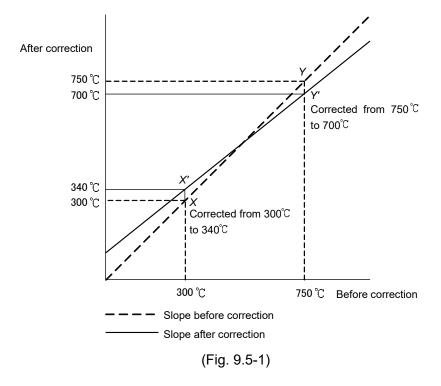
In [Sensor correction coefficient], set the slope of temperature change.

In [Sensor correction], set the difference between temperatures before correction and after correction.

PV after input correction is expressed by the following formula.

PV after input correction = Current PV x Sensor correction coefficient + (Sensor correction value)

The following shows an example of input value correction using 'Sensor correction coefficient' and 'Sensor correction value'.



(1) Select any 2 points of PV to be corrected, and determine the PV after correction.

PV before correction: 300°C → PV after correction: 340°C

PV before correction: 750° C \rightarrow PV after correction: 700° C

(2) Calculate Sensor correction coefficient from Step (1).

$$(Y'-X')/(Y-X) = (700-340)/(750-300) = 0.8$$

- (3) Enter a PV value of 300°C using an mV generator or dial resistor.
- (4) Set Step (2) value as a Sensor correction coefficient.
- (5) Read the PV.

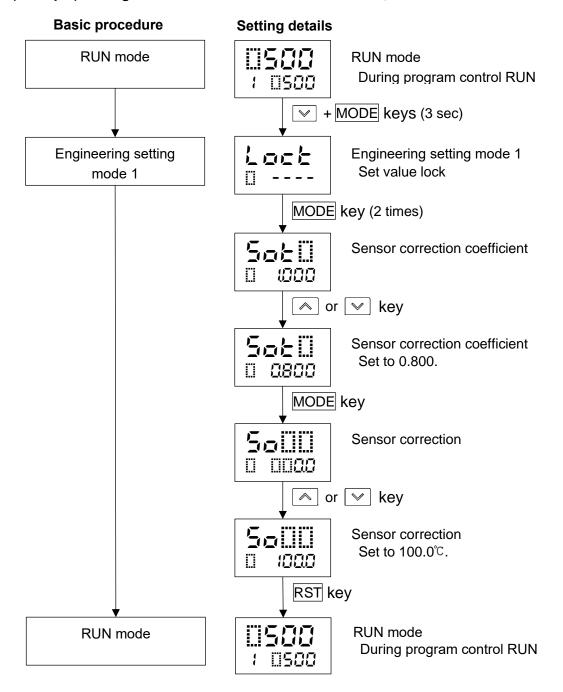
240°C will be indicated.

(6) Calculate the sensor correction value.

Calculate the difference between 'PV after correction' and Step (5) PV. $340^{\circ}C - 240^{\circ}C = 100^{\circ}C$

- (7) Set Step (6) value as a Sensor correction value.
- (8) Enter an electromotive force or resistance value equivalent to 750℃ using an mV generator or dial resistor.
- (9) Read the PV, and confirm that 700°C is indicated.

(Example) Setting Sensor correction coefficient to 0.800, and Sensor correction to 100.0℃



9.6 Items to be Initialized by Changing Settings

If settings are changed, the following items will be initialized.

●: Initialized

X: Not initialized

Setting item to be changed Item to be initialized	Input Type	Event output EV1 allocation	Event output EV2 allocation	Event output EV3 allocation	Transmission output
Loop break alarm time	•	X	X	X	Х
Loop break alarm band	•	х	х	х	Х
Sensor correction coefficient	•	х	х	Х	Х
Sensor correction	•	х	х	х	Х
SVTC bias	•	х	х	х	Х
Scaling high limit	•	х	х	х	Х
Scaling low limit	•	х	х	х	Х
EV1 alarm value 0 Enabled/Disabled	х	•	х	х	Х
EV1 alarm hysteresis	х	•	х	х	Х
EV1 alarm delay time	х	•	х	х	Х
EV1 alarm Energized/De-energized	х	•	х	х	Х
EV2 alarm value 0 Enabled/Disabled	х	х	•	Х	Х
EV2 alarm hysteresis	х	х	•	Х	Х
EV2 alarm delay time	х	х	•	Х	Х
EV2 alarm Energized/De-energized	х	х	•	Х	Х
EV3 alarm value 0 Enabled/Disabled	х	х	х	•	Х
EV3 alarm hysteresis	х	х	х	•	Х
EV3 alarm delay time	х	х	х	•	Х
EV3 alarm Energized/De-energized	х	х	х	•	Х
Transmission output high limit *	•	х	х	х	•
Transmission output low limit *	•	х	х	х	•
Step SV when program control starts	•	х	х	х	Х
AT bias	•	х	х	Х	Х

^{*} When PV transmission or SV transmission is selected, and if input type is changed, these setting items will be initialized.

10. Action Explanation

10.1 OUT1 Action

Action	Reverse (Heating)	Action	Direct ((Cooling) Ac	tion
Control action	ON P-band OFF	ŠV		P-band	— ON — OFF
Relay contact output	(15) (15) (15) (15) (15) (15) (15) (15)		(I) Cycle ac accord	15 gl	
Non-contact voltage output	+ (5)— + (5)— 12/0 V DC - (6)— Cycle action is pe according to dev	0 V DC - 16		/12 V DC	12 V DC - 16—— ormed
Direct current output	+ 15 + 15 - 1 20 mA DC 20 to 4 mA DO - 16 - 16 - 1 Changes continu according to devi	4 mA DC – 16	Chang	o 20 mA DC	20 mA DC - 16
Indicator (OUT) Green	Lit	Unlit	Unlit		Lit

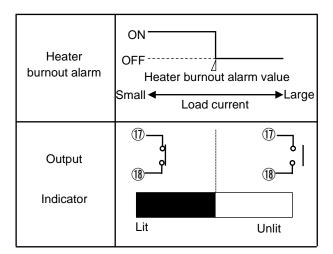
: Turns ON (lit) or OFF (unlit).

10.2 OUT1 ON/OFF Control Action

Action	Reverse (Heating) Action	Direc	ct (Cooling) A	ction
Control action	ON Hysteresis	A SV		Hysteresis	ON OFF
Relay contact output	15 7	15-	15		15—
Non-contact voltage output	+ (5) 12 V DC - (6)	+15 0 V DC -16	+15 0 V DC -16		+ ① T 12 V DC - ⑥
Direct current output	+ ^(f)	+ 15— 4 mA DC - 16—	+ 15 4 mA DC - 16		+ 15— 20 mA DC - 16—
Indicator (OUT) Green	Lit	Unlit	Unlit		Lit

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

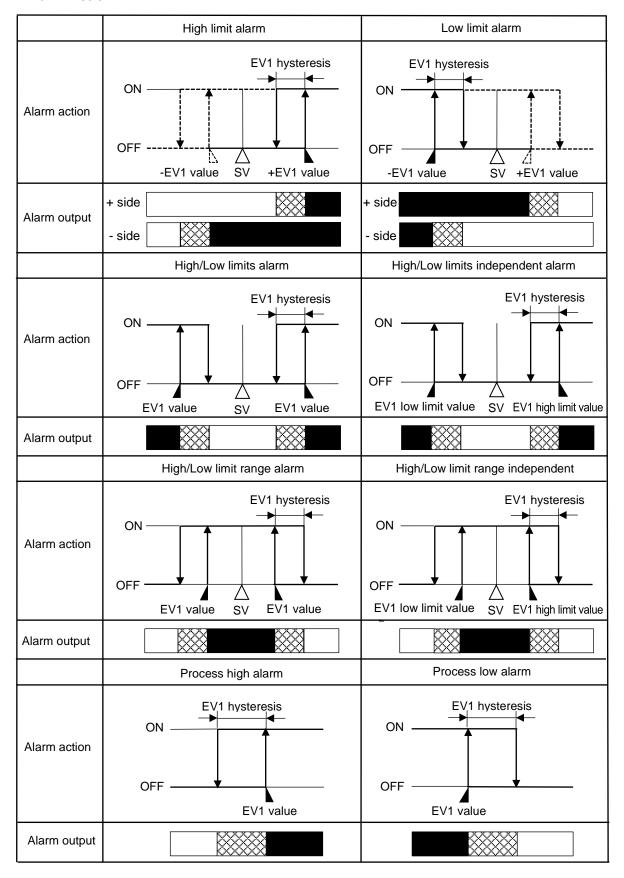
10.3 Heater Burnout Alarm Action

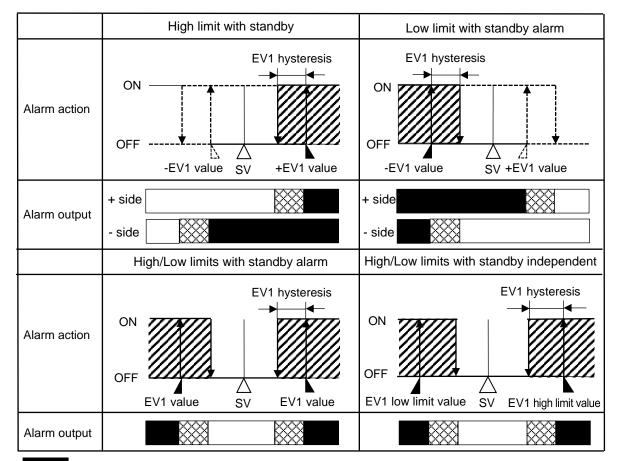


Event output EV1 terminal numbers: 17, 18
Event output EV2 terminal numbers: 19, 20

Event output EV3 terminal numbers: 6, 7

10.4 Alarm Action





:Event output EV1 terminals 17, 18: ON

:Event output EV1 terminals 17, 18: ON or OFF

: Event output EV1 terminals 17, 18: OFF

////: Alarm output is in standby.

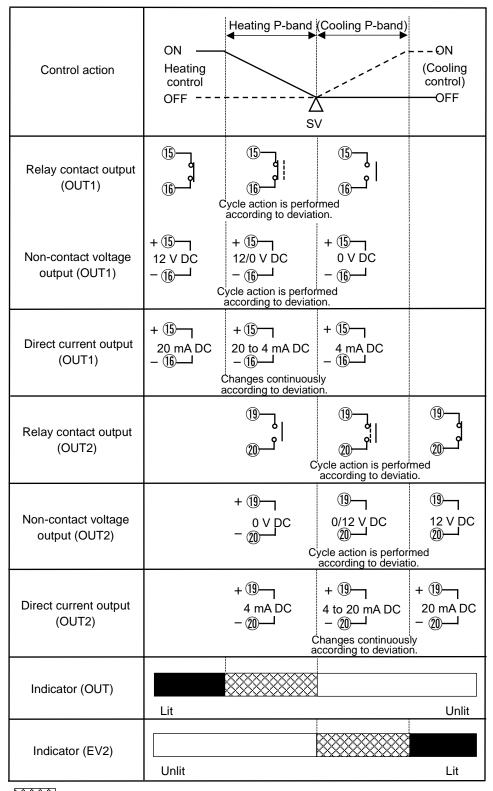
 EV1 value, EV1 high limit value, and EV1 hysteresis represent EV1 alarm value, EV1 high limit alarm value and EV1 alarm hysteresis respectively.
 EV1 will be substituted by EV2 or EV3.

• EV1 indicator lights up when Event output EV1 terminals 17 and 18 are ON, and turns off when their output terminals 17 and 18 are OFF.

EV2 indicator lights up when Event output EV2 terminals 19 and 20 are ON, and turns off when their output terminals 19 and 20 are OFF.

EV3 indicator lights up when Event output EV3 terminals 6 and 7 are ON, and turns off when their output terminals 6 and 7 are OFF.

10.5 OUT2 (Heating/Cooling Control) Action

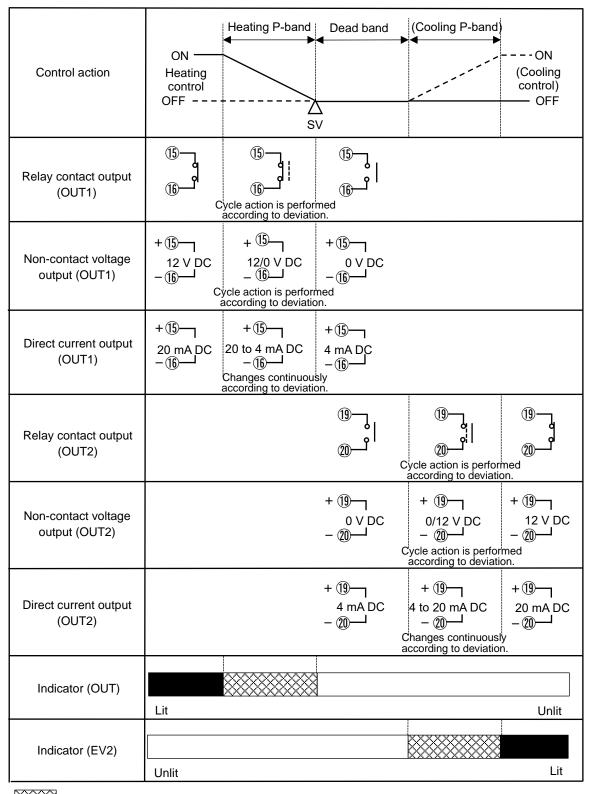


: Turns ON (lit) or OFF (unlit).

: Represents Heating control action.
---: Represents Cooling control action.

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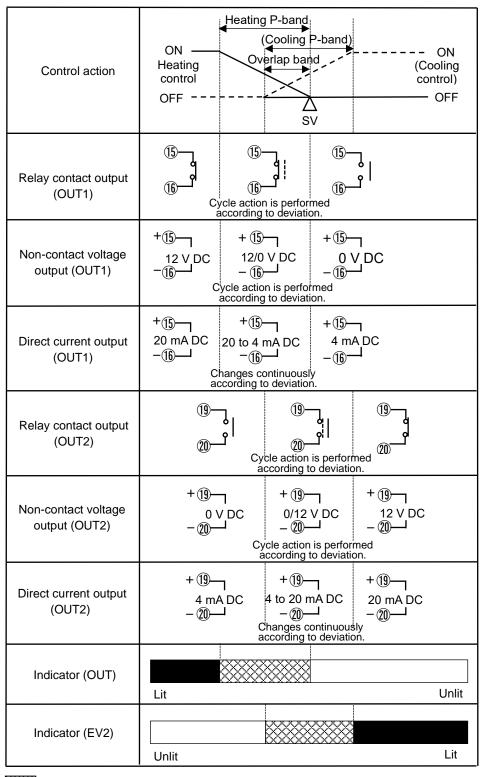
10.6 OUT2 (Heating/Cooling Control) Action (When Setting Dead Band)



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

: Represents Heating control action. : Represents Cooling control action.

