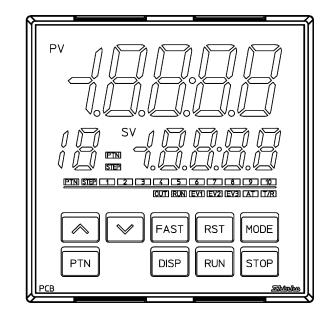
PROGRAMMABLE CONTROLLER PCB1 INSTRUCTION MANUAL





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 ir	n this	manual
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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	-1	0	1	Ū.	E	ч	5	5		8	9	E	Æ
Number, ℃/°F	-1	0	1	2	3	4	5	6	7	8	9	°C	°F
Indication	R	Ð	L	0	Ε	Ļ	IJ	H		5	F	L	i.
Alphabet	А	В	С	D	Е	F	G	Н	Ι	J	К	L	М
Indication	Ē	0	Ū,	Ūr	ŗ	un	۱ <u>.</u>		Э	۲ I	1	н	11
Alphabet	Ν	0	Ρ	Q	R	S	Т	U	V	W	Х	Y	Ζ

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. 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.

\land 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.

\land 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.

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

l Caution

This instrument is intended to be used under the following environmental conditions (IEC61010-1): Overvoltage category $~~I\!I$, 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

- 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.

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1. Model

1.1 Model

PCB1			0-						
Control	R					Relay contact ou	Itput		
output	S					Non-contact voltage output			
OUT1	А					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.		
				4			Event output EV2, or Heating/Cooling		
				1		EV2(DR) (*1)	control output OUT2 Relay contact output		
				2		DS	Heating/Cooling control output OUT2		
				2		03	Non-contact voltage output		
				3		DA	Heating/Cooling control output OUT2		
				5			Direct current output		
Option 1				4		P24	Insulated power output		
						EV3(DR) (*1), (*2)	Event output EV3 + Event output EV2, or		
				5	5		Heating/Cooling control output OUT2		
							Relay contact output		
				6		EV3DS (*2)	Event output EV3 + Heating/Cooling control		
				Ŭ			output OUT2 Non-contact voltage output		
				7		EV3DA (*2)	Event output EV3 + Heating/Cooling control		
				'			output OUT2 Direct current output		
					0		Option 2 not needed.		
					1	C5W(20A) (*3)	Serial communication + Heater burnout		
					<u> </u>	0011(20)()(0)	alarm output + Event input (*4)		
					2	C5W(100A) (*3)	Serial communication + Heater burnout		
						. ,	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		
					Ŭ		mADC)		
					6	C5	Serial communication RS-485 + Event		
							input (*4)		
					7	W(20A) (*3)	Heater burnout alarm output		
					8	W(100A) (*3) Heater burnout alarm output			
					9	El	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.

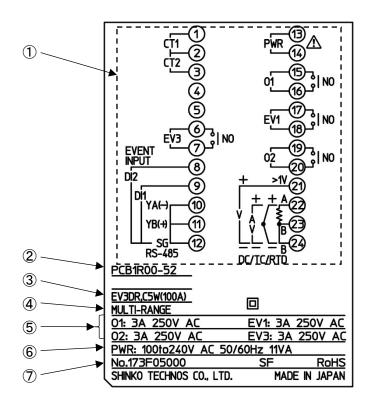
(*2) The EV3D \Box option and EIT option cannot be ordered together.

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

(*4) '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.



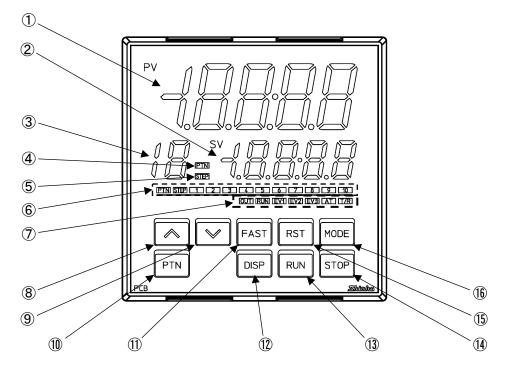
(Fig. 1.2-1)

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
$\overline{\mathcal{O}}$	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

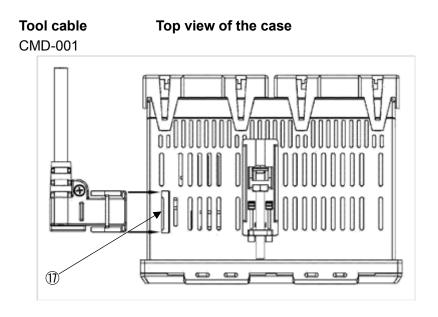
No.	Name	Description
1	PV Display	Indicates process variable (PV) in RUN mode.
	(Red)	Indicates setting characters in Setting mode.
		Flashes during Wait action or program control HOLD in program
		control.
2	SV Display	Indicates the desired value (SV), Output manipulated variable (MV),
	(Green)	or Remaining 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 (\Im) ,
		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 (\Im) 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.
L		

Action Indicator

No.	Name	Description
(7)	OUT (Green)	Lights up when control output OUT1 is ON.
Ŭ		For direct current output, flashes corresponding to the MV in 125 ms
		cycles.
	RUN (Orange)	Lights up during program control RUN.
	(0)	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 \Box , EI options) is ON.
	AT (Orange)	Flashes while AT is performing.
	T/R (Orange)	Lights up during Serial communication (C5W, C5 options)
		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.
1	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.



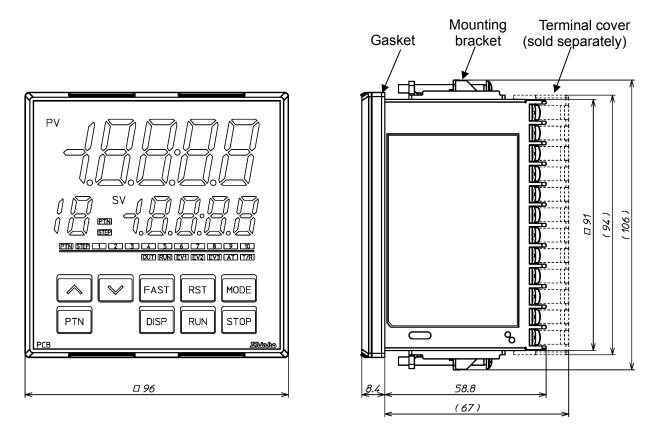
(Fig. 2-2)

Connector

No.	Name	Description
1	Tool cable	By connecting the Tool cable (CMD-001, sold separately), the following
	connector	operations can be conducted from an external computer, using the
		Monitoring software SWM-PCB101M.
		Tool cable 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)



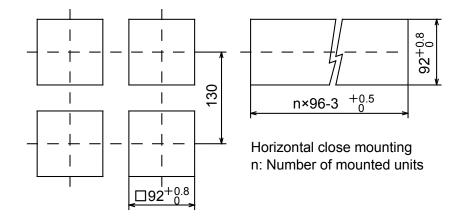
(): Size when mounting brackets or terminal cover (sold separately) are mounted.

(Fig. 3.1-1)

3.2 Panel Cutout (Scale: mm)

Caution

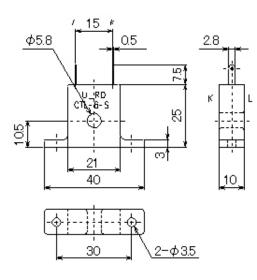
If horizontal close mounting is used for the controller, IP66 specification (Drip-proof/Dust-proof) may be compromised, and all warranties will be invalidated.



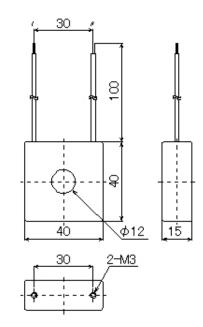
(Fig. 3.2-1)

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

CTL-6-S-H (for 20 A)



CTL-12-S36-10L1U (for 100 A)



(Fig. 3.3-1)

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

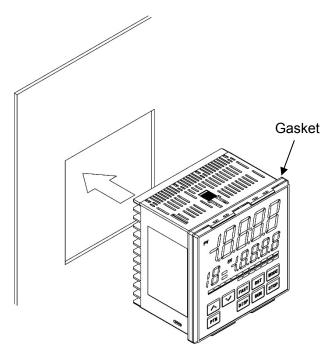
Mount the controller vertically to the flat, rigid panel to ensure it adheres to the Drip-proof/Dust-proof specification (IP66).

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

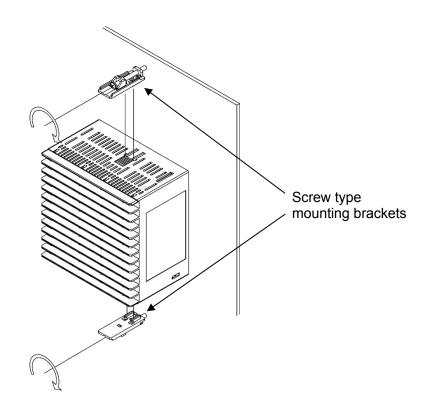
(1) Insert the controller from the front side of the control panel. (Fig. 3.4.1-1)

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

Λ 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.

1 Caution

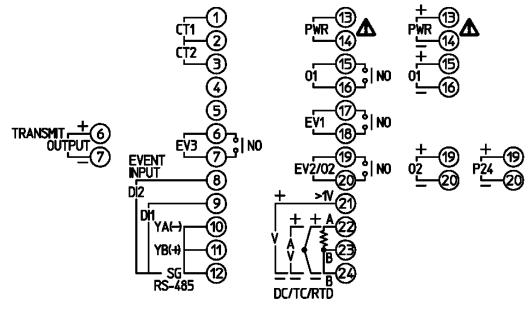
- Do not leave wire remnants in the instrument, as they could cause a fire or malfunction.
- Use the solderless terminal with an insulation sleeve in which the M3 screw fits when wiring the instrument.
- The terminal block of this instrument is designed to be wired from the left side. The lead wire must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



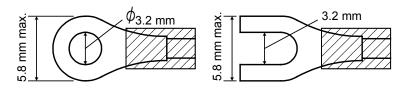
(Fig. 4.1-1)

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)		
ТС	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, EI 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	
Vitro	Nichifu Terminal Industries Co., Ltd.	TMEV1.25Y-3		
Y-type	Japan Solderless Terminal MFG Co., Ltd.	VD1.25-B3A	0.02 N	
Ding trop	Nichifu Terminal Industries Co., Ltd.	TMEV1.25-3	0.63 N∙m	
Ring-type	Japan Solderless Terminal MFG Co., Ltd.	V1.25-3		

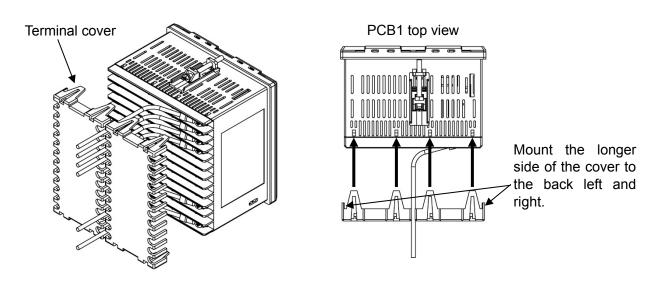


(Fig. 4.2-1)

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.