10.7 OUT2 (Heating/Cooling control) Action (When Setting Overlap band)



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

: Represents Heating control action.

: Represents Cooling control action.

11. Specifications

11.1 Standard Specifications

Rating

Rated scale	Input	Input	: Range	Resolution
	V	-200 to 1370 °C	-328 to 2498 °F	1 ℃(°F)
	K	-200.0 to 400.0 °C	-328.0 to 752.0 °F	0.1 °C(°F)
	J	-200 to 1000 °C	-328 to 1832 °F	1 °C(°F)
	R	0 to 1760 °C	32 to 3200 °F	1 °C(°F)
	S	0 to 1760 °C	32 to 3200 °F	1 ℃(˚F)
	В	0 to 1820 °C	32 to 3308 °F	1 °C(°F)
	Е	-200 to 800 °C	-328 to 1472 °F	1 °C(°F)
	Т	-200.0 to 400.0 °C	-328.0 to 752.0 °F	0.1 °C(°F)
	N	-200 to 1300 °C	-328 to 2372 °F	1 °C(°F)
	PL-Ⅱ	0 to 1390 ℃	32 to 2534 °F	1 °C(°F)
	C(W/Re5-26)	0 to 2315 ℃	32 to 4199 °F	1 ℃(˚F)
	Pt100	-200.0 to 850.0 °C	-328.0 to 1562.0 °F	0.1 °C(°F)
	PUIOU	-200 to 850 °C	-328 to 1562 °F	1 °C(°F)
	JPt100	-200.0 to 500.0 °C	-328.0 to 932.0 °F	0.1 °C(°F)
	JPITOU	-200 to 500 °C	-328 to 932 °F	1 ℃(°F)
	4 – 20 mA	-2000 to 10000 (*)		1
	0 – 20 mA	-2000 to 10000 (*)		1
	0 – 1 V	-2000 to 10000 (*)		1
	0 – 5 V	-2000 to 10000 (*)		1
	1 – 5 V	-2000 to 10000 (*)		1
	0 – 10 V	-2000 to	10000 (*)	1
	(*) Scaling and de	cimal point place selection	on are possible.	

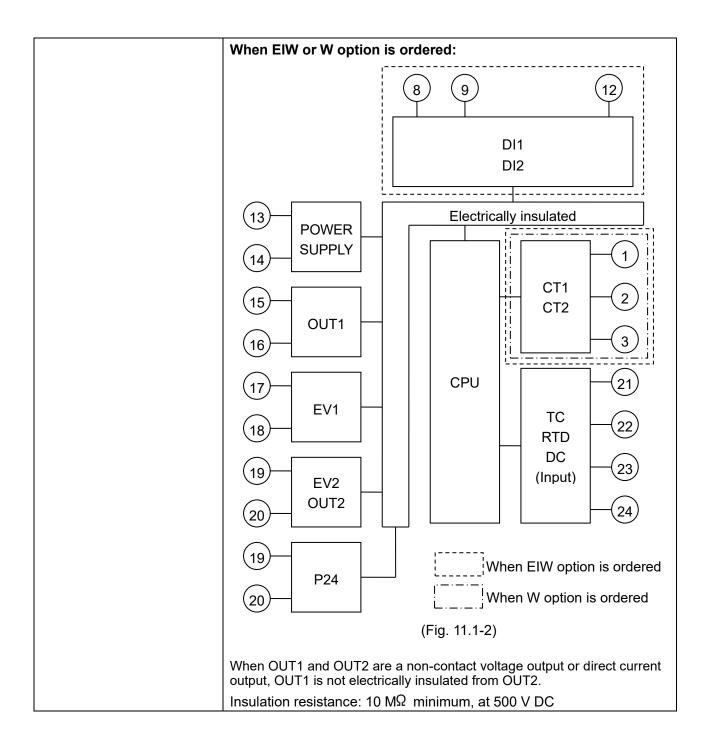
Input

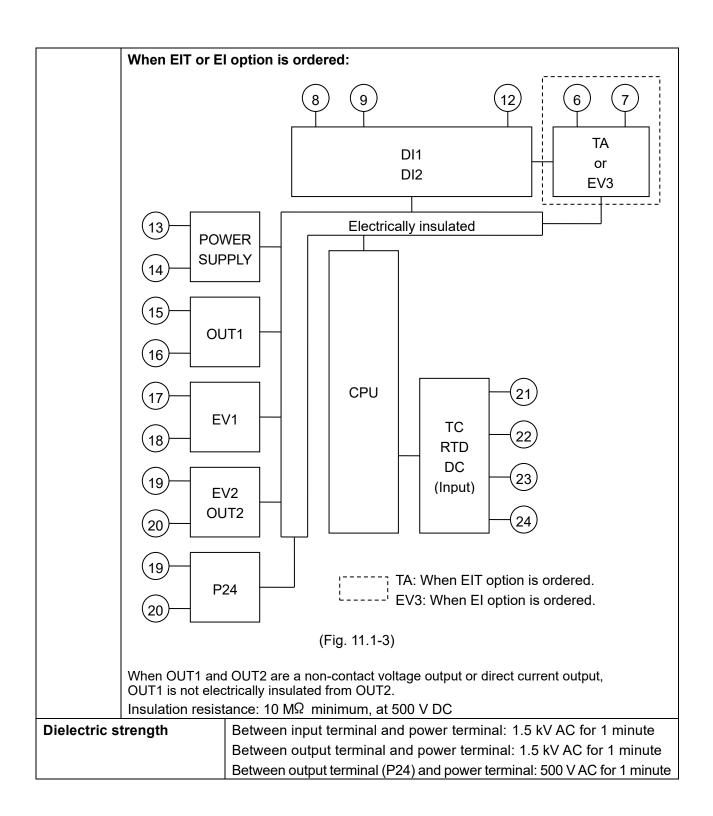
Input	Thermocouple	K, J, R, S, B, E, T, N, PL- II, C(W/Re5-26)			
	-	External resistance: 100 Ω max.			
		However, for B input, External resistance: 40 Ω max.			
	RTD	Pt100, JPt100 3-wire type			
		Allowable input lead wire resistance: 10 Ω max. per wire			
	Direct current	0 to 20 mA DC, 4 to 20 mA DC			
		Input impedance: 50 Ω			
		Allowable input current: 50 mA DC max.			
	DC voltage	0 – 1 V DC			
		Input impedance: 1 MΩ minimum			
		Allowable input voltage: 5 V DC max.			
		Allowable signal source resistance: 2 kΩ max.			
		0 – 5 V DC, 1 – 5 V DC, 0 – 10 V DC			
		Input impedance: 100 kΩ minimum			
		Allowable input voltage: 15 V DC max.			
		Allowable signal source resistance: 100 Ω max.			
Event inpu	ut				
(C5W, EIW,	EIT, C5, EI options)				
	Input point	2 points			
	Circuit current	Approx. 16 mA			
	when closed				
	Action	Edge action			
		When the power is turned ON, level action is engaged.			

Output				
Control	Relay contact	Control capacity: 3 A 250 V AC (resistive load)		
output	1a	1 A 250 V AC (inductive load $\cos \phi = 0.4$)		
OUT1		Electrical life: 100,000 cycles		
		Minimum applicable load: 10 mA 5 V DC		
	Non-contact	12 V DC±15%		
	voltage	Max. 40 mA (short circuit protected)		
	(for SSR drive)	The same of the same process and		
	Direct current	4 - 20 mA DC (Resolution: 12000)		
	2000.000	Load resistance: Max. 550 Ω		
Event out	tput EV1			
	Relay contact	Control capacity: 3 A 250 V AC (resistive load)		
	1a	1 A 250 V AC (inductive load $\cos\phi$ =0.4)		
		Electrical life: 100,000 cycles		
		Minimum applicable load: 10 mA 5 V DC		
Event out	tput EV2			
	(DR) options]			
	Relay contact	Control capacity: 3 A 250 V AC (resistive load)		
	1a	1 A 250 V AC (inductive load cosφ=0.4)		
		Electrical life: 100,000 cycles		
		Minimum applicable load: 10 mA 5 V DC		
Event out	tput EV3			
(EV3D□, E	El options)			
	Relay contact	Control capacity: 3 A 250 V AC (resistive load)		
	1a	1 A 250 V AC (inductive load cos <i>Ф</i> =0.4)		
		Electrical life: 100,000 cycles		
		Minimum applicable load: 10 mA 5 V DC		
Control or	utput OUT2			
(EV2, EV3D	D□ options)			
Relay	contact 1a	Control capacity: 3 A 250 V AC (resistive load)		
[EV2, E	EV3(DR) options]	1 A 250 V AC (inductive load $\cos\phi$ =0.4)		
		Electrical life: 100,000 cycles		
		Minimum applicable load: 10 mA 5 V DC		
Non-co	ontact voltage	12 V DC±15 %		
(for SS	SR drive)	Max. 40 mA (short circuit protected)		
(DS, E\	/3DS options)			
Direct	current	4 – 20 mA DC (Resolution: 12000)		
	/3DA options)	Load resistance: Max. 550 Ω		
	sion output			
(EIT	Resolution	12000		
option)	Output	4 - 20 mA DC (Load resistance: Max. 550 Ω)		
	Output	Within ±0.3% of Transmission output span		
	accuracy			
	Response time	400 ms + Input sampling period (0%→90%)		
Insulated	power output			
(P24	Output voltage	24±3 V DC (when load current is 30 mA DC)		
option)	Ripple voltage	Within 200 mV DC (when load current is 30 mA DC)		
	Max. load	30 mA DC		
	current			

Power

Power			
Power supply	Model	PCB1_00	PCB1_10
	Power supply	100 – 240 V AC, 50/60 Hz	24 V AC/DC, 50/60 Hz
	Allowable	85 – 264 V AC	20 – 28 V AC/DC
	fluctuation range		
Power consumption	Power supply	Power cons	sumption
	100 – 240 V AC	Approx. 8 VA max. (When the	ne maximum number of
		options are ordered: Approx	z. 11 VA max.)
	24 V AC	Approx. 5 VA max. (When the	ne maximum number of
		options are ordered: Approx	z. 8 VA max.)
	24 V DC	Approx. 5 W max. (When th	e maximum number of
		options are ordered: Approx	8 W max.)
Inrush current	Power supply	Inrush c	urrent
	100 – 240 V AC	Max. 14 to 34 A	
	24 V AC	Max. 34 A	
	24 V DC	Max. 34 A	
Circuit insulation	When C5W or C	5 option is ordered:	
configuration			
		(8) (9) (10)) (11) (12)
		DI:	1
		DI	2
		¦ RS-4	l85
		i i L	
	(13)— DOWE	- Electrically	insulated
		K L	
	SUPPI	LY	
		-	CT1
	45	\lnot \mid \mid \mid \mid \mid	CT2 2
	OUT	.	
		' 🗍	-3
	(16)		
		_	
	17)	CPU	21)
	EV1		TC CO
	(18)		RTD (22)
		_	DC
	(19)—		(Input) (23)
	EV2		(, par,
	(20)— OUT:	2	-(24)
	(19)—	!	0-111
	P24	Wher	C5W option is ordered
	(20)—	· · · · · · · · · · · · · · · · · · ·	C5 option is ordered
			i oo option is ordered
		(Fig. 11.1-1)	
	When OUT1 and	OUT2 are a non-contact voltag	e output or direct current
		ot electrically insulated from \overline{O} nce: 10 M Ω minimum, at 500	
	เมอนเสมบา เยรเรโล	noo. To wise Hilliminum, at 500	, v DC





Recommended Environment

Ambient temperature	-10 to 55℃ (However, non-condensing or no icing)	
Ambient humidity	35 to 85 %RH (However, non-condensing)	
Environmental	RoHS directive compliant	
specification		
Altitude	2,000 m or less	

Performance

Base accur	асу	At ambient temperature 23℃ (for a single unit mounting)			
	Thermocouple	Within ±0.2% of each input span±1 digit			
		However, R, S inputs, 0 to 200° $\mathbb C$ (32 to 392° $\mathbb F$): Within ± 6 ° $\mathbb C$ (12° $\mathbb F$)			
		B input, 0 to 300℃ (32 to 572℉): Accuracy is not guaranteed.			
		K, J, E, T, N inputs, Less than $0^\circ\mathbb{C}$ (32°F): Within \pm 0.4% of input span			
		±1 digit			
	RTD	Within ±0.1% of each input span±1 digit			
	Direct current	Within ±0.2% of each input span±1 digit			
	DC voltage				
Effect of an	nbient	Within 50 ppm/℃ of each input span			
temperatur	е				
Input samp	ling period	125 ms			
Time indica	ntion accuracy	Within ±0.5% of setting time			
Setting	Temperature Thermocouple, RTD input without decimal point: 1℃ (℉)				
resolution		Thermocouple, RTD input with decimal point: 0.1℃ (℉)			
		DC voltage, current input: 1			
	Time	1 minute or 1 second			

General Structure

Weight		Approx. 220 g	
External d	External dimensions 96 x 96 x 68 (W x H x D) (Depth of control panel interior: 60 n		
Mounting	Mounting Flush (Applicable panel thickness: 1 to 7 mm)		
Case	Case Flame-resistant resin, Color: Black		
Front pan	el	Membrane sheet	
Drip-proof	f/Dust-proof	IP66 for front panel only	
Display	PV Display	In RUN mode, indicates process variable (PV).	
		In setting mode, indicates setting characters.	
		Flashes during Wait action or program control HOLD in program control.	
		7-segments Red LED display 4.5 digits	
		Character size: 24.0 x 11.0 mm (H x W)	
	SV Display	In RUN mode, indicates desired value (SV), Output manipulated	
		variable (MV), or Remaining time (TIME).	
		Retains display indication at power OFF.	
		In setting mode, indicates the set values.	
		7-segments Green LED display 4.5 digits	
		Character size:14.0 x 7.0 mm (H x W)	

	PTN/STEP	Indicates the pattern number or step number.
	Display	Each time the DISP key is pressed, the PTN/STEP Display and the
		PTN/STEP indicator alternately indicate the pattern number and step
		number.
		Flashes during Wait action, or when the step number is indicated.
		If 'SV digital reception' is selected in [Communication protocol],
		r is indicated.
		7-segments Orange LED display 1.5-digits
		Character size:14.0 x 7.0 mm (H x W)
Indicator	PTN indicator	Lights up when the pattern number is indicated on the PTN/STEP
		Display.
		Orange LED
	STEP indicator	Lights up when the step number is indicated on the PTN/STEP Display.
		Orange LED
	PTN/STEP	LED for the pattern number or step number lights up.
	indicator	Each time the DISP key is pressed, the PTN/STEP indicator and the
		PTN/STEP Display alternately indicate the pattern number and step
		number.
		Green LED 12 pieces (PTN, STEP, 1 to 10)
Action	OUT (Green)	Lights up when control output OUT1 is ON.
indicator		Lights up when Heating output [DS, DA, EV2 (if 🗓 🗗 is selected in
		Event output EV2 allocation), EV3D□ options] is ON.
		For direct current output type, flashes corresponding to the MV in 125
		ms cycles.
	RUN (Orange)	Lights up during program control RUN.
	EV4 (Dod)	Flashes during program control HOLD or Fixed value control.
	EV1 (Red)	Lights up when Event output EV1 is ON.
	EV2 (Red)	Lights up when Event output EV2 [(EV2, EV3(DR) options] is ON.
		Lights up when control output OUT2 [Cooling output: DS, DA, EV2 (if
		∷ 🗓 🗗 is selected in Event output EV2 allocation), EV3D□ options] is
		ON. For direct current output type (DA, EV3DA options), flashes
		corresponding to the MV in 125 ms cycles.
	EV3 (Red)	Lights up when Event output EV3 (EV3D□, EI options) is ON.
	AT (Orange)	Flashes while AT is performing.
		Lights up during Serial communication (C5W, C5 options)
	T/R (Orange)	TX (transmitting) output.
1	1	17. (transmitting) output.