(Fig. 4.3-1)

(Fig. 4.3-2)

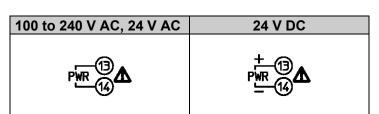
4.4 Wiring

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).



4.4.2 Control Output OUT1 and OUT2

When EV2, DS, DA or EV3D \Box 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	
ој (МО	+ 9	
EV2/02 ⁽⁹⁾ NO	+(19) 02(20)	

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

- SA-400 series: 5 units
- SA-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)
+22 (23) _=22 π		+22 } ↓223 ⊾ 22	н С С С С С С С С С С С С С С С С С С С

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	
Е <u>V1 (1</u>) NO	ЕV2/02 0 - I NO		

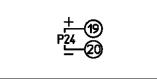
4.4.5 Insulated Power Output

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

Specifications of Insulated power output are shown below.

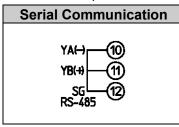
Output voltage	24±3 V DC (When load current is 30 mA DC)		
Ripple voltage	Within 200 mV DC (When load current is 30 mA DC)		
Max. load current	30 mA DC		

Insulated Power Output



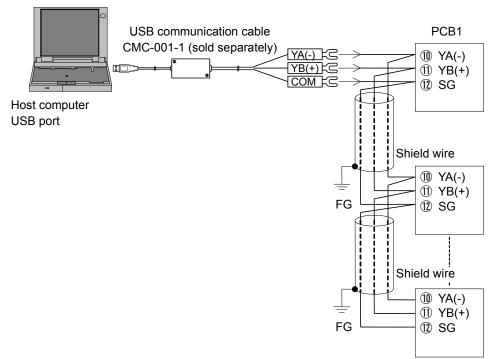
4.4.6 Serial Communication

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



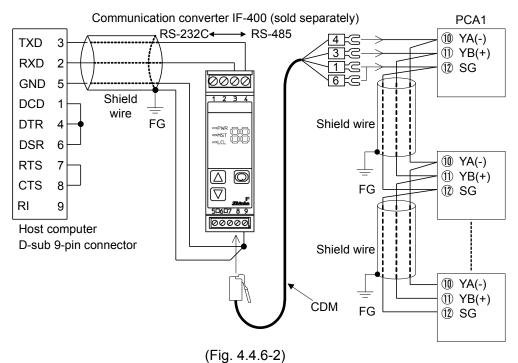
(1) Serial Communication

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





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



(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]:

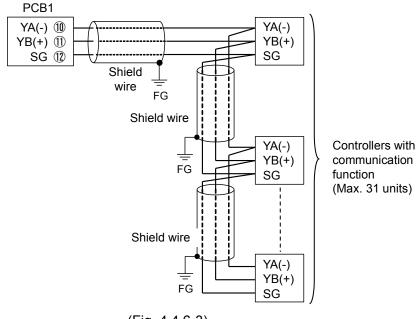
Step SV can be received via SVTC command from the connected Shinko programmable controllers PCA1 or PCB1 (on which 'SV digital transmission' should be selected in [Communication protocol]).

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

(Fig. 4.4.6-3)

Shield wire

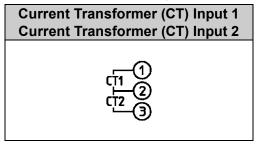
Connect only one end of the shield to the FG to avoid a ground loop. If both ends of the shield wire are connected to the FG, the circuit will be closed, resulting in a ground loop. This may cause noise. Be sure to ground the FG.

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

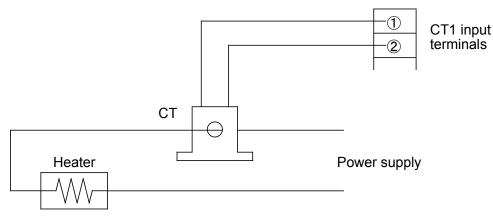
Current Transformer (CT) input is available when Heater burnout alarm output (C5W, EIW, W options) is ordered.

Cannot be used for detecting heater current under phase control.



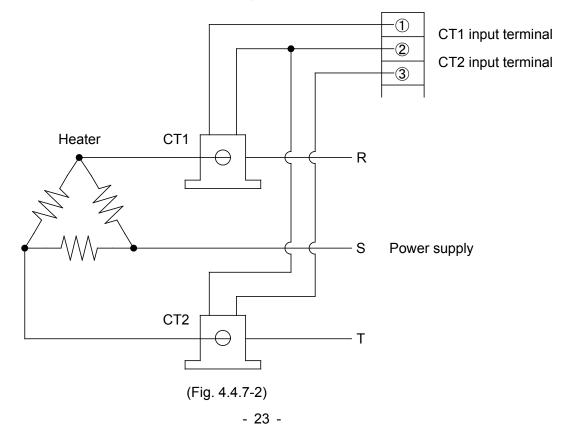
Use the CT (current transformer) provided, and pass one lead wire of the heater circuit into the hole of the CT. (Fig. 4.4.7-1)

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



(Fig. 4.4.7-1)

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%)	

Transmission Output

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

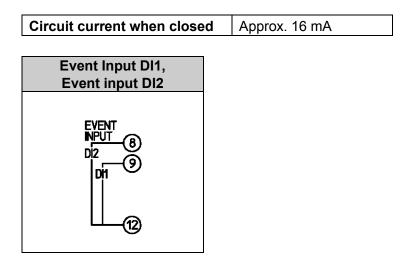
outputs the value in current. (Factory default: PV transmission)

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 $DI\square$ 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.

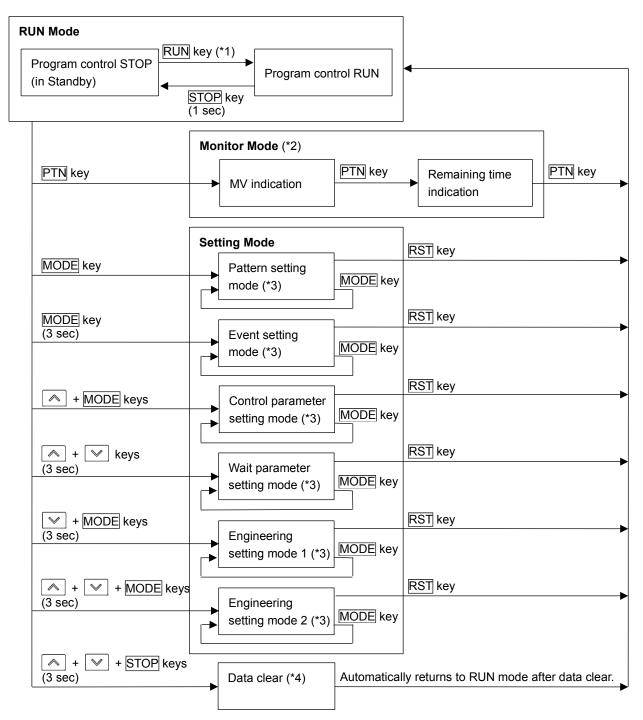
• When 'Pattern number selection' is selected for both Event input DI1 and DI2:

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)

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		
N		status.		
Monitor mode	mode. The PV Display	key during program control RUN, the unit enters Monitor y indicates PV, and the SV Display indicates MV. y is pressed, SV, MV or remaining time is indicated.		
Setting mode	Pattern setting mode	Sets the following:		
Setting mode	Fallem selling mode	Step SV, Step time, PID block number, number of repetitions, pattern link.		
	Event setting mode	Sets the following: 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 setting mode 2	Sets the following: 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		
Dala Clear	To clear data, select	am control STOP (in Standby), Data clear Yes/No appears. YES, and press the \underline{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 \land or \checkmark key is pressed with the FAST key simultaneously, makes the numeric value change faster.

To switch the selection items, use the \fbox or \checkmark 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:

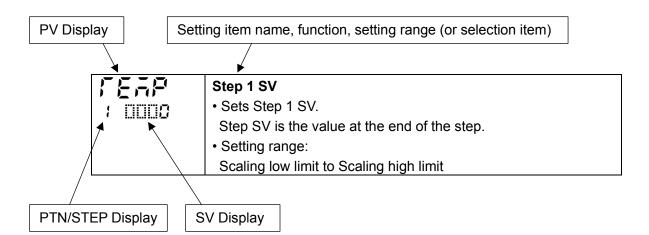
• Upper left: PV Display: Indicates setting characters.

• 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).

Initial Setting Item	Factory Default
Engineering setting mode 2	
Input type	K -200 to 1370℃
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

(Table 6-1)

The following shows the procedure for initial settings.

(1) Enter Engineering setting mode 2.

In RUN mode, press , w and 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
5875 0 2000	current (2 • When cha sensor co input is cl • When cha Changing • Selection	In input type from thermocouple (10 types), RTD (2 types), direct types) and DC voltage (4 type), and the unit $^{\circ}C/^{\circ}F$. anging the input from DC voltage to other inputs, remove the onnected to this controller first, then change the input. If the nanged with the sensor connected, the input circuit may break. anging an input type, refer to Section "9.6 Items to be Initialized by Settings" (p.109).
	2003	K -200 to 1370 °C
	200£	K -200.0 to 400.0 °C

Characters,	Setting Item, Function, Setting Range		
Factory Default			
	3000	J	-200 to 1000 °C
	- 000 - 000	R	0 to 1760 °C
	5000	S	0 to 1760 °C
	5000	В	0 to 1820 °C
	2002	E	-200 to 800 °C
	5000 <u>5</u>	Т	-200.0 to 400.0 °C
		N	-200 to 1300 ℃
	PL 20	PL-II	0 to 1390 °C
	<u>c000</u>	C(W/Re5-26)	
	PF [][Pt100	-200.0 to 850.0 °C
		JPt100	-200.0 to 500.0 °C
	PC [][Pt100	-200 to 850 °C
		JPt100	-200 to 500 °C
	E DDF	K	-328 to 2498 °F
	2005	K	-328.0 to 752.0 °F
	JUUF	J	-328 to 1832 °F
	- [][]F	R	32 to 3200 °F
	SUDF	S	32 to 3200 °F
	500F	В	32 to 3308 °F
	500F	E	-328 to 1472 °F
	500F	Т	-328.0 to 752.0 °F
		N	-328 to 2372 °F
	PL 2F	PL-II	32 to 2534 °F
	<u>c008</u>	C(W/Re5-26)	
	PC IIF	Pt100	-328.0 to 1562.0 °F
		JPt100	-328.0 to 932.0 °F
	PF []F	Pt100	-328 to 1562 °F
		JPt100	-328 to 932 °F
	8052	4 to 20 mA	-2000 to 10000
	8050	0 to 20 mA	-2000 to 10000
	80 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
5568	Scaling hi	-	
0 1370		ng high limit val	
	-	• •	v limit to Input range high limit
	DC voltag	e, current inputs	s: -2000 to 10000 (The placement of the decimal
	Cooling 1	ar limait	point follows the selection.)
5522	• Sets scali	w limit ng low limit valu	
0 -200		•	e low limit to Scaling high limit
	-		s: -2000 to 10000 (The placement of the decimal
		_, input	point follows the selection.)

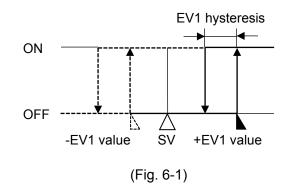
Characters, Factory Default	Setting Item, Function, Setting Range		
	Decimal point place		
dPIII	Selects decimal point place.		
	Selection item:		
		No decimal point	
		1 digit after decimal point	
		2 digits after decimal point	
	0000	3 digits after decimal point	
		e only when DC voltage or current input is selected in [Input type].	
E8a l	Event output EV1 allocation		
		vent output EV1 from the table below.	
		utput EV1 is changed, some setting items will be initialized. Refer to	
		9.6 Items to be Initialized by Changing Settings" (p.109).	
	Selection		
		No event	
	000 (Alarm output, High limit alarm	
	5000	Alarm output, Low limit alarm	
	0003	Alarm output, High/Low limits alarm	
	0004	Alarm output, High/Low limits independent alarm	
	0005	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	
	0 00	Alarm output, Low limit with standby alarm	
		Alarm output, High/Low limits with standby alarm	
	5:00	Alarm output, High/Low limits with standby independent alarm	
	E: 00	Heater burnout alarm output (when C5W, EIW or W option is	
		ordered):	
		Detects load current value with CT (current transformer), and	
		turns ON if it is lower than heater burnout alarm value.	
	00 /H	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.	

Characters,	Setting Item, Function, Setting Range		
Factory Default			
		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 "□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□	
		 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 band setting under the value of 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 band setting 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 %	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.	
	0 16 0 17	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].	
	0 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	
	00 /9	RUN output: Turns ON during program control RUN.	
	When [][0] [][0] /5 (Time When [][0] /3	(High limit alarm) to [] [

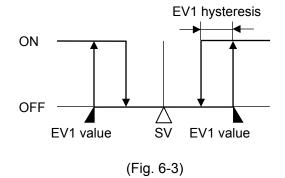
Alarm output

EV1 alarm output actions are shown below.

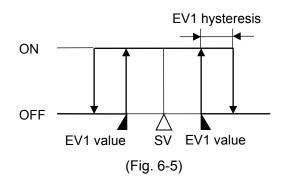
• High limit alarm



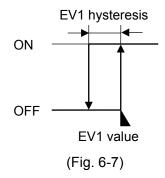
• High/Low limits alarm



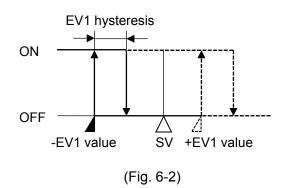
• High/Low limit range alarm



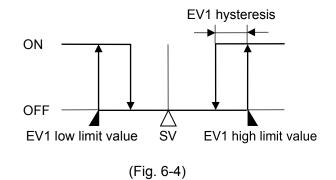
Process high alarm



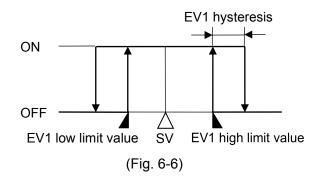
Low limit alarm



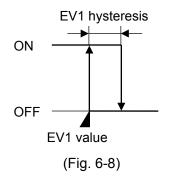
High/Low limits independent alarm

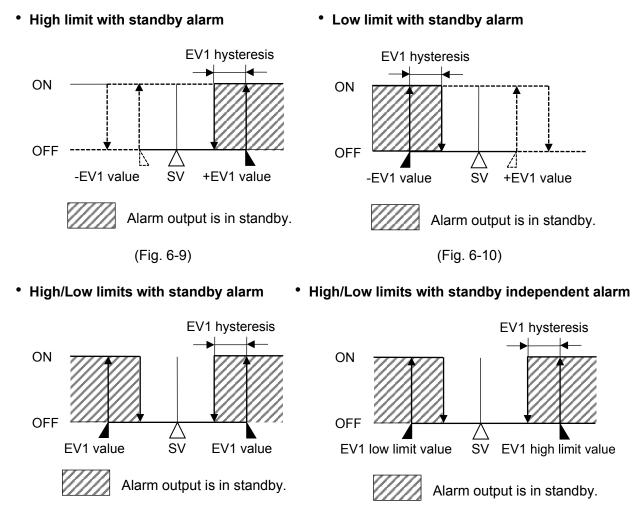


• High/Low limit range independent alarm



• Process low alarm





(Fig. 6-11)

(Fig. 6-12)

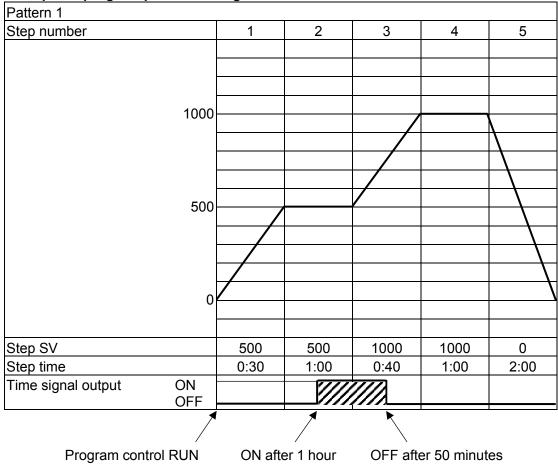
Time signal output

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	Press the MODE key multiple times until the following characters appear.		
ā_5	Step time unit		
0 50 50	Selects the Step time unit.		
	Selection item:		
		Hours : Minutes	
	58c0	Minutes : Seconds	

Characters,		Outling Home Frenching Outling Dense	
Factory Default	Setting Item, Function, Setting Range		
PrEF	Power res	tore action	
0 SFoP	 If the pow 	er fails during program control RUN, the controller can be operated	
	depending	g on the selection in [Power restore action].	
	Selection item:		
	56oP	Stops after power is restored:	
		After power is restored, stops current program control, and returns	
		to the program control STOP (in Standby).	
	cont	Continues after power is restored:	
		After power is restored, continues (resumes) previous program	
	Hold	control.	
		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	
	01000	resumes.	
5_58	-	hen program control starts	
		SV when program control starts.	
	Setting ra	-	
	•	ow limit to Scaling high limit (The placement of the decimal point ne selection.)	
		ontrol start type	
0 8800	-	control start type can be selected.	
	Selection		
	6800	PV start	
		Only when program control starts, the step SV and step time are	
		advanced to the PV, then program control starts.	
	P8-0	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 DOT V	l av The unit i	returns to RUN mode.	
	ey. The unit i		

(2) Enter Control parameter setting mode.

In RUN mode, press the A 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.

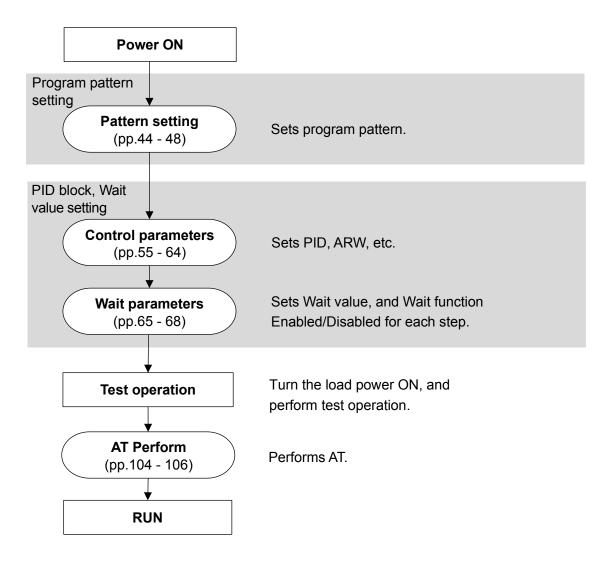
Characters, Factory Default	Setting Item, Function, Setting Range	
	key multiple times until the following characters appear.	
	 OUT1 proportional cycle Sets OUT1 proportional cycle. For the relay contact output type, if the proportional cycle time is decreased, the frequency of the relay action increases, 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 Setting range: 0.5, 1 to 120 seconds Available when OUT1 is relay contact output or non-contact voltage output. 	
Press the MODE	key multiple times until the following characters appear.	
E DAÎ U HERC	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% 0% $Low \leftarrow \triangle \rightarrow High$ FV (Fig. 6-14)	
	Reverse action: In Reverse action, MV is increased when SV is higher than PV (negative deviation). Electric furnaces perform Reverse action. Image: Constraint of the second	
Press the RST key. The unit returns to RUN mode.		
Press the KSI key. The unit returns to RUN mode.		