Setting Structure

Setting Structure		_	,
Function key		UP key	In setting mode, increases the numerical value.
			By pressing for approx. 1 second during program
			control RUN, time progress pauses, and program
			control HOLD function initiates.
	\checkmark	DOWN key	In setting mode, decreases the numerical value.
	FAST	FAST key	In setting mode, makes the numeric value change
			faster.
			During program control RUN, makes step time
			progress 60 times faster.
	RST	RESET key	In setting mode, registers the setting data, and
			moves to RUN mode.
	MODE	MODE key	In setting mode, registers the setting data, and
			moves to the next setting item.
	PTN	PATTERN key	During program control STOP (in Standby),
			selects a program pattern number to perform or to
			set.
			By pressing this key during program control RUN,
			the unit moves to Monitor mode. In Monitor mode,
	5.05		switches the indication item.
	DISP	Display key	During RUN mode, the PTN/STEP Display and
			PTN/STEP indicator alternately indicates the
			pattern number and step number.
			In setting mode, registers the setting data, and moves back to the previous mode.
	RUN	RUN key	Performs program control, or cancels program
	I TOIN	NON KEY	control HOLD function while program control is
			held. By pressing for approx. 1 second during
			program control RUN, stops performing step, and
			proceeds to the next step (Advance function
			initiates.).
	STOP	STOP key	Stops program control by pressing for approx. 1
			second during program control RUN, or cancels
			pattern end output.

Program Performance

Number of patterns	10 patterns (Linkable)			
Number of steps	100 (10 steps/pattern)			
Number of repetitions	0 to 10000 times (Repetitions disabled when set to 0)			
Program time range	0 to 99 hours 59 minutes/step, or 0 to 99 minutes 59 seconds/step			
	(When is set: Fixed value control is performed using step SV.)			
Wait value	Thermocouple, RTD inputs: 0 to 20% of input span			
	DC voltage, current input: 0 to 20% of scaling span (The placement of			
	the decimal point follows the selection.)			
	(The Wait function is disabled when set to 0 or 0.0.)			

Control Performance

Control Periormance			
Control action	PID control action (with AT function)		
	PI control action (When derivative time is set to 0.)		
	PD control action (When integral time is set to 0.)		
	P control action (When integral and derivative time are set to 0.)		
	ON/OFF control action (When proportional band is set to 0 or 0.0.)		
OUT1 proportional	Thermocouple, RTD inputs without decimal point:		
band (P)	0 to Input span [℃] (℉)		
	Thermocouple, RTD inputs with decimal point:		
	0.0 to Input span℃ (℉)		
	DC voltage, current inputs:		
	0.0 to 1000.0%		
	(ON/OFF control action when set to 0 or 0.0.)		
Integral time (I)	0 to 3600 seconds (Setting the value to 0 disables the function.)		
Derivative time (D)	0 to 1800 seconds (Setting the value to 0 disables the function.)		
OUT1 proportional	0.5, 1 to 120 seconds		
cycle			
ARW	0 to 100%		
OUT1 ON/OFF	0.1 to 1000.0℃ (°F)		
hysteresis	DC voltage, current inputs:		
	1 to 10000 (The placement of the decimal point follows the selection.)		
OUT1 high limit,	0 to 100% (Direct current output: -5 to 105%)		
OUT1 low limit			

Standard Function

Wait function	During program control, the program does not proceed to the next step			
	until the deviation between PV and SV enters SV ± Wait value at the end			
	of step.			
	The PV Display and PTN/STEP Display flash while the Wait function			
	working.			
Program control HOLD	During program control RUN, progress of current step can be			
function	suspended.			
	During program control RUN, if the 🔼 key is pressed for approx. 1			
	second, the program control HOLD function is enabled.			
	While the program control HOLD function is working, the PV Display			
	and RUN indicator flash.			
	Pressing the RUN key cancels suspension, and program control			
	resumes.			
Advance function	Interrupts current step during program control RUN, and proceeds to the			
	beginning of the next step.			
	During program control RUN, if the RUN key is pressed for approx. 1			
	second, the Advance function is enabled.			
Pattern link and	Patterns 1 to 10 can be linked to the next pattern (of each pattern).			
repetitions function	For Pattern 10, Pattern 1 can be linked.			
	Number of repetitions for Patterns 1 to 10: 0 to 10000 times.			
	For repetitions of linked patterns, the whole linked pattern will be			
	repeated as many times as set for the former pattern.			
Step SV when program	Program control starts from the step SV set in [Step SV when program			
control starts	control starts].			

Program control start type	Selects program control start type. PV start:		
	Only when program control starts, the step SV is advanced to the PV,		
	then program control starts.		
	PVR start:		
	When program control starts and in pattern repeating, the step SV is		
	advanced to the PV, then program control starts.		
	SV start:		
	Program control starts from the step SV which has been set in		
	[Step SV when program control starts].		
Power restore action	If power fails during program control RUN, the controller can be		
	operated depending on the selection in [Power restore action].		
	Stops after power is restored:		
	Stops current program control, and returns to program control STOP		
	(in Standby).		
	Continues after power is restored:		
	Continues (Resumes) previous program control after power is		
	restored.		
	Suspends after power is restored:		
	Suspends (on hold) current program control, and performs Fixed		
	value control using the step SV at the time of suspension.		
	Pressing the RUN key cancels suspension, and program control		
	resumes.		
Ston time speed up	Progressing time error when power is restored: 1 minute or 1 second During program control RUN, makes step time progress 60 times faster		
Step time speed-up function	while the FAST key is pressed.		
If the Wait function is set, the Wait function has priority.			
Event output EV1	Output turns ON or OFF, depending on Event conditions selected in		
	[Event output EV1 allocation]:		
	Alarm output, Heater burnout alarm output, Loop break alarm output,		
	Time signal output, Output during AT, Pattern end output, Output by		
	communication command, RUN output		
Alarm action	Selects any alarm action in [Event output EV allocation] from the		
	following: High limit alarm, Low limit alarm, High/Low limits alarm, High/Low		
	limits independent alarm, High/Low limit range alarm,		
	High/Low limit range independent alarm, Process high alarm,		
	Process low alarm, High limit with standby alarm, Low limit with		
	standby alarm, High/Low limits with standby alarm, High/Low limits		
	with standby independent alarm		
	Alarm Energized/De-energized action are applied to the above alarms,		
	totaling 24 alarm types. No alarm action can also be selected.		
Set value	Factory default value: 0		
Action ON/OFF action			
Alarm hysteresis 0.1 to 1000.0°C (°F)			
	DC voltage, current inputs: 1 to 10000 (The placement of the decimal		
	point follows the selection.)		
Output EV output for which Alarm output (001 to 012) is selected in			
	output EV allocation].		

Loop break alarm	When Loop break alarm is selected in [Event output EV□ allocation], detects actuator trouble (heater burnout, heater adhesion) or sensor burnout.			
Loop break alarm time	0 to 200 minutes			
Loop break alarm band	Thermocouple, RTD inputs without decimal point: 0 to 150°C (°F) Thermocouple, RTD inputs with decimal point: 0.0 to 150.0°C (°F) DC voltage, current inputs: 0 to 1500 (The placement of the decimal point follows the selection.)			
Output	EV⊡ output for which Loop break alarm output is selected in [Event output EV⊡ allocation].			
Time signal output	When Time signal output is selected in [Event output EV allocation], Time signal output activates during Time signal output ON time within one pattern total time. Time signal output ON time follows Time signal output OFF time after the program control starts. During Wait action or program control HOLD, progress time of Time			
	signal output stops. When step time is changed during program control RUN, Time signal output timing is re-calculated using the pattern time after change.			
Output during AT	When 'Output during AT' is selected in [Event output EV☐ allocation], turns ON during AT.			
Pattern end output	When Pattern end output is selected in [Event output EV allocation], Pattern end output is turned ON during Pattern end output time after program control is finished, and the SV Display flashes P.F. B. By pressing the STOP key for approximately 1 second, Pattern end output is turned OFF, and the unit returns to program control STOP (in Standby). If Pattern end output time is set, Pattern end output is automatically turned OFF after Pattern end output time has expired. The unit returns to program control STOP (in Standby).			
RUN output	When 'RUN output' is selected in [Event output EV□ allocation], turns ON during program control RUN.			
Data clear function	During program control STOP (in Standby), if the , , and STOP keys (in that order) are pressed together for approx. 3 seconds, the PV Display indicates and the unit enters [Data clear Yes/No]. Select [Data clear Yes), and press the MODE key. The PV Display indicates in for approx. 3 seconds, and all data will return to factory default values.			

Attached Functions

Attached Functions				
Sensor correction coefficient	Sets slope of input value from a sensor.			
Sensor correction	Corrects the input value from a sensor.			
Set value lock	Locks the set values to prevent setting errors.			
Power failure countermeasure	The setting data is backed up in the non-volatile IC memory.			
Self-diagnosis	The CPU is monitored by a watchdog timer, and if an abnormal status occurs, the controller is switched to warm-up status, turning all outputs OFF.			
Automatic cold junction	Detects the temperature at the connection terminal between the			
temperature	thermocouple and the instrument, and maintains it at the same status as			
compensation	if the reference junction location temperature were at 0° C (32°F).			
Indication range,	Thermocouple input:			
Control range	[Input range low limit value – 50°C (100°F)] to			
- Common range	[Input range high limit value + 50°C (100°F)]			
	RTD input:			
	[Input range low limit value – (Input span x 1%)] to			
	[Input range high limit value + 50°C (100°F)]			
	DC voltage, current inputs:			
	[Scaling low limit value – (Scaling span x 1%)] to			
	[Scaling high limit value + (Scaling span x 10%)]			
Input error (Overscale,	If input errors (overscale, underscale) occur, the following will be			
Underscale)	performed depending on the selection in [Error indication].			
	If 'Disabled' is selected in [Error indication]:			
	Overscale occurs if PV has exceeded Input range high limit value			
	(Scaling high limit value for DC voltage, current inputs). The PV Display indicates PV.			
	Underscale occurs if PV has dropped below Input range low limit value			
	(Scaling low limit value for DC voltage, current inputs). The PV Display			
	indicates PV.			
	If 'Enabled' is selected in [Error indication]:			
	Overscale occurs if PV has exceeded Input range high limit value			
	(Scaling high limit value for DC voltage, current inputs). The PV Display indicates the PV and error code $E r \Box \Xi$ alternately.			
	Underscale occurs if PV has dropped below Input range low limit value			
	(Scaling low limit value for DC voltage, current inputs). The PV Display indicates the PV and error code $E r \Box E$ alternately.			

Burnout

If burnout occurs, the following will be performed depending on the selection in [Error indication].

If 'Disabled' is selected in [Error indication]:

If PV has exceeded Indication range and Control range, the PV Display flashes . OUT1 and OUT2 are turned OFF (OUT1 low limit value for direct current output, OUT2 low limit value for DA, EV3DA).

If PV has dropped below Indication range and Control range, the PV Display flashes _ _ _ _ .

OUT1 and OUT2 are turned OFF (OUT1 low limit value for direct current output, OUT2 low limit value for DA, EV3DA).

If thermocouple or RTD input is burnt out, or if DC voltage (0 - 1 V DC) input is disconnected, the PV Display flashes

If the following DC voltage or current input is disconnected:

- 4 20 mA DC, 1 5 V DC inputs: The PV Display flashes ____.
- 0-20 mA DC, 0-5 V DC, 0-10 V DC inputs: The PV Display indicates the value corresponding with 0 mA DC or 0 V DC input.

If Alarm output, Heater burnout alarm output or Loop break alarm output is selected in [Event output EV allocation], Event output will be turned ON under the alarm active conditions.

Burnout is enabled even in program control STOP (in Standby) status. However, Event output is not turned ON.

[Output status when input errors occur] can be used only for controllers using direct current and voltage inputs, and direct current output.

Output status differs depending on selection in [Output status when input errors occur].

Output		Output Status			
status	Contents,	OUT1		OUT2	
when input	Indication	Direct (Cooling)	Reverse (Heating)	Direct (Cooling)	Reverse (Heating)
errors occur		action	action	action	action
on	[]	ON (20 mA) or OUT1 high limit value (*)	OFF (4 mA) or OUT1 low limit	OFF or OUT2 low limit	ON or OUT2 high limit value (*)
oFF.	flashes.	OFF (4 mA) or OUT1 low limit value	value	value	OFF or OUT2 low limit value
an	[]	OFF (4 mA) or OUT1 low limit	ON (20 mA) or OUT1 high limit value (*)	ON or OUT2 high limit value (*)	OFF or OUT2 low limit
oFF	flashes.	value	OFF (4 mA) or OUT1 low limit value		value

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

If 'Enabled' is selected in [Error indication]:

If PV has exceeded Indication range and Control range, the PV Display indicates and Erll alternately. OUT1 and OUT2 are turned OFF (OUT1 low limit value for direct current output, OUT2 low limit value for DA, EV3DA).