At this stage, the initial settings are complete.

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

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

Pattern 1					
Step number	1	2	3	4	5
1000					
500					
0					
Step SV	500	500	1000	1000	0
Step time	0:30	1:00	0:40	1:00	2:00
PID block number	2	2	3	3	2
Wait function Enabled/Disabled	Enabled	Disabled	Enabled	Disabled	Disabled

(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° to 0° 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°C (*)
3	10°C (*)	200 sec (*)	50 sec (*)	50% (*)	10°C (*)

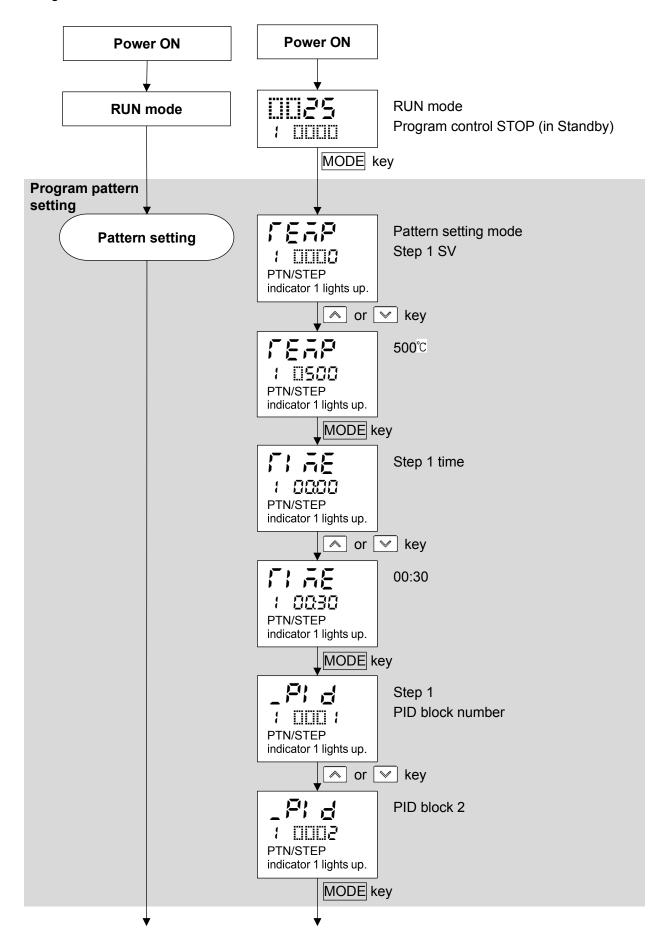
(*) Setting items in PID block are determined after performing AT. So, they are currently factory default values.

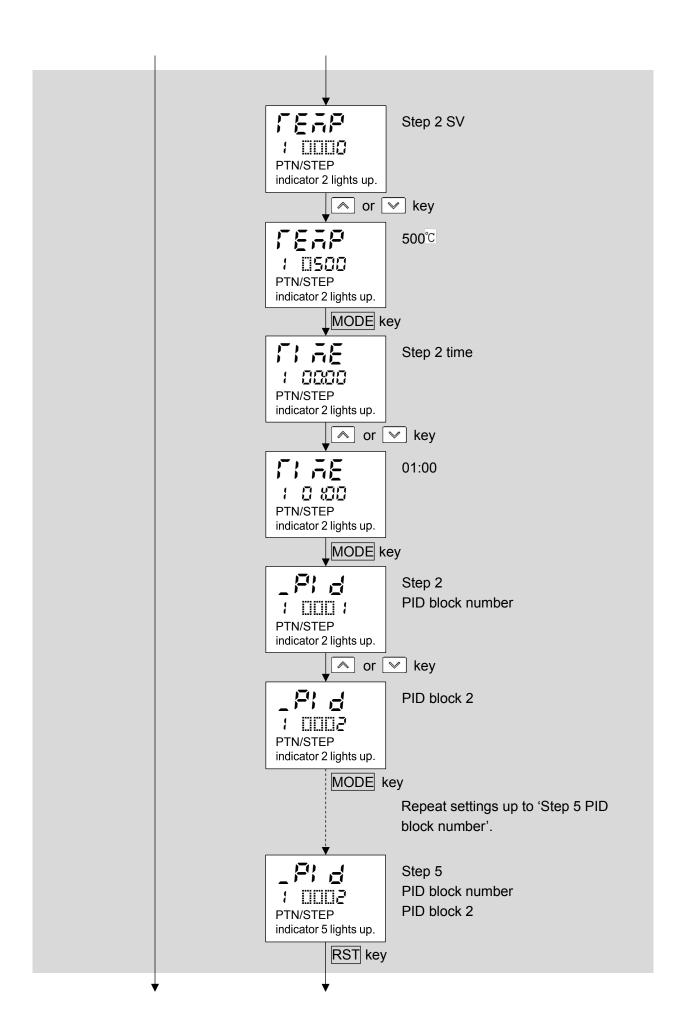
Example of Wait Value Setting

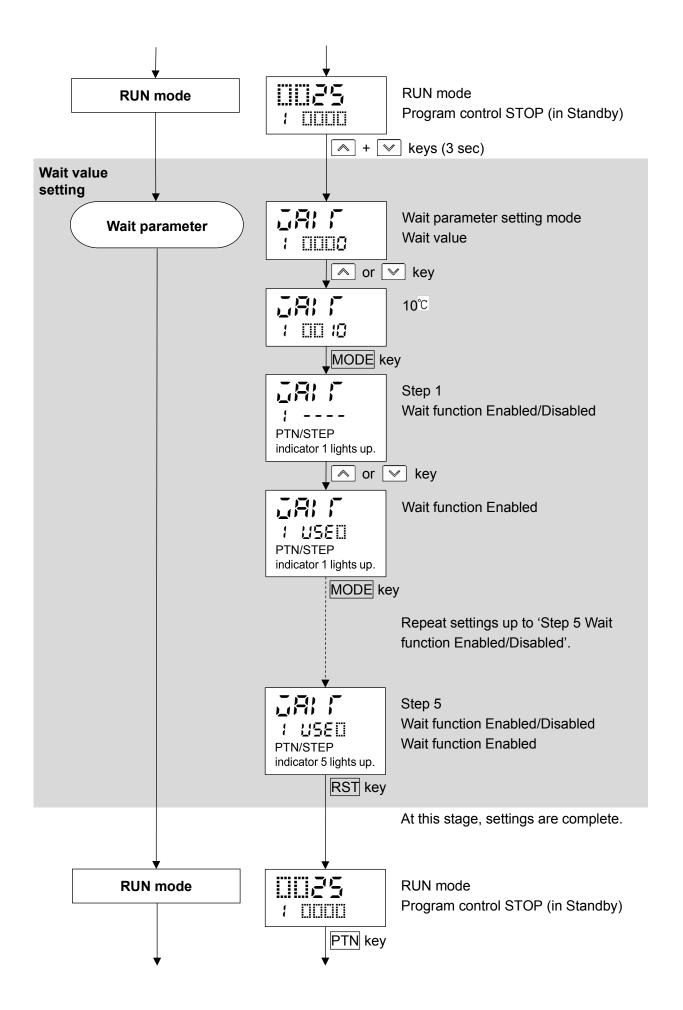
Wait value: 10℃

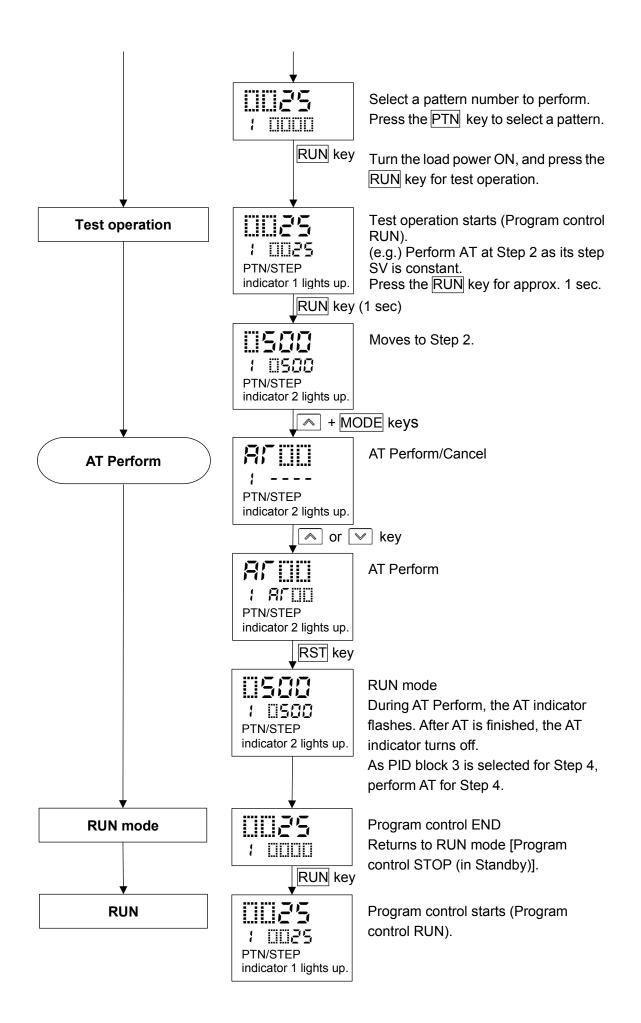
Wait value is common to all steps of each pattern.

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
TEAP	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
17: AE	Step 1 time
: 0800	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 🕟 key is pressed at 00:00, will appear.
	If is set, Fixed value control will be performed using Step 1 SV.
_P; d	Step 1 PID block number
	Selects PID block number used for Step 1.
PTN/STEP	Selection item:
indicator 1	1 to 10
lights up.	Stan 2 SV
reap	Step 2 SV
1 10000	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,	Setting Item, Function, Setting Range			
Factory Default	Step 2 time			
	Sets Step 2 time.			
PTN/STEP indicator 2	Step time is the processing time of the step.			
lights up.	Setting range:			
	, 00:00 to 99.59 (Time unit follows the selection in [Step time unit].)			
	If the vertice key is pressed at 00:00, will appear.			
	If – – – is set, Fixed value control will be performed using Step 2 SV.			
_P; d	Step 2 PID block number			
1 000 1	Selects PID block number used for Step 2.			
PTN/STEP	Selection item:			
indicator 2	1 to 10			
lights up.	Step 3 SV			
-	• Sets Step 3 SV.			
TIN/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 Step 3 time			
	Sets Step 3 time.			
	Step time is the processing time of the step.			
PTN/STEP indicator 3				
lights up.	• Setting range:			
	, 00:00 to 99.59 (Time unit follows the selection in [Step time unit].)			
	If the v key is pressed at 00:00, will appear.			
	If is set, Fixed value control will be performed using Step 3 SV.			
	Step 3 PID block number			
1 200 1	Selects PID block number used for Step 3.			
PTN/STEP	Selection item:			
indicator 3 lights up.	1 to 10			
TEAP	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			
5:25	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 \checkmark key is pressed at 00:00, $$ will appear.			
	If is set, Fixed value control will be performed using Step 4 SV.			

Characters, Factory Default	Setting Item, Function, Setting Range
	Step 4 PID block number
	Selects PID block number used for Step 4.
PTN/STEP	Selection item:
indicator 4	1 to 10
lights up.	
FEAP	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
<u>, , , , , , , , , , , , , , , , , , , </u>	Step 5 time
1 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 \checkmark key is pressed at 00:00, $$ will appear.
	If $$ is set, Fixed value control will be performed using Step 5 SV.
- 21 d	Step 5 PID block number
	Selects PID block number used for Step 5.
Image: PTN/STEP	Selection item:
indicator 5	1 to 10
lights up.	
l'Eap	Step 6 SV
	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
17 AE	Step 6 time
	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 w 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
	Selects PID block number used for Step 6.
PTN/STEP	Selection item:
indicator 6	1 to 10
lights up.	
I E A P	Step 7 SV
1 0000	Sets Step 7 SV.
PTN/STEP	Step SV is a value (SV) at the end of the step.
indicator 7	Setting range:
lights up.	Scaling low limit to Scaling high limit

Factory Default Step 7 time I I I I I I I I I I I I I I I I I I I	
Sets Step 7 time.	
PTN/STEP Step time is the processing time of the step.	
lights up.	
, 00:00 to 99.59 (Time unit follows the select	tion in [Step time unit].)
If the 💌 key is pressed at 00:00, will app	
If is set, Fixed value control will be performe	ed using Step 7 SV.
Step 7 PID block number	
Selects PID block number used for Step 7.	
PTN/STEP • Selection item:	
indicator 7 1 to 10	
lights up.	
Step 8 SV • Sets Step 8 SV.	
PTN/STEP Step SV is a value (SV) at the end of the step.	
lights up	
Step 8 time	
Sets Step 8 time.	
PTN/STEP Step time is the processing time of the step.	
indicator 8 • Setting range: lights up.	
, 00:00 to 99.59 (Time unit follows the select	tion in [Step time unit].)
If the 💌 key is pressed at 00:00, will app	ear.
If is set, Fixed value control will be performe	ed using Step 8 SV.
Step 8 PID block number	
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.	
lights up.	
• Setting range:	
Scaling low limit to Scaling high limit	
Step 9 time	
COOO Sets Step 9 time.	
PTN/STEP Step time is the processing time of the step.	
• Setting range:	
lights up, 00:00 to 99.59 (Time unit follows the select	tion in [Step time unit].)
If the 💌 key is pressed at 00:00, will app	ear.
If is set, Fixed value control will be performe	

Characters, Factory Default	Setting Item, Function, Setting Range				
	Step 9 PID block number				
	Selects PID block number used for Step 9.				
PTN/STEP	Selection item:				
indicator 9	1 to 10				
lights up.					
FEAP	Step 10 SV				
	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				
17 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.				
문문	Step 10 PID block number				
	Selects PID block number used for Step 10.				
PTN/STEP	Selection item:				
indicator 10	1 to 10				
lights up.					
,- ;= ;= ;-	Number of repetitions				
	Sets the number of repetitions for the selected Pattern 1				
PTN/STEP	• Setting range:				
indicator turns off.	0 to 10000 Pattern link				
cHI a					
	• Selects whether to link Pattern 2 to currently selected pattern 1.				
PTN/STEP indicator turns off.	If Pattern 10 is selected, Pattern 1 can be linked, and selects whether to link				
	Pattern 1.				
	Randomly selected pattern numbers (Pattern 1 and Pattern 5) cannot be				
	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				
	도법 효 Pattern link Enabled				

At this stage, settings for Pattern setting mode are complete. Press the $\ensuremath{\mathsf{RST}}$ 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 \square allocation], TS \square output OFF time and TS \square 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.

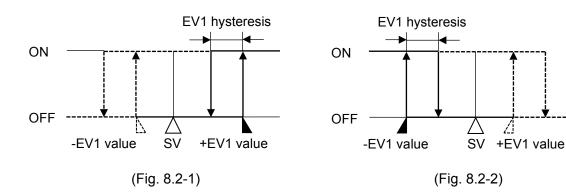
If 'Pattern link Enabled' is selected in [Pattern link]: Even if the performing pattern is changed from 1 to 2 during Event setting mode, Pattern 1 will be remained, and pattern number will not be updated until the unit reverts to RUN mode.

Alarm output

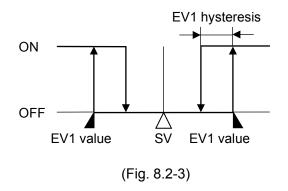
EV1 alarm output actions are shown below. EV1 alarm output will be substituted by EV2 or EV3 alarm output.



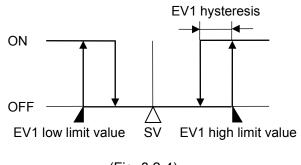
• Low limit alarm



High/Low limits alarm



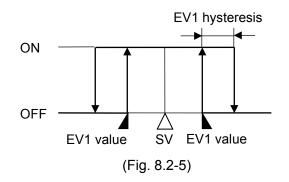
High/Low limits independent alarm



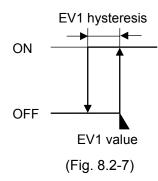
Δ

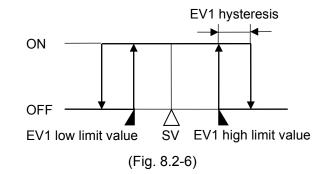
(Fig. 8.2-4)

High/Low limit range alarm

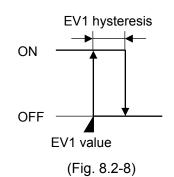


• Process high alarm

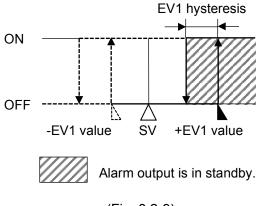




Process low alarm

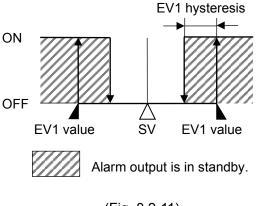


• High limit with standby alarm



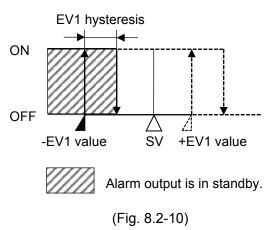


• High/Low limits with standby alarm

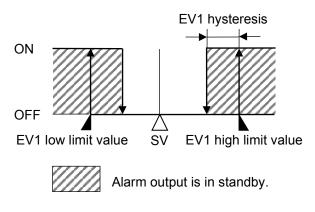


(Fig. 8.2-11)

• Low limit with standby alarm



• High/Low limits with standby independent alarm



(Fig. 8.2-12)

- 50 -

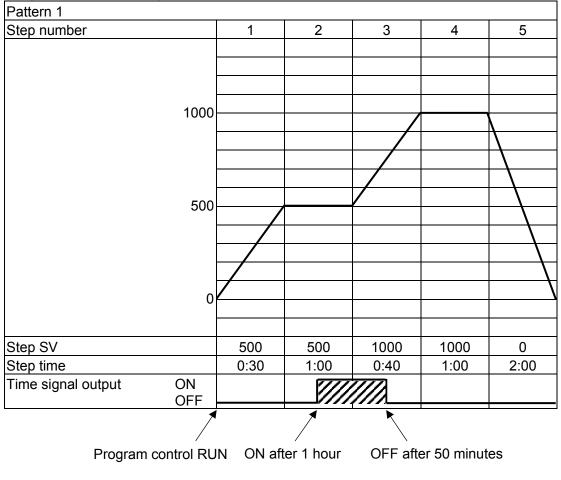
High/Low limit range independent alarm

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.



Program pattern setting example

(e.g.) Time signal output setting Time signal output OFF time: 1 hour

Time signal output OFF time. Thou 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 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				
	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				
	scaling low (or high) limit value. (The placement of the decimal point follows the selection.)				
	Available when $\square \square \square \square \square$ (High limit alarm) to $\square \square \square \square$ (High/Low limits with standby				
	independent alarm) is selected in [Event output EV1 allocation].				
8 880	EV1 high limit alarm value				
	Sets EV1 high limit alarm value.				
·	Setting range: Same as those of EV1 alarm value.				
	Available when				
	independent alarm) or $\mathbb{B}\mathcal{G}\not\mathrel{\mathcal{C}}$ (High/Low limits with standby independent alarm) is selected				
	in [Event output EV1 allocation].				
¦⊊ ¦⊡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 $\blacksquare 9$ /5 (Time signal output) is selected in [Event output EV1 allocation].				