If PV has dropped below Indication range and Control range, the PV Display indicates _ _ _ and £ - ☐ alternately. OUT1 and OUT2 are turned OFF (OUT1 low limit value for direct current output, OUT2 low limit value for DA, EV3DA).

If thermocouple, RTD or DC voltage (0 to 1 V DC) input is burnt out or disconnected, the PV Display indicates and ErD7 alternately.

If the following DC voltage or current input is disconnected:

- 4-20 mA DC, 1-5 V DC inputs: The PV Display indicates 2-2-2 and 2-2-3 alternately.
- 0 20 mA DC, 0 5 V DC, 0 10 V DC inputs: The PV Display indicates the value corresponding with 0 mA DC or 0 V DC input.

If Alarm output, Heater burnout alarm output or Loop break alarm output is selected in [Event output $EV \square$ allocation], Event output will be turned ON under the alarm active conditions.

Burnout is enabled even in program control STOP (in Standby) status. However, Event output is not turned ON.

[Output status when input errors occur] can be used only for controllers using direct current and voltage inputs, and direct current output.

Output status differs depending on selection in [Output status when input errors occur].

Output		Output Status			
status	Contents,	OUT1		OUT2	
when input	Indication	Direct (Cooling)	Reverse (Heating)	ν σ,	Reverse (Heating)
errors occur		action	action	action	action
Da	Indicates	ON (20 mA) or OUT1 high limit value (*)	OFF (4 mA) or OUT1 low limit	OFF or OUT2 low limit	ON or OUT2 high limit value (*)
oFF.	[E - []] alternately.	OFF (4 mA) or OUT1 low limit value	value	value	OFF or OUT2 low limit value
<u>o</u> n	Indicates [] and [E-D] alternately.	OFF (4 mA) or OUT1 low limit	ON (20 mA) or OUT1 high limit value (*)	ON or OUT2 high limit value (*)	OFF or OUT2 low limit
oFF		value	OFF (4 mA) or OUT1 low limit value	OFF or	value

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

and GGTT (GF GGTZ) riight limit value, depending on deviation.			
Warm-up indication	After the power supply to the instrument is turned on, the PV Display indicates the input type, and SV Display indicates input range high limit value (for thermocouple, RTD inputs) or scaling high limit value (for direct current and voltage inputs) for approximately 3 seconds. Control output is OFF (0 mA for direct current output), and Transmission output is 0 mA.		
Console communication	By connecting to the tool cable (CMD-001, sold separately) to the Console connector, the following operations can be conducted from an external computer, using the Console software SWC-PCB101M. Console communication and Serial communication (C5W, C5 options) cannot be used together. (1) Reading and writing of step SV, step time, PID and various set values (2) Reading of PV and action status (3) Function change Communication line: TTL level		

Other

Accessories included	Mounting brackets: 1 set		
	Instruction manual (excerpt): 1 copy		
Accessories sold	Terminal cover		
separately	CT (Current transformer):		
	CTL-6-S-H (For Heater burnout alarm output 20 A)		
	CTL-12-S36-10L1U (For Heater burnout alarm output 100 A)		
	Tool cable CMD-001		

11.2 Optional Specifications

	•				
Event output EV2		Output will be turned ON or OFF depending on the Event conditions			
[EV2, EV3(DR) options]		selected in [Event output EV2 allocation].			
-	• () •	One output can be selected from the following:			
		Alarm output, Heater burnout alarm output, Loop break alarm output,			
		Time signal output, Output during AT, Pattern end output, Output by			
		communication command, RUN output, Heating/Cooling control			
		Relay contact output			
Н	eating/Cooling control	Performs Heating/Cooling control.			
	utput [EV2(DR), DS, DA,				
E	V3D options]				
	OUT2 proportional	Thermocouple, RTD inputs without decimal point: 0 to Input span $^{\circ}$ (F)			
	band	Thermocouple, RTD inputs with decimal point: 0.0 to Input span°C (F)			
		DC voltage, current inputs: 0.0 to 1000.0%			
		(ON/OFF control when set to 0.0)			
	Integral time (I)	0 to 3600 seconds (Setting to 0 disables the function.)			
		(Same as OUT1 integral time)			
	Derivative time (D)	0 to 1800 seconds (Setting to 0 disables the function.)			
		(Same as OUT1 derivative time)			
	OUT2 proportional cycle	0.5, 1 to 120 seconds			
	Overlap/Dead band	Thermocouple, RTD inputs:			
		-200.0 to 200.0°C (°F)			
		DC voltage, current inputs:			
		-2000 to 2000 (The placement of the decimal point follows the selection.)			
	OUT2 ON/OFF	Thermocouple, RTD inputs:			
	hysteresis	0.1 to 1000.0℃ (℉)			
		DC voltage, current inputs:			
		1 to 10000 (The placement of the decimal point follows the selection.)			
	OUT2 high limit,	0 to 100% (DA, EV3DA: –5 to 105%)			
	OUT2 low limit				
	OUT2 cooling method	(1) Air cooling (Linear characteristics)			
		(2) Oil cooling (1.5th power of the linear characteristics)			
-		(3) Water cooling (2nd power of the linear characteristics)			
	sulated power output 24 option)				
۱,	Output voltage	24±3 V DC (when load current is 30 mA DC)			
	Ripple voltage	Within 200 mV DC (when load current is 30 mA DC)			
	Max. load current	30 mA DC			
_		Output will be turned ON or OFF depending on the Event conditions			
	vent output EV3 EV3D=, El options)	selected in [Event output EV3 allocation].			
(1	=v3D≘, ⊏i options)	One output can be selected from the following:			
		Alarm output, Heater burnout alarm output, Loop break alarm output,			
		Time signal output, Output during AT, Pattern end output, Output by			
		communication command, RUN output			
S	erial communication	The following operations can be carried out from an external computer.			
	C5W, C5 options)	(1) Reading and writing of the step SV, step time, PID values and various			
,,	7011, 00 optionoj	set values			
		(2) Reading of the PV and action status (3) Function change			
		EIA RS-485			
		Half-duplex communication			
		9600, 19200, 38400 bps (Selectable by keypad)			
	Synchronization method	Start-stop synchronization			
	Start-stop synchronization				

Commu	inication ol	Shinko protocol, SV digital transmission, SV digital reception, Modbus ASCII mode, Modbus RTU mode (Selectable by keypad) Communication converter IF-400 is available for Shinko protocol and Modbus protocol.				
Data bit	/Parity	Data bit: 7, 8 (Selectab	• • • •			
		<u> </u>	parity (Selectable by key	pad)		
Stop bit		1, 2 (Selectable by keypad)				
Data format	Communication Protocol	Shinko Protocol	Modbus ASCII	Modbus RTU		
Torride	Start bit	1	1	1		
	Data bit	7 (8)	7 (8)	8		
		Selectable	Selectable	-		
	Parity	Even (No parity, Odd) Selectable	Even (No parity, Odd) Selectable	No parity (Even, Odd) Selectable		
	Stop bit	1 (2) Selectable	1 (2) Selectable	1 (2) Selectable		
Kespon	se delay time	Response from the controller can be delayed after receiving command from the host computer. If Response delay time is changed via software communication, the changed delay time will be reflected from that response data. • Setting range: 0 to 1000 ms				
SV digital f	When 'SV digital transmission (Shinko protocol)' is selected in [Communication protocol], step SV can be digitally transmitted to connected Shinko digital indicating controllers with the communication (C5 option). When 'SV digital reception (Shinko protocol)' is selected in [Communication protocol], step SV can be received via SVTC command from the connected Shinko programmable controllers PCA1 or PCB1 (on which 'SV digital transmission' should be selected in [Communication protocol]).			ally transmitted to the with the communication selected in vived via SVTC mable controllers		
PCE	31	Controllers with	communication function	(Max. 31 units)		
YA(-	-) 10	YA(-)	YA(-)	YA(-)		
YB(+	+) ①	YB(+)	YB(+)	YB(+)		
So	G 12	SG —	SG	SG		
	(Fig. 11.2-1)					

Heater burnout alarm	Monitors heater current with CT (current transformer), and detects
(C5W, EIW, W options)	heater burnout.
(COVV, LIVV, VV options)	EV output, for which Heater burnout alarm is selected in [Event output
	EV allocation], will be turned ON or OFF.
	-
Γ	This alarm is also activated when the input is burnt out.
Rated current:	20 A, 100 A (Must be specified when ordering.)
	Single-phase: Detects burnout with CT1 input.
	3-phase: Detects burnout with CT1 and CT2 inputs.
Setting accuracy	±5% of the rated current
Transmission output	Converting the value (PV, SV or MV transmission) to analog signal
(EIT option)	every 125 ms, outputs the value in current.
	Outputs Transmission output low limit value if Transmission output
	high limit and low limit value are the same.
	If SV or MV transmission is selected, 4 mA is output during program
	control STOP (in Standby).
Event input	Action can be switched by event conditions selected in [Event input
(C5W, EIW, EIT, C5, EI	DI allocation].
options)	One function can be selected from the following:
	Pattern number selection, Direct/Reverse action, Program control
	RUN/STOP, Program control Holding/Not holding, Program control
	Advance function
	Signal edge action from OFF to ON / ON to OFF is engaged.
	However, when power is turned ON, level action is engaged except
	Program control Advance function.

12. Troubleshooting

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

Moreover, the instrument must be grounded before the power supply to the instrument is

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

12.1 Indication

Problem	Possible Cause	Solution
The PV Display indicates ₣ ♬ ;.	Internal non-volatile IC memory is defective.	Cancel the error code by pressing the MODE key, and perform data clearing.(p.90) If the problem is not still solved after power is turned ON again, contact our agency or us.
The PV Display indicates E - 02.	Data writing (in non-volatile IC memory) error when power failure occurs.	Cancel the error code by pressing the MODE key, and execute data clearing. (P.90)
The PV Display indicates PV and E - U5 (*) alternately.	Overscale. PV has exceeded Input range high limit value (scaling high limit value for DC voltage, current inputs).	Check the input signal source.
The PV Display indicates PV and E - U5 (*) alternately.	Underscale. PV has dropped below Input range low limit value (scaling low limit value for DC voltage, current inputs).	Check the input signal source and wiring of input terminals.
The PV Display flashes	PV has exceeded the Indication range and Control range.	Check the input signal source.
The PV Display indicates and F [] (*) alternately.	Burnout of thermocouple, RTD or disconnection of DC voltage (0 to 1 V DC)	Replace each sensor. How to check whether the sensor is burnt out: [Thermocouple] If the input terminals of the instrument are shorted, and if a value around room temperature is indicated, the instrument is likely to be operating normally, however, the sensor may be burnt out. [RTD] If approx. $100 \ \Omega$ of resistance is connected to the input terminals between A-B of the instrument and between B-B is shorted, and if a value around $0^{\circ}C$ ($32^{\circ}F$) is indicated, the instrument is likely to be operating normally, however, the sensor may be burnt out. [DC voltage (0 to 1 V 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.

(*) Available when 'Enabled' is selected in [Error indication].

Problem	Possible Cause	Solution
	Check whether the input terminals	Connect the sensor terminals to the
	of thermocouple, RTD or DC	instrument input terminals securely.
	voltage (0 to 1 V DC) are securely	-
	mounted to the instrument input	
	terminals.	
The PV Display	PV has dropped below the	Check the input signal source and wiring of
flashes [].	Indication range and Control	input terminals.
	range.	·
The PV Display	Check whether input signal wire	How to check whether the input signal
indicates []	for direct current (4 to 20 mA DC)	wire is disconnected:
and [੬ੵੵਜ਼ੵੑੵੑੵੑ] (*)	or DC voltage (1 to 5 V DC) is	[Direct current (4 to 20 mA DC)]
alternately.	disconnected.	If the input to the input terminals of the
		instrument is 4 mA 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 voltage (1 to 5 V DC)]
		If the input to the input terminals of the
		instrument is 1 V DC and if a scaling low
		limit value is indicated, the instrument is
		likely to be operating normally, however, the
	Charle what has inner their and wine for	signal wire may be disconnected.
	Check whether input signal wire for	Connect the input signal wire to the terminals
	direct current (4 to 20 mA DC) or DC	of this instrument securely.
	voltage (1 to 5 V DC) is securely	
	connected to the instrument input	
	terminals.	NAC Al
	Check if polarity of thermocouple or compensating lead wire is	Wire them correctly.
	correct.	
	Check whether codes (A, B, B) of	
	RTD agree with the instrument	
	terminals.	
The PV Display	Hardware malfunction	Contact our agency or us.
indicates [E r 12].		
The indication of	Check whether sensor input or	Select the sensor input and temperature
PV Display is	temperature unit (°C or °F) is	unit (°C or °F) correctly.
irregular or	correct.	·
unstable.	Sensor correction coefficient or	Set them to suitable values.
	Sensor correction value is	
	unsuitable.	
	Check whether the sensor	Use a sensor with appropriate
	specification is correct.	specifications.
	AC leaks into the sensor	Use an ungrounded type sensor.
	circuit.	
	There may be equipment that	Keep the instrument clear of any potentially
	interferes with or makes noise near	disruptive equipment.
	the instrument.	

^(*) Available when 'Enabled' is selected in [Error indication].

Problem	Possible Cause	Solution
The PV Display	Check whether the input signal	Check the input signal wires of direct
keeps indicating	wire for direct current (0 to 20 mA	current (0 to 20 mA DC) and DC voltage
the value set in	DC) and DC voltage (0 to 5 V DC,	(0 to 5 V DC, 0 to 10 V DC).
[Scaling low limit].	0 to 10 V DC) is disconnected.	How to check whether the input signal
		wire is disconnected:
		[Direct current (0 to 20 mA DC)]
		If the input to the input terminal of this
		controller is 4 mA DC, and if a value
		(converted value from scaling high, low limit
		setting) corresponding to 4 mA DC is
		indicated, the controller is likely to be
		operating normally, however, the input
		signal wire may be disconnected.
		[DC voltage (0 to 5 V DC, 0 to 10 V DC)]
		If the input to the input terminal of this
		controller is 1 V DC, and if a value
		(converted value from scaling high, low
		limit setting) corresponding to 1 V DC is
		indicated, the controller is likely to be
		operating normally, however, the input
		signal wire may be disconnected.
	Check whether the input terminals	Connect the input terminals of direct current
	for direct current (0 to 20 mA DC)	or DC voltage to the input terminals of this
	or DC voltage (0 to 5 V DC, 0 to 10	instrument securely.
	V DC) are securely connected to	
	the instrument input terminals.	