Characters, Factory Default	Setting Item, Function, Setting Range
l'Ion	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 $\square O $ (Time signal output) is selected in [Event output EV1 allocation].
8200	EV2 alarm value
1 0008	• 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 $\square \square \square \square \square$ (High limit alarm) to $\square \square \square \square \square \square$ (High/Low limits with standby
	independent alarm) is selected in [Event output EV2 allocation].
Rehi	EV2 high limit alarm value
	• Sets EV2 high limit alarm value.
·	 Setting range: Same as those of EV1 alarm value.
	Available when $\Box \Box \Box \Box \downarrow$ (High/Low limits independent alarm), $\Box \Box \Box \Box \Box $ (High/Low limit range
	independent alarm) or 🗓 🕻 (High/Low limits with standby independent alarm) is selected
120F	in [Event output EV2 allocation]. TS2 output OFF time
	Sets TS2 output OFF time.
	• Setting range:
	00:00 to 99:59 (Time unit follows the selection in [Step time unit].)
	Available when $\Box \hat{\mathcal{G}}$ (Time signal output) is selected in [Event output EV2 allocation].
	TS2 output ON time
1 0000	Sets TS2 output ON time.
	Setting range:
	00:00 to 99:59 (Time unit follows the selection in [Step time unit].)
	Available when $\Box \Box J$ (Time signal output) is selected in [Event output EV2 allocation].
8300	EV3 alarm value
1 0008	 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 $\Box \Box \Box \Box I$ (High limit alarm) to $\Box \Box I I$ (High/Low limits with standby
	independent alarm) is selected in [Event output EV3 allocation].
R3H[]	EV3 high limit alarm value
	Sets EV3 high limit alarm value.
	• Setting range: Same as those of EV1 alarm value.
	Available when $\square\square\square$ (High/Low limits independent alarm), $\square\square\square\square$ (High/Low limit range independent alarm) or $\square\square$ (C (High/Low limits with standby independent alarm) is selected
	independent alarm) or it is c (High/Low limits with standby independent alarm) is selected in [Event output EV3 allocation].

Characters, Factory Default	Setting Item, Function, Setting Range
	TS3 output OFF time
1 0000	Sets TS3 output OFF time.
	Setting range:
	00:00 to 99:59 (Time unit follows the selection in [Step time unit].)
	Available when $\blacksquare \mathcal{G} \mathcal{B}$ (Time signal output) is selected in [Event output EV3 allocation].
l' Bon	TS3 output ON time
	Sets TS3 output ON time.
	Setting range:
	00:00 to 99:59 (Time unit follows the selection in [Step time unit].)
	Available when $\blacksquare \mathcal{G}/\mathcal{G}$ (Time signal output) is selected in [Event output EV3 allocation].

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

Press the $\ensuremath{\overline{\mathsf{RST}}}$ 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, Factory Default		Setting Item, Function, Setting Range				
	AT Perform	n/Cancel				
[]	 Selects A 	Γ (auto-tuning) Perform/Cancel.				
11	AT will wo	rk only during program control RUN.				
		tarts, and if AT has not been completed within 4 hours, or if input				
	errors hav	e occurred, $ar{E} = ar{E} ar{G}$ will be indicated on the PV Display, and AT will				
	be forced	to stop.				
	 Selection 	item:				
		AT Cancel				
	8500	AT Perform				
	PID block	number				
	 Selects a 	PID block number from 1 to 10 for the following settings:				
	OUT1 p	roportional 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					

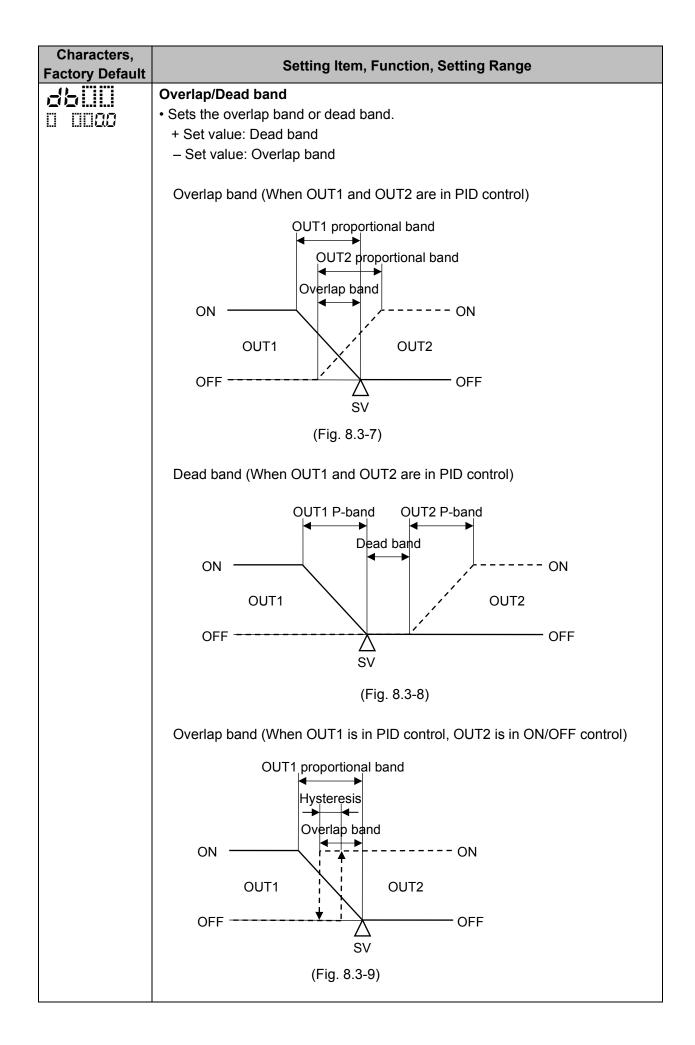
Characters,						
Factory Default	Setting Item, Function, Setting Range					
P[][][] 1 00 10	 OUT1 proportional band Sets OUT1 proportional band for the PID block number selected in [PID block number]. 					
	The PTN/STEP Display indicates the PID block number selected in [PID block number].					
	OUT1 becomes ON/OFF control when set to 0 or 0.0.					
	OUT1 proportional band					
	OFF					
	(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%					
2	Integral time					
1 0200	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					
(******	Setting range: 0 to 3600 seconds					
	 Derivative time Sets the derivative time of the PID block number selected in [PID block 					
1 0050	-					
	number]. The PTN/STEP Display indicates the PID block number selected in [PID block					
	number].					
	Setting range: 0 to 1800 seconds					
8-50	ARW					
1 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%					

Factory Default Setting Item, Function, Setting Range - IIIIIII OUT1 proportional cycle							
- UT1 proportional cycle							
	OUT1 proportional cycle						
	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	0.5, 1 to 120 seconds						
Available when OUT1 is relay contact output or non-contact voltage output type.							
OUT1 ON/OFF hysteresis							
• Sets ON/OFF hysteresis for OUT1.	Sets ON/OFF hysteresis for OUT1.						
Hysteresis	Hysteresis						
OUTI SV							
hysteresis							
(Fig. 8.3.2)	(Fig. 8.3-2)						
$(1 \text{ ig. } 0.5^{-2})$	(1 ig. 0.3 - 2)						
• Setting range:	Setting range:						
	$0.1 \text{ to } 1000.0^{\circ} \text{C} \text{ (F)}$						
	DC voltage, current inputs: 1 to 10000 (The placement of the decimal point						
follows the selection.)							
OUT1 high limit							
• Sets OUT1 high limit value.							
• Setting range:							
OUT1 low limit to 100%							
Direct current output type: OUT1 low limit to 105%							
OUT1 low limit							
Sets OUT1 low limit value.							
Setting range:							
0% to OUT1 high limit							
Direct current output type: -5% to OUT1 high limit							

Characters, Factory Default	Setting Item, Function, Setting Range				
	 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.				
	(Fig. 8.3-3) ON (100%) = 0 fr (0%)				