12.2 Key Operation

Problem	Possible Cause	Solution
The following values cannot be	Set value lock (Lock 1 or Lock 4) is selected.	Release the lock in [Set value lock].
set: Step SV, step time, OUT1 proportional band, EV alarm value, etc.	AT is performing.	Cancel AT.
Only step SV, step time and EV alarm value can be set. Other settings are not possible.	Set value lock (Lock 2 or Lock 5) is selected.	Release the lock in [Set value lock].
The setting indication does not change in the input range, and new values are unable to be set.	Scaling high or low limit value may be set at the point where the value does not change.	Set it to a suitable value.
A pattern number cannot be selected by the PTN key.	A pattern number might be selected by means of Event input. The pattern number selected via Event input has priority over a pattern number selected by the PTN key.	Open (OFF) the SG terminal and any one terminal of Event input (DI1, DI2).

12.3 Control

Problem	Possible Cause	Solution
Even though	The step time of the performing	Set the step time to a suitable value.
program control	pattern number is set to 00:00.	
is executed, the		
control is advanced		
and the program is		
finished soon.		
Step does not	Program control is suspended	Press the RUN key.
progress.	(program control HOLD function).	Suspension of control will be cancelled, and
	While program control is	program control will resume.
	suspended, the PV Display and	
	RUN indicator flash.	
	The Wait function is working.	Press the RUN key for approx. 1 second
	If the Wait function works, the	to cancel the Wait function.
	PV Display and PTN/STEP	The Wait function will be cancelled,
	Display flash.	and program control will resume.
PV does not rise or	Sensor is out of order.	Replace the sensor.
fall.	Check whether the sensor or	Ensure that the sensor or control output
	control output terminals are	terminals are mounted to the instrument
	securely mounted to the	input terminals securely.
	instrument input terminals.	
	Check whether the wiring of	Wire them correctly.
	sensor or control output terminals	
	is correct.	
Control output	OUT1 or OUT2 low limit value is set	Set it to a suitable value.
OUT1 or OUT2	to 100% or higher.	
remains in an ON		
status.	OUT4 OUT01: 1 " " 1	
The control output	OUT1 or OUT2 high limit value is	Set it to a suitable value.
OUT1 or OUT2 remains in an OFF	set to 0% or less.	
status.		
The PV Display	AT has not been completed even if	Manually set P, I, D and ARW values.
indicates En EQ	approx. 4 hours have elapsed	Mandally Soci , i, D and Artiv values.
maicates £, ££.	since AT started.	
	SILICE AT STATEM.	

13. Character Table

Explanation of Setting Item

(e.g.) Setting Step 1 SVUpper left: PV Display

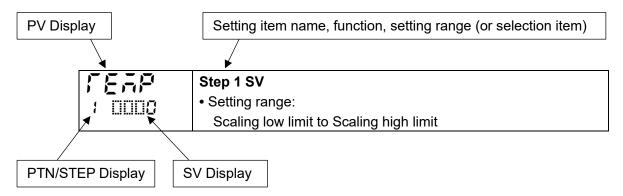
Indicates setting item characters.

Lower left: PTN/STEP Display, SV Display

The PTN/STEP Display indicates the selected pattern number, and indication is different depending on the setting item.

The SV Display indicates factory default.

Right side: Indicates the setting item, explanation of its function, and setting range.



13.1 Error Code

Error codes are indicated on the PV Display.

Error Code	Error Contents	Occurrence
E-D 	Internal non-volatile IC memory (EEPROM) is defective.	When power is turned ON
E-D2 : 0500(*1)	Data writing error when power failure occurs.	When power is turned ON
F-05 : 0500 (*2)	PV has exceeded Input range high limit value (Scaling high limit value for DC voltage, current inputs).	When operating
F-DB 0500(*2)	PV has dropped below Input range low limit value (Scaling low limit value for DC voltage, current inputs).	When operating
E-07 1 0500 (*2)	Input burnout or disconnection. Input value is outside of the Indication range and Control range.	When operating
E- 10 1 0500	Hardware malfunction or errors (This error cannot be cancelled.)	When operating
E-20 : 0500 _(*1)	AT has not been completed even if approx. 4 hours have elapsed since AT started. When input errors have occurred.	After AT starts

^(*1) Can be cancelled by the MODE key.

^(*2) An error code is indicated when Enabled is selected in [Error indication].

13.2 Pattern Setting Mode

Characters,	Setting Item, Setting Range	Data
Factory Default	Stan 4 SV	
reap	Step 1 SV Scaling low limit to Scaling high limit	
1 0000	Scaling low little to Scaling riight little	
PTN/STEP		
indicator 1 lights.		
	Step 1 time	
: 00:00	, 00:00 to 99.59 (Time unit follows the selection in [Step time	
PTN/STEP	unit].)	
indicator 1 lights.	If the w key is pressed at 00:00, will be indicated.	
<u> </u>	If is set, Fixed value control will be performed using Step 1 SV.	
_ }-'/' _='	Step 1 PID block number	
1 000 1	1 to 10	
PTN/STEP		
indicator 1 lights.		
FEAP	Step 2 SV	
: 0008	Scaling low limit to Scaling high limit	
PTN/STEP		
indicator 2 lights.		
{``} \\ \\	Step 2 time	
1 0000	, 00:00 to 99.59 (Time unit follows the selection in [Step time	
PTN/STEP	unit].)	
indicator 2 lights.	If the ☑ key is pressed at 00:00, will be indicated.	
	If is set, Fixed value control will be performed using Step 2 SV.	
	Step 2 PID block number	
{ DDD {	1 to 10	
PTN/STEP		
indicator 2 lights.		
<u>reap</u>	Step 3 SV	
	Scaling low limit to Scaling high limit	
PTN/STEP		
indicator 3 lights.		
[] [] [] [] [] [] [] [] [] []	Step 3 time	
; asaa	, 00:00 to 99.59 (Time unit follows the selection in [Step time	
PTN/STEP	unit].)	
indicator 3 lights.	If the w key is pressed at 00:00, will be indicated.	
	If is set, Fixed value control will be performed using Step 3 SV.	
	Step 3 PID block number	
	1 to 10	
PTN/STEP		
indicator 3 lights.		

Characters,	Setting Item, Setting Range	Data
Factory Default	Step 4 SV	
	Scaling low limit to Scaling high limit	
: 0008	Godining fow infinit to Godining ringin infinit	
PTN/STEP		
indicator 4 lights.	Cton 4 time	
IT AE	Step 4 time	
: 8888	, 00:00 to 99.59 (Time unit follows the selection in [Step time	
PTN/STEP	unit].)	
indicator 4 lights.	If the w key is pressed at 00:00, will be indicated. If is set, Fixed value control will be performed using Step 4 SV.	
) <u></u>	Step 4 PID block number	
_ F1 _ d	1 to 10	
	1 10 10	
PTN/STEP		
indicator 4 lights.	Otan 5 OV	
reap	Step 5 SV	
	Scaling low limit to Scaling high limit	
PTN/STEP		
indicator 5 lights.		
	Step 5 time	
: 8888	, 00:00 to 99.59 (Time unit follows the selection in [Step time	
PTN/STEP	unit].)	
indicator 5 lights.	If the <u></u> key is pressed at 00:00, ¬¬¬¬ will be indicated.	
—	If is set, Fixed value control will be performed using Step 5 SV.	
_	Step 5 PID block number	
	1 to 10	
PTN/STEP		
indicator 5 lights.		
<u>reap</u>	Step 6 SV	
: 0000	Scaling low limit to Scaling high limit	
PTN/STEP		
indicator 6 lights.		
[] AE	Step 6 time	
1 0000	, 00:00 to 99.59 (Time unit follows the selection in [Step time	
PTN/STEP	unit].)	
indicator 6 lights.	If the ☑ key is pressed at 00:00, will be indicated.	
_	If is set, Fixed value control will be performed using Step 6 SV.	
	Step 6 PID block number	
	1 to 10	
PTN/STEP		
indicator 6 lights.		

Data	Setting Item, Setting Range	Characters,
	tory Default	Factory Default
	Scaling low limit to Scaling high limit	
	/STEP	PTN/STEP
	ator 7 lights.	indicator 7 lights.
	Step 7 time	{^} ; ĀE
	7 - 7, 00:00 to 99.59 (Time unit follows the selection in [Step time	1 00:00
	/STEP unit].)	PTN/STEP
	atter i ng.tter	indicator 7 lights.
	1 to 10	1 000 1
	/STEP	PTN/STEP
	eator 7 lights.	indicator 7 lights.
	Step 8 SV	
	Cooling Love limit to Cooling blind limit	_
		indicator 8 lights.
	Step 8 time	[: 5F
	= = = 00.00 to 00 FO /Time unit follows the collection in [Ctan time	_
	unit1\	
	If the selection proceed at 00.00 = = = = will be indicated	
	If is set, Fixed value control will be performed using Step 8 SV.	
	Step 8 PID block number	F: ,-:
	1 to 10	
	Step 9 SV	<u> </u>
	O = 10 = 1 = 1 = 1 = 10 = 10 = 10 = 10 =	
1		[] [] []
	The second to th	ייים אינים אינ
	unit)	
	If the life key is presented at 00:00 = = = will be indicated	
	If is set, Fixed value control will be performed using Step 9 SV.	
		₽\ .d
	1 to 10	
	initialist *	
	/STEP	indicator 9 lights.
	If the wey is pressed at 00:00, will be indicated. If is set, Fixed value control will be performed using Step 7 SV. Step 7 PID block number 1 to 10 Step 8 SV Scaling low limit to Scaling high limit Step 8 time, 00:00 to 99.59 (Time unit follows the selection in [Step time unit].) If the key is pressed at 00:00, will be indicated. If is set, Fixed value control will be performed using Step 8 SV. Step 8 PID block number 1 to 10 Step 8 PID block number 1 to 10 Step 8 PID block number 1 to 10 Step 9 SV Scaling low limit to Scaling high limit Step 9 SV Scaling low limit to Scaling high limit Step 9 SV Scaling low limit to Scaling high limit Step 9 SV Scaling low limit to Scaling high limit Step 9 SV Scaling low limit to Scaling high limit Step 9 SV Step 9 Sights. The condition of the condits of the condition of the condition of the condition of the cond	PTN/STEP indicator 8 lights. PTN/STEP indicator 8 lights. PTN/STEP indicator 8 lights. PTN/STEP indicator 8 lights. PTN/STEP indicator 9 lights. PTN/STEP indicator 9 lights.

Characters,		Sotting Itom Sotting Pango	Data
Factory Default		Setting Item, Setting Range	Dala
reap	Step 10 SV	/	
	Scaling I	ow limit to Scaling high limit	
PTN/STEP			
indicator 10 lights.			
[] AE	Step 10 tir	me	
1 0000	,	00:00 to 99.59 (Time unit follows the selection in [Step time	
PTN/STEP	unit].)		
indicator 10 lights.	If the [⊌	key is pressed at 00:00, will be indicated.	
J	If	is set, Fixed value control will be performed using Step 10 SV.	
	Step 10 PI	D block number	
7 0001	1 to 10		
PTN/STEP			
indicator 10 lights.			
-EP!	Number of	f repetitions	
	0 to 1000	00	
PTN/STEP			
indicator turns off.			
chi n	Pattern link		
		Pattern link Disabled	
PTN/STEP	c∺ n	Pattern link Enabled	
indicator turns off.			

13.3 Event Setting Mode

Characters, Factory Default	Setting Item, Setting Range	Data
	EV1 alarm value	
# 1008	High limit alarm Low limit alarm -(Input span) to Input span (*1) High/Low limits alarm High/Low limits independent alarm High/Low limit range alarm High/Low limit range independent alarm O to Input span (*1) High/Low limit range independent alarm High/Low limit range independent alarm O to Input span (*1) High/Low limit range independent alarm O to Input span (*1) Process high alarm Input range low limit to Input range high limit (*2) Process low alarm Input range low limit to Input range high limit (*2) High limit with standby alarm -(Input span) to Input span (*1) Low limit with standby alarm -(Input span) to Input span (*1) High/Low limits with standby alarm O to Input span (*1) High/Low limits with standby independent alarm O to Input span (*1) (*1) For DC voltage, current inputs, the input span is the same as the scaling span. (The placement of the decimal point follows the selection.) (*2) For DC voltage, current inputs, input range low (or high) limit value is the same as scaling low (or high) limit value. (The placement of the decimal point follows the selection.)	
	Available when 🗓 🗓 🕻 (High limit alarm) to 🗓 🖟 (High/Low limits with standby	
	independent alarm) is selected in [Event output EV1 allocation].	
# ## <u> </u>	EV1 high limit alarm value Setting range: Same as those of EV1 alarm value. Available when IDDH (High/Low limits independent alarm), IDDE (High/Low limit range independent alarm) or IDHE (High/Low limits with standby independent alarm) is selected in [Event output EV1 allocation].	
[lof : 0000	TS1 output OFF time Setting range: 00:00 to 99:59 (Time unit follows the selection in [Step time unit].) Available when III 15 (Time signal output) is selected in [Event output EV1 allocation].	
/ lon : 0000	TS1 output ON time Setting range: 00:00 to 99:59 (Time unit follows the selection in [Step time unit].) Available when III (Time signal output) is selected in [Event output EV1 allocation].	
#200 : 000	EV2 alarm value Setting range: Same as those of EV1 alarm value. Available when IIII (High limit alarm) to III II (High/Low limits with standby independent alarm) is selected in [Event output EV2 allocation].	
#2# <u> </u> 0000	EV2 high limit alarm value Setting range: Same as those of EV1 alarm value. Available when IDDH (High/Low limits independent alarm), IDDE (High/Low limit range independent alarm) or IDHE (High/Low limits with standby independent alarm) is selected in [Event output EV2 allocation].	

Characters, Factory Default	Setting Item, Setting Range	Data
12eF :0000	TS2 output OFF time Setting range: 00:00 to 99:59 (Time unit follows the selection in [Step time unit].) Available when III 15 (Time signal output) is selected in [Event output EV2 allocation].	
/ 200 / 0000	TS2 output ON time Setting range: 00:00 to 99:59 (Time unit follows the selection in [Step time unit].) Available when (Time signal output) is selected in [Event output EV2 allocation].	
#300 : 0000	EV3 alarm value Setting range: Same as those of EV1 alarm value. Available when IIII (High limit alarm) to III IE (High/Low limits with standby independent alarm) is selected in [Event output EV3 allocation].	
#3# <u> </u> 0000	EV3 high limit alarm value Setting range: Same as those of EV1 alarm value. Available when IDDH (High/Low limits independent alarm), IDDE (High/Low limit range independent alarm) or IDHE (High/Low limits with standby independent alarm) is selected in [Event output EV3 allocation].	
; 3eF : 0000	TS3 output OFF time Setting range: 00:00 to 99:59 (Time unit follows the selection in [Step time unit].) Available when 115 (Time signal output) is selected in [Event output EV3 allocation].	
/ 3en : 0000	TS3 output ON time Setting range: 00:00 to 99:59 (Time unit follows the selection in [Step time unit].) Available when III 15 (Time signal output) is selected in [Event output EV3 allocation].	

13.4 Control Parameter Setting Mode

Characters, Factory Default	Setting Item, Setting Range						
Factory Delault	AT Perform	n/Cancel					
		AT Cancel					
	AC III	AT Perform					
Pale	PID block						
I	1 to 10						
7		portional band					
: 00 :0	Setting ran	_					
		Thermocouple, RTD input without decimal point: 0 to input span [°] C (F) Thermocouple, RTD input with decimal point: 0.0 to input span [°] C (F)					
		ge, current inputs: 0.0 to 1000.0%					
) I''II''I	Integral tin	•					
	_	nge: 0 to 3600 seconds					
1 0200							
₫	Derivative						
: 0050	Setting rai	nge: 0 to 1800 seconds					
8-50	ARW						
1 0050	Setting rai	nge: 0 to 100%					
<u></u>	OUT1 prop	portional cycle					
	Setting rai	nge: 0.5, 1 to 120 seconds					
	Available v	when OUT1 is relay contact output or non-contact voltage output type.					
H45	OUT1 ON/	OUT1 ON/OFF hysteresis					
	_	Setting range:					
		0.1 to 1000.0℃ (℉)					
	DC volta	DC voltage, current inputs: 1 to 10000 (The placement of the decimal					
		point follows the selection.)					
	_	OUT1 high limit					
0 0 100	Setting rai	_					
		ow limit to 100%					
, , ::		urrent output type: OUT1 low limit to 105%					
oll	OUT1 low						
	Setting rai	nge: JUT1 high limit					
		urrent output type: -5% to OUT1 high limit					
		OUT1 rate-of-change Setting range: 0 to 100 %/sec					
cAcl		ing method					
0 8% -0	88 - 0	Air cooling (Linear characteristics)					
	0/10	Oil cooling (1.5th power of the linear characteristics)					
	JACO	Water cooling (2nd power of the linear characteristics)					
		hen EV2 option (if "IDDD Heating/Cooling control output" is selected					
	_	tput EV2 allocation]) is ordered, or when DS, DA or EV3D option is					
	ordered.						

Characters, Factory Default		Setting Item, Setting Range	Data				
PLB	OUT2 prop	portional band					
	Setting rar	nge:					
·	Thermoo	ouple, RTD input without decimal point: 0 to Input span℃ (℉)					
	Thermoc	ouple, RTD input with decimal point: 0.0 to Input span℃ (℉)					
		ge, current inputs: 0.0 to 1000.0%					
	Available w	hen EV2 option (if "∷்ப்ப்ப் Heating/Cooling control output" is selected					
	in [Event output EV2 allocation]) is ordered, or when DS, DA or EV3D option is						
	ordered.						
c_b		portional cycle					
0 0003	_	nge: 0.5, 1 to 120 seconds					
		hen EV2 option (if "∷ີມີ⊂ີ ມີ:Heating/Cooling control output" is selected					
	=	tput EV2 allocation]) is ordered, or when DS, EV3(DR), EV3DS option					
100	is ordered.	OFF by atamaia					
H456		OFF hysteresis					
	_	nge: 0.1 to 1000.0°C (°F)					
	DC VOILA	ge, current inputs: 1 to 10000 (The placement of the decimal point follows the selection.)					
	Available w	hen EV2 option (if "IIII Heating/Cooling control output" is selected					
		tput EV2 allocation]) is ordered, or when DS, DA or EV3D option is					
	ordered.	option is					
o1 Hb	OUT2 high	ı limit					
	_	nge: OUT2 low limit value to 100%					
	Direct current output type (DA, EV3DA options):						
	OUT2 low limit value to 105%						
	Available when EV2 option (if "LDCD: Heating/Cooling control output" is selected						
		tput EV2 allocation]) is ordered, or when DS, DA or EV3D option is					
	ordered.						
-: : :-	OUT2 low	OUT2 low limit					
	Setting ra	nge: 0% to OUT2 high limit value					
	Direct cu	rrent output type (DA, EV3DA options):					
		OUT2 high limit value					
		hen EV2 option (if "ဩಔಔಔ Heating/Cooling control output" is selected					
	in [Event ou	tput EV2 allocation]) is ordered, or when DS, DA or EV3D option is					
45	ordered.						
db	Overlap/D						
	_	nge: -200.0 to 200.0℃ (Ť)					
DC voltage, current inputs: -2000 to 2000 (The placement of the							
decimal point follows the selection.)							
	Available when EV2 option (if "LiDe A Heating/Cooling control output" is selected						
	ordered.	tput EV2 allocation]) is ordered, or when DS, DA or EV3D option is					
	†	erse action					
	HEAL	Reverse (Heating) action					
□ HEAT	cool	Direct (Cooling) action					
		Direct (Occinity) action					

Characters,	Setting Item, Setting Range	Data		
Factory Default	Johnny Rolling Relingt	Data		
H 1	Heater burnout alarm 1 value			
	Setting range:			
H IIII and CT1	20 A: 0.0 to 20.0 A			
current value are	100 A: 0.0 to 100.0 A			
alternately	Available when C5W, EIW, W option is ordered, and OUT1 is relay contact output			
indicated.	or non-contact voltage output type.			
HZ	Heater burnout alarm 2 value			
	Setting range:			
H를III and CT2	20 A: 0.0 to 20.0 A			
current value are	100 A: 0.0 to 100.0 A			
alternately	Available when C5W, EIW, W option is ordered, and OUT1 is relay contact output			
indicated.	or non-contact voltage output type.			
	Loop break alarm time			
	Setting range: 0 to 200 minutes			
	Available when 🗓 🖰 (Loop break alarm output) is selected in [Event output EV			
	allocation].			
LP_H	Loop break alarm band			
	Setting range:			
	Thermocouple, RTD input without decimal point: 0 to 150℃ (℉)			
	Thermocouple, RTD input with decimal point: 0.0 to 150.0℃ (℉)			
	DC voltage, current inputs: 0 to 1500 (The placement of the decimal			
	point follows the selection.)			
	Available when 🖫 🖰 (Loop break alarm output) is selected in [Event output EV			
	allocation].			

13.5 Wait Parameter Setting Mode

Characters, Factory Default	Setting Item, Setting Range		
	Wait value		
	Setting ra	ange: 0 to 20% of input span (*)	
·	(*) DC vo	ltage, current inputs: 0 to 20% of scaling span (The placement	
	of the	decimal point follows the selection.)	
	Step 1 wai	t function Enabled/Disabled	
}		Disabled	
PTN/STEP	USEII	Enabled	
indicator 1 lights up.	Not availab	ole if Wait value is set to 0 or 0.0.	
	Step 2 wai	t function Enabled/Disabled	
}		Disabled	
PTN/STEP	USE.	Enabled	
indicator 2 lights up.	Not availab	ole if Wait value is set to 0 or 0.0.	
	Step 3 wai	t function Enabled/Disabled	
}		Disabled	
PTN/STEP	USEII	Enabled	
indicator 3 lights up.	Not availa	ble if Wait value is set to 0 or 0.0.	
	Step 4 wai	t function Enabled/Disabled	
}		Disabled	
PTN/STEP	USEII	Enabled	
indicator 4 lights up.	Not availa	ble if Wait value is set to 0 or 0.0.	
	Step 5 wai	t function Enabled/Disabled	
		Disabled	
PTN/STEP	USE	Enabled	
indicator 5 lights up.	Not availa	ble if Wait value is set to 0 or 0.0.	
	Step 6 wai	t function Enabled/Disabled	
\		Disabled	
PTN/STEP	WSE.	Enabled	
indicator 6 lights up.	Not availa	ble if Wait value is set to 0 or 0.0.	
	Step 7 wai	t function Enabled/Disabled	
\		Disabled	
PTN/STEP	USEII	Enabled	
indicator 7 lights up.	Not availa	ble if Wait value is set to 0 or 0.0.	
	Step 8 wai	t function Enabled/Disabled	
}		Disabled	
PTN/STEP	USE	Enabled	
indicator 8 lights up.	Not availat	ole if Wait value is set to 0 or 0.0.	
	Step 9 wai	t function Enabled/Disabled	
		Disabled	
PTN/STEP	USED	Enabled	
indicator 9 lights up.	Not availa	ble if Wait value is set to 0 or 0.0.	

Characters, Factory Default		Setting Item, Setting Range			
	Step 10 wa	ait function Enabled/Disabled			
}		Disabled			
PTN/STEP	USED	Enabled			
indicator 10 lights	Not availa	ble if Wait value is set to 0 or 0.0.			
up.					

13.6 Engineering Setting Mode 1

Characters,	Setting Item, Setting Range D				Data
Factory Default				5	Data
Lock	Set value	lock			
<u> </u>				Change	
			Change via Keypad	via Software	
			All ()	Communication	
		Unlock	All set values can be	All set values can	
	Loci	Lock 1	changed.	be changed.	
		LOCK	Only 'Set value lock' can be changed. Other setting		
			items cannot be changed.		
	Loce	Lock 2	Setting items selected in	-	
		LOOK Z	[Changeable in Set value		
			lock] can bechanged.		
			'Set value lock' can be		
			changed. Other setting		
			items cannot be changed.		
	Loc3	Lock 3	All set values can be	Setting items –	
			changed.	except Input type –	
	Loc4	Lock 4	Only 'Set value lock' can	can be changed	
			be changed. Other setting	temporarily via	
	, ,-		items cannot be changed.	software	
	Loc5	Lock 5	Setting items selected in	communication.	
			[Changeable in Set value	However, if power is	
			lock] can be changed.	turned ON again, the	
			'Set value lock' can be	set values revert to the values before	
			changed. Other setting items cannot be changed.	Lock 3, 4 or 5 was	
			nems cannot be changed.	selected.	
L05E	Changeab	le in Set v	value lock		
0 5800	SBUU		Step time can be changed.		
	5858	Step SV,	Step time, EV alarm value	can be changed.	
Sot	Sensor co	rrection c	oefficient		
<u> </u>	Setting ra	nge: -10.0	00 to 10.000		
Soll	Sensor co				
		Ū	00.0 to 1000.0℃ (℉)		
	DC volt	age, curre	nt inputs: –10000 to 10000 (7	·	
-	D\/ 614		decimal point follow	s the selection.)	
F: []	PV filter tin				
	Setting range: 0.0 to 10.0 seconds				
Communication protocol					
I noñL	noñL	Shinko p			
	5870	•	I transmission (Shinko protoc	col)	
	585-		l reception (Shinko protocol)		
	<u> </u>		ASCII mode		
	nodr 	1	RTU mode		
	Available	when C5W o	or C5 option is ordered.		

Characters, Factory Default		Setting Item, Setting Range	Data	
	Instrumen	t number		
	Setting ra	ange: 0 to 95		
	Available v	vhen C5W or C5 option is ordered.		
casp casp	Communic	cation speed		
0 0098	0098	9600 bps		
	0 192	19200 bps		
	384	38400 bps		
	Available wh	en C5W or C5 option is ordered.		
EAFF	Data bit/Pa	arity		
<u> </u>	8non	8 bits/No parity		
12 271	Jaga	7 bits/No parity		
	888n	8 bits/Even		
	788n	7 bits/Even		
	8044	8 bits/Odd		
	ೌರದರ	7 bits/Odd		
	Available wh	en C5W or C5 option is ordered.		
	Stop bit			
		1 bit		
		2 bits		
	Available v	when C5W or C5 option is ordered.		
cād'd	Response	delay time		
	Setting ra	ange: 0 to 1000 ms		
	Available v	when C5W or C5 option is ordered.		
58.5	SVTC bias			
	Setting ra	ange: ±20% of input span		
DC voltage, current inputs: ±20% of scaling span (The p				
		the decimal point follows the selection.)		
	Available v	vhen C5W, C5 option is ordered, or when 5ぱに [SV digital reception		
	(Shinko pr	otocol)] is selected in [Communication protocol].		