OUT2 cooling method Stelects OUT2 cooling method from air, oil or water cooling. OUT2 proportional band Air cooling OUT2 cooling Water cooling SV (Fig. 8.3-5) • Selection item: R! r I Air cooling (Linear characteristics) of L I Oil cooling (2nd power of the linear characteristics) of L I Oil cooling (2nd power of the linear characteristics) of L I Oil cooling (2nd power of the linear characteristics) output EV2 allocation]) is ordered, or when DS, DA or EV3DI option is ordered. OUT2 proportional band * Sets the OUT2 proportional band <th>Characters,</th> <th colspan="5">Setting Item, Function, Setting Range</th>	Characters,	Setting Item, Function, Setting Range						
 Selects OUT2 cooling method from air, oil or water cooling. OUT2 proportional band Air cooling Oil cooling Oil cooling Water cooling (Fig. 8.3-5) Selection item: Air cooling (Linear characteristics) a' L □ Oil cooling (1.5th power of the linear characteristics) a' L □ Oil cooling (1.5th power of the linear characteristics) a' L □ Oil cooling (2nd power of the linear characteristics) Available when EV2 option (if "□020 Aleating/Cooling control output" is selected in [Event output EV2 allocation]) is ordered, or when DS, DA or EV3D□ option is ordered. 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[°]C (F) Thermocouple, RTD input with decimal point: 0.0 to Input span[°]C (F) DC voltage, current inputs: 0.0 to 1000.0% Available when EV2 option (if "□020". Heating/Cooling control output" is selected in 	Factory Default							
OUT2 proportional band Air cooling Water cooling SV (Fig. 8.3-5) • Selection item: R: r:: Air cooling (Linear characteristics) oit L:: Oli cooling (1.5th power of the linear characteristics) oit L:: OUT2 proportional band * Available when EV2 option (if "D22C Heating/Cooling control output" is selected in [Event output EV2 allocation]) is ordered, or when DS, DA or EV3D:: OUT2 proportional band • Sets the 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 [®] C ([®]) Thermocouple, RTD input with decimal point: 0.0 to Input span [®] C ([®]) DC voltage, current inputs: 0.0 to 1000.0% Available when EV2 option (if "D2CD: Heating/Cooling control output" is selected in								
Air cooling Water cooling Water cooling SV (Fig. 8.3-5) • Selection item: RI r ii Air cooling (Linear characteristics) oil L ii Oil cooling (1.5th power of the linear characteristics) oil L ii Oil cooling (2nd power of the linear characteristics) oil L ii Oil cooling (2nd power of the linear characteristics) output EV2 allocation]) is ordered, or when DS, DA or EV3D□ option is ordered. 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°C (F) Thermocouple, RTD input with decimal point: 0.0 to Input span°C (F) DC voltage, current inputs: 0.0 to 1000.0% Available when EV2 option (if "ÜÜ20: Heating/Cooling control output" is selected in	0 8,-0	• Selects OUT2 cooling method from air, oil or water cooling.						
Image: Signal State Sta		OUT2 proportional band						
Image: Signal State Sta								
Water cooling SV (Fig. 8.3-5) • Selection item: RI r I Air cooling (Linear characteristics) ol L I Oil cooling (1.5th power of the linear characteristics) IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII		Air cooling						
Image: SV (Fig. 8.3-5) • Selection item: Image: SV Image: SV Oil cooling (Linear characteristics) Image: SV Oil cooling (1.5th power of the linear characteristics) Image: SV Oil cooling (1.5th power of the linear characteristics) Image: SV Oil cooling (2nd power of the linear characteristics) Image: SV Out2 proportional band • Sets the 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]. 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°C (F) Thermocouple, RTD input with decimal point: 0.0 to Input span°C (F) DC voltage, current inputs: 0.0 to 1000.0% Available when EV2 option (if "ID22D: Heating/Cooling control output" is selected in		Oil cooling						
(Fig. 8.3-5) • Selection item: R! r:i Air cooling (Linear characteristics) o! L:i Oil cooling (1.5th power of the linear characteristics) o: L:i Oil cooling (2nd power of the linear characteristics) Available when EV2 option (if "ID20 Heating/Cooling control output" is selected in [Event output EV2 allocation]) is ordered, or when DS, DA or EV3D□ option is ordered. 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°C (°F) Thermocouple, RTD input with decimal point: 0.0 to Input span°C (°F) DC voltage, current inputs: 0.0 to 1000.0% Available when EV2 option (if "ID20: Heating/Cooling control output" is selected in								
(Fig. 8.3-5) • Selection item: R! r:i Air cooling (Linear characteristics) o! L:i Oil cooling (1.5th power of the linear characteristics) o: L:i Oil cooling (2nd power of the linear characteristics) Available when EV2 option (if "ID20 Heating/Cooling control output" is selected in [Event output EV2 allocation]) is ordered, or when DS, DA or EV3D□ option is ordered. 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°C (°F) Thermocouple, RTD input with decimal point: 0.0 to Input span°C (°F) DC voltage, current inputs: 0.0 to 1000.0% Available when EV2 option (if "ID20: Heating/Cooling control output" is selected in		Δ						
• Selection item: RI → □ Air cooling (Linear characteristics) □I L□ Oil cooling (1.5th power of the linear characteristics) □RT□ Water cooling (2nd power of the linear characteristics) □Available when EV2 option (if "□D20 Heating/Cooling control output" is selected in [Event output EV2 allocation]) is ordered, or when DS, DA or EV3D□ option is ordered. 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 with 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% Available when EV2 option (if "□D20: Heating/Cooling control output" is selected in		SV						
R: r: Air cooling (Linear characteristics) D: L: Oil cooling (1.5th power of the linear characteristics) J: R::: Water cooling (2nd power of the linear characteristics) Available when EV2 option (if "::::::::::::::::::::::::::::::::::::		(Fig. 8.3-5)						
R: r: Air cooling (Linear characteristics) D: L: Oil cooling (1.5th power of the linear characteristics) J: R::: Water cooling (2nd power of the linear characteristics) Available when EV2 option (if "::::::::::::::::::::::::::::::::::::		Selection item:						
Image:		Air cooling (Linear characteristics)						
Available when EV2 option (if "IIII and the entropy of the entrop								
output EV2 allocation]) is ordered, or when DS, DA or EV3D option is ordered. 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°C (°F) Thermocouple, RTD input with decimal point: 0.0 to Input span°C (°F) DC voltage, current inputs: 0.0 to 1000.0% Available when EV2 option (if "ÜQ2Q: Heating/Cooling control output" is selected in								
 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[°]C ([°]F) Thermocouple, RTD input with decimal point: 0.0 to Input span[°]C ([°]F) DC voltage, current inputs: 0.0 to 1000.0% Available when EV2 option (if "ÜQ2Q: Heating/Cooling control output" is selected in 								
 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[°]C ([°]F) Thermocouple, RTD input with decimal point: 0.0 to Input span[°]C ([°]F) DC voltage, current inputs: 0.0 to 1000.0% Available when EV2 option (if "□020: Heating/Cooling control output" is selected in 		output EV2 allocation]) is ordered, or when DS, DA or EV3D \Box option is ordered.						
 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[°]C ([°]F) Thermocouple, RTD input with decimal point: 0.0 to Input span[°]C ([°]F) DC voltage, current inputs: 0.0 to 1000.0% Available when EV2 option (if "DDD" action of the exact o	P_60							
 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[°]C ([°]F) Thermocouple, RTD input with decimal point: 0.0 to Input span[°]C ([°]F) DC voltage, current inputs: 0.0 to 1000.0% Available when EV2 option (if "DDDC 20: Heating/Cooling control output" is selected in 	1 00 10							
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 [°] C ([°] F) Thermocouple, RTD input with decimal point: 0.0 to Input span [°] C ([°] F) DC voltage, current inputs: 0.0 to 1000.0% Available when EV2 option (if "∷020: Heating/Cooling control output" is selected in		-						
 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[°]C ([°]F) Thermocouple, RTD input with decimal point: 0.0 to Input span[°]C ([°]F) DC voltage, current inputs: 0.0 to 1000.0% Available when EV2 option (if "D20: Heating/Cooling control output" is selected in 								
 in [OUT2 cooling method] will be disabled. 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% Available when EV2 option (if "□020: Heating/Cooling control output" is selected in 		-						
Setting range: Thermocouple, RTD input without decimal point: 0 to Input span [℃] ([°] F) 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 "□□2□: Heating/Cooling control output" is selected in								
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% Available when EV2 option (if " $\square O = O$: Heating/Cooling control output" is selected in								
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 "□□□□□: Heating/Cooling control output" is selected in								
DC voltage, current inputs: 0.0 to 1000.0% Available when EV2 option (if "								
[Event output EV2 allocation]) is ordered, or when DS, DA or EV3D \square option is ordered.		[Event output EV2 allocation]) is ordered, or when DS, DA or EV3D \Box option is ordered.						
OUT2 proportional cycle	c_b0	OUT2 proportional cycle • Sets OUT2 proportional cycle.						
• Sets OUT2 proportional cycle.	00003							
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 "DCC 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					
8456	OUT2 ON/OFF hysteresis					
	Sets OUT2 ON/OFF hysteresis.					
	-					
	Hysteresis					
	ON					
	Δ Δ 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 "III Heating/Cooling control output" is selected in					
	[Event output EV2 allocation]) is ordered, or when DS, DA or EV3D option is ordered.					
ol Hb	OUT2 high limit					
	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 " $\square \square \square \square \square \square \square \square$ Heating/Cooling control output" is selected in					
	[Event output EV2 allocation]) is ordered, or when DS, DA or EV3D \Box option is ordered.					
ollo	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 "IIII and Heating/Cooling control output" is selected in					
	[Event output EV2 allocation]) is ordered, or when DS, DA or EV3D \Box option is ordered.					



Characters,	Setting Item, Function, Setting Range					
Factory Default						
	Dead band (When OUT1 is in PID control, OUT2 is in ON/OFF control)					
	ON ON					
	OUT1 OUT2					
	OFF OFF					
	Δ SV					
	(Fig. 8.3-10)					
	Setting range:					
	-200.0 to 200.0°C (°F)					
	DC voltage, current inputs: -2000 to 2000 (The placement of the decimal point follows the selection.)					
	Available when EV2 option (if "					
	[Event output EV2 allocation]) is ordered, or when DS, DA or EV3D option is ordered.					
Leoni	Direct/Reverse action					
O HEAT	 Selects either Direct (Cooling) or Reverse (Heating) control action. Selection range: 					
	HER Reverse (Heating) action					
	EBEL Direct (Cooling) action					
H 100	Heater burnout alarm 1 value					
0 0000						
H III and CT1						
alternately						
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 outp					
) (–(;;;;;;	non-contact voltage output type.					
HZUU	 Heater burnout alarm 2 value Sets the detecting current value for Heater burnout alarm 2. 					
HEILIGO	Available only when using 3-phase.					
current value are	When setting to 0.0, Heater burnout alarm 2 is disabled.					
alternately	Characters H2 and CT2 current value are indicated alternately on the PV					
indicated.	Display.					
	When OUT1 is ON, the CT2 current value is updated.					

Characters, Factory Default	Setting Item, Function, Setting Range				
	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 timeSets the time to assess the Loop break alarm.				
0 0000	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 "…ここここ 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 Available when III '4 (Loop break alarm output) is selected in [Event output EV] allocation].					
1 P 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°C (°F)					
	Thermocouple, RTD input with decimal point: 0.0 to 150.0° (F)					
	DC voltage, current inputs: 0 to 1500 (The placement of the decimal point follows					
	the selection.)					
	Available when $\square \mathcal{G} \mathrel{{}^{\!$					
	allocation].					

At this stage, settings for Control parameter setting mode are complete. Press the $\boxed{\text{RST}}$ 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.