13.7 Engineering Setting Mode 2

′ [Characters,				
	Factory Default		Settii	ng Item, Setting Range	Data
	<u>56-5</u>	Input type			
		EUUC	K	-200 to 1370 ℃	
		EUUC	K	-200.0 to 400.0 °C	
		JUUE	J	-200 to 1000 °C	
			R	0 to 1760 °C	
		5000	S	0 to 1760 °ℂ	
		6000	В	0 to 1820 ℃	
		EUUE	E	-200 to 800 ℃	
		ruc	Т	-200.0 to 400.0 °C	
		nIII[N	-200 to 1300 ℃	
		PL 20	PL-II	0 to 1390 ℃	
		c000	C(W/Re5-26)	0 to 2315 °ℂ	1
		PFOE	Pt100	-200.0 to 850.0 ℃	
			JPt100	-200.0 to 500.0 °C	
		PFOE	Pt100	-200 to 850 ℃	
		_1P1	JPt100	-200 to 500 ℃	
		EDDF	K	-328 to 2498 °F	
		EUUF	K	-328.0 to 752.0 °F	
		JUUF	J	-328 to 1832 °F	
		, IIIF	R	32 to 3200 °F	
		500F	S	32 to 3200 °F	
		book	В	32 to 3308 °F	
		EUUF	E	-328 to 1472 °F	
		roof	T	-328.0 to 752.0 °F	
		n I I F	N	-328 to 2372 °F	
		P <u></u> 25	PL-Ⅱ	32 to 2534 °F	
		coop	C(W/Re5-26)	32 to 4199 °F	
		PF F	Pt100	-328.0 to 1562.0 °F	
		<u> </u>	JPt100	-328.0 to 932.0 °F	
		PFOF	Pt100	-328 to 1562 °F	
		<u> </u>	JPt100	-328 to 932 °F	
		4208	4 to 20 mA	-2000 to 10000	
		0208	0 to 20 mA	-2000 to 10000	_
		00 18	0 to 1 V	-2000 to 10000	_
		0058	0 to 5 V	-2000 to 10000	1
		# <u>##</u>	1 to 5 V	-2000 to 10000	1
F			0 to 10 V	-2000 to 10000	
		Scaling hi	_	w limit to Input range high limit	
	□ 1370	_	•	uts: -2000 to 10000 (The placement of the	
		20 101	ago, ourroin iip	decimal point follows the selection.)	
L		İ		1	1

Characters, Factory Default		Setting Item, Setting Range	Data
5711	Scaling lov		
<u> </u>	_	nge: Input range low limit to Scaling high limit	
	DC volta	ge, current inputs: -2000 to 10000 (The placement of the	
, 		decimal point follows the selection.)	
dP	Decimal po	-	
		No decimal point	
		1 digit after decimal point	
		2 digits after decimal point	
	8888	3 digits after decimal point	
	Available w	nen DC voltage or current input is selected in [Input type].	
EB5:	Event outp	out EV1 allocation	
		No event	
	II 00 t	Alarm output, High limit alarm	
	0002	Alarm output, Low limit alarm	
	E003	Alarm output, High/Low limits alarm	
	000 4	Alarm output, High/Low limits independent alarm	
	0005	Alarm output, High/Low limit range alarm	
	0008	Alarm output, High/Low limit range independent alarm	
	1007	Alarm output, Process high alarm	
	0008	Alarm output, Process low alarm	
		Alarm output, High limit with standby alarm	
		Alarm output, Low limit with standby alarm	
		Alarm output, High/Low limits with standby alarm	
	00 12	Alarm output, High/Low limits with standby independent alarm	
	IIO 13	Heater burnout alarm output (When C5W, EIW or W option is ordered)	
	<u> </u>	Loop break alarm output	
	00 /5	· · · · · · · · · · · · · · · · · · ·	
	00 15	Time signal output	
		Output during AT	
		Pattern end output	
	00 18	Output by communication command	
	00 19	RUN output	
		(High limit alarm) to □□□ ; (High/Low limit with standby	
	set to one e	t alarm) or 🏥 🛂 (Time signal output) is selected, one output can be	
		vent output. /금 (Heater burnout alarm output), 필급 /님 (Loop break alarm), 필급 /동	
		ng AT) to [[] [4] (RUN output) are selected, each output is common to	
	multiple eve		
AKEA	-	value 0 Enabled/Disabled	
	noll	Disabled	
O noDO	485U	Enabled	
		en any alarm from 🗓 🖟 (High limit alarm) to 🗓 🖟 (High/Low limits	
		, - , - , - , - , - , - , - , - , - , -	
	-	independent alarm) is selected in [Event output EV1 allocation] -	
	excluding !!i	30 $^{\circ}$ (Process high alarm) and 300 (Process low alarm].	

Characters, Factory Default		Setting Item, Setting Range	Data
A IHH	EV1 alarm	hysteresis	
	Setting ra	nge: 0.1 to 1000.0℃ (℉)	
	DC volt	age, current inputs: 1 to 10000 (The placement of the	
		decimal point follows the selection.)	
	Available wl	nen any alarm from 🗓 🗓 🖟 (High limit alarm) to 🗓 🖟 (High/Low limits	
	with standb	y independent alarm) is selected in [Event output EV1 allocation].	
A 197	EV1 alarm	delay time	
	Setting ra	nge: 0 to 10000 seconds	
	Available wl	nen any alarm from 🗓 🗓 🕻 (High limit alarm) to 🗓 🖟 (High/Low limits	
	with standb	y independent alarm) is selected in [Event output EV1 allocation].	
AKA		Energized/De-energized	
O noñL	noñ!	Energized	
	-685	De-energized	
	Available wl	nen any alarm from 🗓 🗓 🕻 (High limit alarm) to 🗓 🖟 (High/Low limits	
	with standb	y independent alarm) is selected in [Event output EV1 allocation].	
EBoZ		out EV2 allocation	
		No event	
		Alarm output, High limit alarm	
	800	Alarm output, Low limit alarm	
	8003	Alarm output, High/Low limits alarm	
		Alarm output, High/Low limits independent alarm	
	0005	Alarm output, High/Low limit range alarm	
	888	Alarm output, High/Low limit range independent alarm	
		Alarm output, Process high alarm	
	008	Alarm output, Process low alarm	
	0009	Alarm output, High limit with standby alarm	
		Alarm output, Low limit with standby alarm	
		Alarm output, High/Low limits with standby alarm	
	00 i2	Alarm output, High/Low limits with standby independent	
	<u> </u>	alarm	
	114 (3	Heater burnout alarm output (When C5W, EIW or W option	
	::::::::::::::::::::::::::::::::::::::	is ordered)	
	00 14 00 15	Loop break alarm output	
		Time signal output	
	<u> </u>	Output during AT	
		Pattern end output	
	<u> </u>	Output by communication command	
	<u> </u>	RUN output	
	IIDZD	Heating/Cooling control output	
		የ ∤ (High limit alarm) to ፫፫ ሐ፫ (High/Low limit with standby t alarm) or ፫፫ ሐ፫ (Time signal output) is selected, one output can be	
	set to one e		
		남 (Heater burnout alarm output), [[[] 라 (Loop break alarm), [[[] 남	
		ng AT) to ██ 19 (RUN output) are selected, each output is common to	
	multiple eve	-	
	Available wh	nen the EV2 or EV3(DR) option is ordered.	

Characters, Factory Default		Setting Item, Setting Range	Data
APEA	EV2 alarm	value 0 Enabled/Disabled	
U noUU	noll	Disabled	
	9850	Enabled	
		hen any alarm from 🗓 🖟 🖟 (High limit alarm) to 🗓 🖟 (High/Low limits	
		by independent alarm) is selected in [Event output EV2 allocation] -	
AT TA A A		∄፬፬ (Process high alarm) and ∷፱፬፬8 (Process low alarm].	
ASHA		hysteresis	
	_	nge: 0.1 to 1000.0℃ (℉),	
	DC VOIT	age, current inputs: 1 to 10000 (The placement of the	
	Available v	decimal point follows the selection.) when any alarm from □□□□□(High limit alarm) to □□□□□(High/Low	
		standby independent alarm) is selected in [Event output EV2 allocation].	
8244		delay time	
		nge: 0 to 10000 seconds	
	_	hen any alarm from 🗓 🗓 (High limit alarm) to 🗓 🖟 (High/Low	
		standby independent alarm) is selected in [Event output EV2 allocation].	
ABLA		Energized/De-energized	
	noñL	Energized	
i) ((2) ()_	-685	De-energized	
	Available w	hen any alarm from 🗓 🖸 🏅 (High limit alarm) to 🗓 🗗 (High/Low	
	limits with s	tandby independent alarm) is selected in [Event output EV2 allocation].	
[863		out EV3 allocation	
		No event	
		Alarm output, High limit alarm	
	8002	Alarm output, Low limit alarm	
	8003	Alarm output, High/Low limits alarm	
	888	Alarm output, High/Low limits independent alarm	
	0005	Alarm output, High/Low limit range alarm	
	0008	Alarm output, High/Low limit range independent alarm	
	0007	Alarm output, Process high alarm	
	0008	Alarm output, Process low alarm	
	0009	Alarm output, High limit with standby alarm	
	E0 10	Alarm output, Low limit with standby alarm	
	00::	Alarm output, High/Low limits with standby alarm	
	00 12	Alarm output, High/Low limits with standby independent	
	ini ver 1 er	alarm	
	E: 00	Heater burnout alarm output (When C5W, EIW or W option	
		is ordered)	
		Loop break alarm output	
	<u> </u>	Time signal output	
		Output during AT	
		Pattern end output	
	<u> </u>	Output by communication command	
	00 /9	RUN output	
		I (High limit alarm) to ☐☐ I☐ I☐ (High/Low limit with standby alarm) or ☐☐ I☐	
	to one event		
		를 (Heater burnout alarm output), 🏥 기가 (Loop break alarm), 🏥 기를	
		ng AT) to 🏥 🕄 (RUN output) are selected, each output is common to	
	multiple ever	nt outputs. Available when the EV3D or El option is ordered.	

Characters, Factory Default	Setting Item, Setting Range											
ABEA	EV3 alarm	value 0 Enabled/Disabled	t									
D nell	ng	Disabled										
1 7 1.2 1 1	4E5II	Enabled										
	Available w	hen any alarm from 🏻 🗓 🖟 (Hig	jh limit alarm) to 🗓🗓	₽ (High/Low limits								
	with standb	y independent alarm) is selec	ted in [Event outpo	ut EV3 allocation] -								
	excluding	cluding 🗓🗓 7 (Process high alarm) and 🗓 🗓 🖰 (Process low alarm].										
ABAH	EV3 alarm hysteresis											
	Setting ra	nge: 0.1 to 1000.0℃ (℉),										
	DC voltage, current inputs: 1 to 10000 (The placement of the											
	decimal point follows the selection.)											
		nen any alarm from 🏻 🗖 🖟 (Hig	•	` •								
N=1 = 1 1 1		y independent alarm) is selected	d in [Event output E'	V3 allocation].								
ABGA	EV3 alarm delay time Setting range: 0 to 10000 seconds											
	Available when any alarm from \$\textstyle \mathbb{Q} \tau \tau \text{(High limit alarm) to \$\text{L} \mathbb{Q} \tau \tau \text{(High/Low limits with steep limits and one alarm) is a placeted in \$\text{(From to what \$\text{E} \text{(2)} \text{cont} \text{(High/Low limits with steep limits alarm)}}\$											
77 70 -	limits with standby independent alarm) is selected in [Event output EV3 allocation].											
ABLA T	EV3 alarm Energized/De-energized Energized											
O noñL	-E85	De-energized										
		hen any alarm from ፟፟፟፟፟፟፟	h limit alarm) to Ü∏	€ (High/Low limits								
		•	,	, -								
EH!!	with standby independent alarm) is selected in [Event output EV3 allocation]. Event input DI1 allocation											
		Event Input Function	Input ON (Closed)	Input OFF (Open)								
	11000	No event										
	II 00 t											
	Direct/Reverse action Direct action Reverse action											
	8003	Program control RUN STOP										
		RUN/STOP										
	<u> </u>	Program control Holding/Not holding	Holding	Not holding								
	0005	Program control	Advance	Usual control								
		Advance function	function									
	Available v	when C5W, EIW, EIT, C5 or EI of	option is ordered.									

Setting Item, Setting Range										
Event in	put DI2 allocation									
	Event Input Function	Input ON (Closed)	Input OFF (Open)							
0000	No event									
II00 :	Pattern number selection									
1002	Direct/Reverse action	Direct action	Reverse action							
8003	Program control RUN/STOP	RUN	STOP							
<u> </u>	Program control Holding/Not holding	Holding	Not holding							
0005	Program control Advance	Advance	Usual control							
	•	tion is ordered.								
	· · · · · · · · · · · · · · · · · · ·									
	• =									
, , ,										
Available when EIT option is ordered.										
Transmission output low limit										
Setting range:										
PV, SV transmission: Input range low limit to Transmission output high limit										
	Direct current, voltage input	ts: -2000 to 100	00							
(The placement of the decimal point follows the selection.)										
		ion output high	limit							
	Τ									
20 05	1		m control and							
	1		· ·							
Continues (resumes) previous program control after power										
	is restored.									
Hold	· ·									
	1	, ,								
	<u> </u>	alue control usi	ng tne step SV							
	<u> </u>	ls suspension :	and Program							
	control resumes.	io odoporiolori, e	and riogidin							
	Available Transmi Setting PV, SV MV tra Available Transmi Setting PV, SV MV tra Available Transmi Setting PV, SV	Event input DI2 allocation Event Input Function DOD No event DOD Pattern number selection DOD Program control RUN/STOP Program control RUN/STOP Program control Advance function Available when CSW, EIW, EIT, C5 or EI op Transmission output type PUI SV transmission Available when EIT option is ordered. Transmission output high limit Setting range: PV, SV transmission: Transmission output Available when EIT option is ordered. Transmission output low limit Setting range: PV, SV transmission: Transmission output Available when EIT option is ordered. Transmission output low limit Setting range: PV, SV transmission: Transmission output Available when EIT option is ordered. Transmission output low limit Setting range: PV, SV transmission: Input range low lim Direct current, voltage input (The placement of the decin MV transmission output low limit Setting range: PV, SV transmission: Input range low lim Direct current, voltage input (The placement of the decin MV transmission: -5.0% to Transmiss Available when EIT option is ordered. Step time unit A a a Hours: Minutes SEc a Minutes: Seconds Power restore action Stops after power is restored, stops returns to the program control Continues (resumes) after por Continues (resumes) previou is restored. Suspends after power is restored, suspends after power is restored, suspends after power is restored. Suspends after power is restored. Hold Suspends after power is restored, suspends after power is restored, suspends after power is restored. Hold My transmission. Pressing the RUN key cance	Event input DI2 allocation Input ON (Closed)	Event Input Function Input ON (Closed) Input OFF (Open)						

Characters, Factory Default	Setting Item, Setting Range								
5_58	Step SV when program control starts								
	Setting range: Scaling low limit to Scaling high limit (The placement of								
	the decimal point follows the selection.)								
5_51	Program control start type								
D PBDD	PBIII PV start:								
	Only when Program control starts, the step SV and step								
	time are advanced to the PV, then Program control starts.								
	PB- [PVR start:								
	When Program control starts and in pattern repeating, the								
	step SV and step time are advanced to the PV, then								
	Program control starts.								
	5800 SV start:								
	When Program control starts, the Program control starts								
	from the step SV set in [Step SV when program control								
	starts].								
PESA	Pattern end output time								
	Setting range: 0 to 10000 seconds								
87.5	AT bias								
0 0020	Setting range:								
	Thermocouple, RTD inputs without decimal point: 0 to 50℃ (0 to 100℉)								
	Thermocouple, RTD inputs with decimal point: 0.0 to 50.0℃ (0.0 to 100.0℉)								
	Available when Thermocouple or RTD input is selected in [Input type].								
Eall	Output status when input errors occur								
O offO	øFF□ Output OFF								
	□□□□□ Output ON								
	Available for direct current and voltage inputs, and direct current output.								
{	Indication time								
	Setting range: 00:00 to 60:00 (Minutes : Seconds)								
	When set to 00:00, Displays remain ON.								
EarF	Error indication								
O noOO	no Disabled								
	SEST Enabled								

13.8 Data Clear

Characters, Factory Default	Setting Item, Setting Range									
cLr.	Data clear	Yes/No								
	ngIII	Data clear No								
	985U	Data clear Yes								

14. Making Program Pattern Table and Data Table

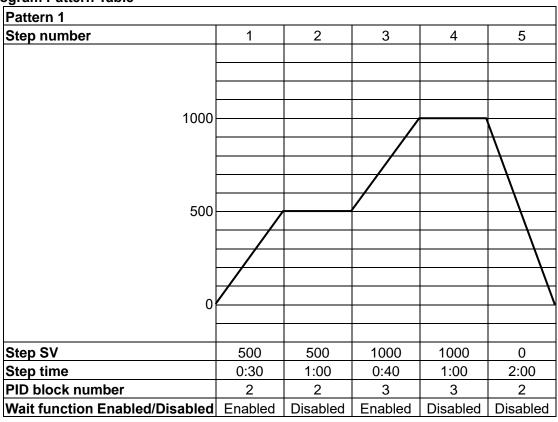
Before setting program, make a program pattern table and data table.

14.1 Making Program Pattern Table

Please make a copy of the program pattern table (p.161), and follow the procedure below.

- (1) Write a step SV, step time, PID block number, Wait function Enabled/Disabled for each step from Step 1 in numerical order.
 - (Even if the same block number is used, write it for every step.)
- (2) Draw a line graph of step SV.

Program Pattern Table



(Fig. 14.1-1)

Explanation of Program Pattern Table

Program pattern table consists of Y axis which represents the step SV (${}^{\circ}C$, ${}^{\circ}F$), and X axis which represents the step time (Hours : Minutes, Minutes : Seconds).

Step SV is considered to be the SV at the end of the step.

Step time is considered to be the step process time.

- The relation between the step SV and step time can be explained as follows.
- Step 1: The control is performed so that the temperature reaches from 0 to 500° for 30 minutes. Depending on the selection in [Program control start type], control is performed as follows.
 - When SV start is selected: Performs control from the step SV set in [Step SV when program control starts] so that the temperature reaches 500°C.
 - When PV start or PVR start is selected: Step SV and time are advanced to PV, and control starts so that the temperature reaches 500°C.
- Step 2: The control is performed so that SV is maintained at 500°C for 1 hour.
- Step 3: The control is performed so that SV rises from 500°C to 1000°C for 40 minutes.
- Step 4: The control is performed so that SV is maintained at 1000℃ for 1 hour.
- Step 5: The control is performed so that SV drops from 1000°C to 0°C for 2 hours.

- PID block includes: OUT1 proportional band, Integral time, Derivative time, ARW, OUT2 proportional band
- 10 types of PID block (1 10) can be set.
- Wait function Enabled/Disabled can be selected for each step.

14.2 Making Data Table

Please make a copy of Data Table (p.162), and follow the procedure below.

- (1) Write data for block numbers in Control parameter setting mode, by referring to the PID block numbers in the Program pattern table.
- (2) For Wait value and other setting items, write the data in the table if required.

About PID block settings

If program pattern is not set for a step, its PID block number becomes 1 (factory default). We highly recommend that you leave the factory default values of PID block 1 as they are, and set the values from PID block 2.

Example of PID block setting

PID Block	OUT1	Integral	Derivative	ARW	OUT2
number	P-band	time	time	ARVV	P-band
1	10℃	200 sec	50 sec	50%	10°ℂ
2	30℃	240 sec	60 sec	35%	10℃
3	50℃	340 sec	85 sec	40%	10°C

• Example of Wait value setting

Wait value	10℃

Wait value is common to all steps for each pattern.

• Example of other setting items

Setting items	Data					
OUT1 proportional cycle	15 seconds					
OUT2 proportional cycle	15 seconds					
Number of repetitions	1					
Pattern link	Pattern link Disabled					
Communication protocol	Shinko protocol					
Instrument number	1					
Communication speed	38400 bps					
Data bit/Parity	7 bits/Even					
Stop bit	1 bit					
Response delay time	10 ms					

Program Pattern Table

Please make a copy of this table for use.

Pattern number										
Step number	1	2	3	4	5	6	7	8	9	10
Step SV										
Step time										
PID block number										
Wait function Enabled/Disabled										

Data Table

Please make a copy of this table for use.

• PID block

PID Block number	OUT1 P-band	Integral time	Derivative time	ARW	OUT2 P-band
1		sec	sec	%	
2		sec	sec	%	
3		sec	sec	%	
4		sec	sec	%	
5		sec	sec	%	
6		sec	sec	%	
7		sec	sec	%	
8		sec	sec	%	
9		sec	sec	%	
10		sec	sec	%	

Wait value

Wait value

Wait value is common to all steps for each pattern.

Other setting data (Please use the blank for your own usage.)

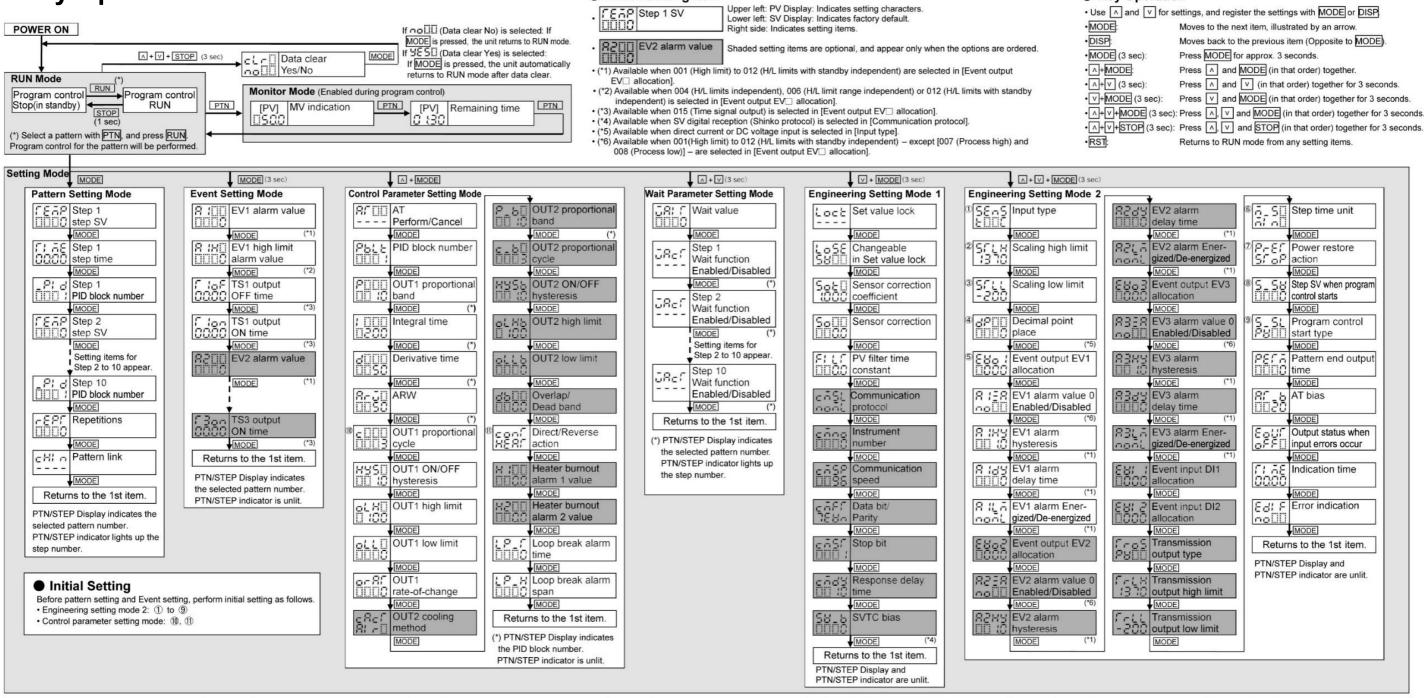
Setting item	Data
OUT1 proportional cycle	sec
OUT2 proportional cycle	sec
Number of repetitions	times
Pattern link	
Communication protocol	
Instrument number	
Communication speed	bps
Data bit/Parity	
Stop bit	
Response delay time	ms

15. Key Operation Flowchart

Godd 7 bits / Odd

Loc4 Lock 4

JOOF J



About Setting Item

Key Operation

		334		8			56	3.5		22		32			
Pattern lin	k	Locs	Lock 5	Stop bit			-DDF	R	32 to 3200 °F	0.000	3 digits after decimal point	020	Heating/Cooling control output *	Power res	store action
	Pattern link Disabled	Changeat	ble in Set value lock		1 bit		SUUF	S	32 to 3200 °F	Event out	put EV1 to EV3 allocation	* Available	e only for Event output EV2 allocation	SFOP	Stops after power is restored
cHin	Pattern link Enabled	SBOO	Step SV + Step time	5000	2 bits		ЬШШЕ	В	32 to 3308 °F	□000	No event	EV1 to EV	/3 alarm value 0 Enabled / Disabled	conf	Continues after power is restored
AT Perform	m / Cancel	SBEB	Step SV + Step time + EV ☐ alarm	Input type	•		EDDE	E	-328 to 1472 °F	□00 :	High limit alarm	noIII	Disabled	Hold	Suspends after power is restored
	AT Cancel	2000	value	FUUC	K	-200 to 1370 °C	ſ∏ F	Т	-328.0 to 752.0 °F	2000	Low limit alarm	985D	Enabled	Program o	control start type
AFDD	AT Perform		cation protocol	FD C	K	-200.0 to 400.0 °C	nDDF	N	-328 to 2372 °F	E003	H/L limits alarm	EV1 to EV	/3 alarm Energized / De-energized	P800	PV start
OUT2 coo	ling method	nont	Shinko protocol	JUUC	J	-200 to 1000 °C	PLEF	PL-II	32 to 2534 °F	□00 4	H/L limits independent alarm	nonL	Energized	PBrD	PVR start
St -D	Air cooling	SUFE	SV digital transmission (Shinko protocol)	-000	R	0 to 1760 °C	cDDF	C(W/Re5-26)	32 to 4199 °F	0005	H/L limit range alarm	~E85	De-energized	SBOO	SV start
of LO	Oil cooling	SBFF	SV digital reception (Shinko protocol)	SUUC	S	0 to 1760 °C	PF F	Pt100	-328.0 to 1562.0 °F	□006	H/L limit range independent alarm	Event inpo	ut DI1, DI2 allocation	Output sta	atus when input errors occur
JACO	Water cooling	ñodR	Modbus ASCII mode	ьшшс	В	0 to 1820 °C	JPCF	JPt100	-328.0 to 932.0 °F	□007	Process high alarm	□000	No event	oFF	Output OFF
Direct / Re	everse action	ñodr	Modbus RTU mode	EDDC	E	-200 to 800 °C	PFOF	Pt100	-328 to 1562 °F	E008	Process low alarm	□00 :	Pattern number selection	onDD	Output ON
HERE	Reverse control action	Communi	cation speed	LO T	Т	-200.0 to 400.0 °C	JPCF	JPt100	-328 to 932 °F	E009	High limit with standby alarm	2000	Direct / Reverse action	Error indic	cation
cool	Direct control action	0096	9600 bps	~DDC	N	-200 to 1300 °C	420R	4 - 20 mA	-2000 to 10000	E0 10	Low limit with standby alarm	II003	Program control RUN / STOP	noDD	Disabled
Step 1 to	10 Wait function Enabled / Disabled	D 192	19200 bps	PLBC	PL-II	0 to 1390 °C	8050	0 - 20 mA	-2000 to 10000	0011	H/L limits with standby alarm	□004	Program control Holding / Not holding	985D	Enabled
	Disabled	38 4	38400 bps	cDDC	C(W/Re5-26)	0 to 2315 °C	00 18	0 - 1 V	-2000 to 10000	E0 15	H/L limits with standby independent	II005	Program control Advance function		3
USED	Enabled	Data bit /	Parity	Pr L	Pt100	-200.0 to 850.0 °C	0058	0 - 5 V	-2000 to 10000	EIO 13	Heater burnout alarm output	Transmiss	sion output type		
Set value	lock	8000	8 bits / No parity	JPCE	JPt100	-200.0 to 500.0 °C	1058	1 - 5 V	-2000 to 10000	E0 14	Loop break alarm output	PROD	PV transmission		
	Unlock	non	7 bits / No parity	PFDC	Pt100	-200 to 850 °C	0.108	0 - 10 V	-2000 to 10000	00 /5	Time signal output	SBIII	SV transmission		
Loci	Lock 1	8884	8 bits / Even	JPCC	JPt100	-200 to 500 °C	Decimal	point place		00 (6	Output during AT	ARDD	MV transmission		
Loc2	Lock 2	7886	7 bits / Even	FUUF	K	-328 to 2498 °F		No decimal poir	nt	00 10	Pattern end output	Step time	unit		
Loc3			8 bits / Odd	FII F	К	-328.0 to 752.0 °F	ппоо	1 digit after dec	imal point	DO 18	Output by communication command	āi alī	Hours : Minutes	7	

-328 to 1832 °F IDDD 2 digits after decimal point

ID 19 RUN output

5Ec | Minutes : Seconds

***** Inquiries *****

For any inquiries about this unit, please contact our agency or the vendor where you purchased the unit after checking the following.

[Example]

• Model	PCB1R00-52
• Option	EV3(DR), C5W(100A)
Serial number	No. 173F05000

In addition to the above, please let us know the details of the malfunction, or discrepancy, and the operating conditions.

SHINKO TECHNOS CO., LTD. OVERSEAS DIVISION

Head Office: 2-5-1, Senbahigashi, Minoo, Osaka, 562-0035, Japan

[URL] https://shinko-technos.co.jp/e/ Tel: +81-72-727-6100 [E-mail] overseas@shinko-technos.co.jp Fax: +81-72-727-7006