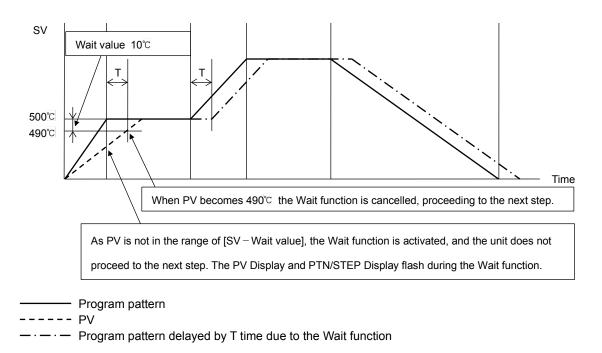
Wait function

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

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

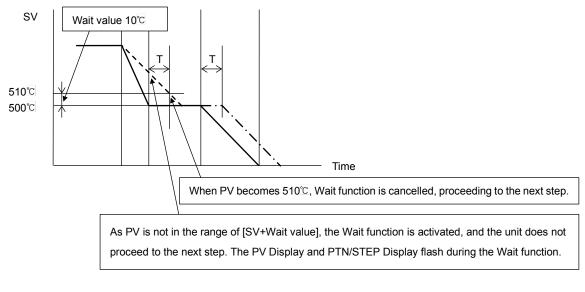
• Explanation of Wait Function

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 🔊 and 💟 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					
1 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,	Setting Item, Function, Setting Range					
Factory Default						
LAC!	Step 1 wait function Enabled/Disabled					
1	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				
		ble if wait value is set to 0 or 0.0.				
<u>laac</u> (-	t function Enabled/Disabled				
:		ne wait function Enabled or Disabled at Step 2, based on the wait				
PTN/STEP		in [Wait value].				
indicator 2	 Selection 	item:				
lights up.		Disabled				
	USEU	Enabled				
	Not available	e if wait value is set to 0 or 0.0.				
JAc (Step 3 wai	t function Enabled/Disabled				
	 Selects the 	ne 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				
	USED	Enabled				
	Not available if wait value is set to 0 or 0.0.					
LAE!	Step 4 wai	it function Enabled/Disabled				
	 Selects the 	ne 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					
	USEII Enabled					
	Not available	e if wait value is set to 0 or 0.0.				
<u>JAc</u> f	Step 5 wai	it 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				
	USED	Enabled				
	Not available if wait value is set to 0 or 0.0.					
JAc!	Step 6 wait function Enabled/Disabled					
	• Selects the wait function Enabled or Disabled at Step 6, based on the wait					
PTN/STEP	value set	in [Wait value].				
indicator 6	 Selection 	item:				
lights up.		Disabled				
	USED	Enabled				
	Not available if wait value is set to 0 or 0.0.					
L						

Characters, Factory Default	Setting Item, Function, Setting Range					
<u>, 8-1</u>	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					
	LISE Enabled					
	Not available if wait value is set to 0 or 0.0.					
<u>JAc</u> l	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					
	USEII Enabled					
	Not available if wait value is set to 0 or 0.0.					
JAc (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					
	USEII 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					
	USEII 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 $\ensuremath{\overline{\mathsf{RST}}}$ 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 value 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, Factory Default	Setting Item, Function, Setting Range			
Lock	Set value lock			
	 Locks the 	e set values	s to prevent setting errors.	
ш			be locked depends on the select	ction.
	 Selection 	item:	·	
			Change via Keypad	Change via Software Communication
		Unlock	All set values can be changed.	All set values can be changed.
	Loci	Lock 1	Only 'Set value lock' can	
			be changed. Other setting	
			items cannot be changed.	
	Loca	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
	Locy	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.	
1055	Changeab	le in Set v	•	
0 5800	・When とっこぞ (Lock 2) or とっこち (Lock 5) is selected in [Set value lock], the			
	following items can be changed.			
	Selection item:			
	5800	Step SV	and Step time can be changed	
	5868		Step time and EV alarm value	

Characters, Factory Default	Setting Item, Function, Setting Range
5020 0 000	Sensor correction coefficient Sets sensor correction coefficient. Sets slope of input value from a sensor.
	$750^{\circ}C$ $700^{\circ}C$ $340^{\circ}C$ $340^{\circ}C$ $300^{\circ}C$ X $Corrected from 750^{\circ}C to 700^{\circ}C.$
	300°C 750°C 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
50000 0 0000	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,	Setting Item, Function, Setting Range
Factory Default	
	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%
	$ \longrightarrow $
	T
	(Fig. 8.5-3)
	Setting range: 0.0 to 10.0 seconds
- 2 2 !	Communication protocol
	Selects communication protocol.
0 nonL	Selection item:
	nanic Shinko protocol
	5台に SV digital transmission (Shinko protocol)
	5ビー SV digital reception (Shinko protocol)
	주호성류 Modbus ASCII mode
	กัออ่า Modbus RTU mode
	Available when C5W or C5 option is ordered.
	Instrument number
0 0008	• 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,	
Factory Default	Setting Item, Function, Setting Range
cāŠP	Communication speed
	 Selects a communication speed equal to that of the host computer.
	Selection item:
	EIII.95 9600 bps
	🗒 /92 19200 bps
	표 경용 역 38400 bps
	Available when C5W or C5 option is ordered.
c AF (Data bit/Parity
U 788A	 Selects data bit and parity equal to those of the host computer.
	Selection item:
	ອີກອກ 8 bits/No parity
	ריביהי 7 bits/No parity
	8 bits/Even
	ገደ ይ. 7 bits/Even
	පියේත් 8 bits/Odd
	ියේත් 7 bits/Odd
	Available when C5W or C5 option is ordered.
6755	Stop bit
	 Selects the stop bit equal to that of the host computer.
	Selection item:
	IIII / 1 bit
	CICIC 2 bits
	Available when C5W or C5 option is ordered.
6763	Response 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
· ··· ····	Available when C5W or C5 option is ordered.
58_5	SVTC bias
0 0000	• SV adds SVTC bias value to the value received by the SVTC command.
	• Setting range: ±20% of input span
	DC voltage, current inputs: $\pm 20\%$ of scaling span (The placement of the
	decimal point follows the selection.)
	Available when C5W, C5 option is ordered, and when 587 - [SV digital reception (Shinko
	protocol)] is selected in [Communication protocol].

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

Press the \overrightarrow{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 $EV\Box$ 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 🦱, 💌	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,		Settin	g Item, Function, Setting Range	
Factory Default			g	
56-5	Input type	a input tuna from	n thormoodunlo (10 tunoo) RTD (2 tunoo) direct	
0 2002	• 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		
		• • •	is controller first, then change the input. If the	
	input is cl	hanged with the	e sensor connected, the input circuit may break.	
	 When cha 	anging an input	type, refer to Section "9.6 Items to be Initialized by	
		Settings" (p.10	9).	
	Selection			
	2003	K	-200 to 1370 °C	
	2003	K	-200.0 to 400.0 °C	
	3000	J	-200 to 1000 ℃	
	-00C	R	0 to 1760 ℃	
	5000	S	0 to 1760 ℃	
	600C	В	0 to 1820 ℃	
	2003	E	-200 to 800 ℃	
	/ 000£	Т	-200.0 to 400.0 ℃	
	n000	Ν	-200 to 1300 ℃	
	PL 20	PL-II	0 to 1390 °C	
	c000	C(W/Re5-26)	0 to 2315 ℃	
	PEDE	Pt100	-200.0 to 850.0 °C	
	_:P(JPt100	-200.0 to 500.0 °C	
	PT 🛛 E	Pt100	-200 to 850 °C	
	JPF C	JPt100	-200 to 500 °C	
	FUDE	К	-328 to 2498 °F	
	FUDE	К	-328.0 to 752.0 °F	
	JUDF	J	-328 to 1832 °F	
	- [][]F	R	32 to 3200 °F	
	SUDF	S	32 to 3200 °F	
	600F crinc	В	32 to 3308 °F	
	EUUF	E	-328 to 1472 °F	

Characters,			
Factory Default		Settin	g Item, Function, Setting Range
	5 []][]F	Т	-328.0 to 752.0 °F
	'nЩ∭₽	Ν	-328 to 2372 °F
	PL 2F	PL-II	32 to 2534 °F
	cuur	C(W/Re5-26)	32 to 4199 °F
	₽ſ ∐F	Pt100	-328.0 to 1562.0 °F
	JPC F	JPt100	-328.0 to 932.0 °F
	PT OF	Pt100	-328 to 1562 °F
	_:P(" F	JPt100	-328 to 932 °F
	4208	4 - 20 mA	-2000 to 10000
	8208	0 - 20 mA	-2000 to 10000
	80 18	0 - 1 V	-2000 to 10000
	0058	0 - 5 V	-2000 to 10000
	XII 58	1 - 5 V	-2000 to 10000
	0 108	0 - 10 V	-2000 to 10000
5728	Scaling hi	gh limit	
0 1370	 Sets scali 	ng high limit va	lue.
	-	•	w limit to Input range high limit
	DC voltag	e, current input	s: -2000 to 10000 (The placement of the decimal
			point follows the selection.)
	Scaling low limit Sets scaling low limit value.		
005- 🛙		•	le low limit to Scaling high limit
	-	• • •	s: -2000 to 10000 (The placement of the decimal
	Devenag	o, canon input	point follows the selection.)
dP00	Decimal p	oint place	
	•	ecimal point pla	ice.
	 Selection 		
	0000	No decimal po	pint
		1 digit after de	ecimal point
		2 digits after o	lecimal point
	0000	3 digits after o	lecimal point
	Available	when DC voltage	or current input is selected in [Input type].
E80 (Event outp	out EV1 alloca	tion
		•	1 from the table below.
			utput EV1, refer to Section "9.6 Items to be Initialized
		ing Settings" (p	o.109).
	Selection		
		No event	Llich limit close
	100 /	· · · ·	High limit alarm
		1 · ·	Low limit alarm
		•	High/Low limits alarm
			High/Low limits independent alarm
	1	Alarm output,	High/Low limit range alarm

Characters,		
Factory Default		Setting Item, Function, Setting Range
		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
	5, 00	Alarm output, High/Low limits with standby independent alarm
	00 /3	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.
	00 /4	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 "□□ここ】 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
		within the time allotted to assess the Loop break alarm, the alarm output will be turned ON.

Characters,		Setting Item, Function, Setting Range
Factory Default		
		 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 band setting 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 band setting within the time allotted to assess the Loop break alarm, the alarm output will be turned ON.
	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 /6	Output during AT:
	00 17	Turns ON during AT.
	ii . (((Pattern end output: Turns ON when Program control ends, and remains ON during
		the time set in [Pattern end output time].
	00 /8	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
	00 /9	RUN output:
		Turns ON during program control RUN.
	or [][] /5 (When [][]	 I (High limit alarm) to [] I I (High/Low limit with standby independent alarm) Time signal output) is selected, one output can be set to one event output. I (Heater burnout alarm output), [] I I (Loop break alarm), and [] I I (Output o [] I I (RUN output) are selected, each output is common to multiple event
A IEA		value 0 Enabled/Disabled
0 no00	 When EV Selection 	1 alarm value is 0 (zero), alarm action can be Enabled or Disabled.
		Disabled
	YESU	Enabled
	Available wh standby inde	Len any alarm from $\square \square \square \square$ (High limit alarm) to $\square \square \square \square$ (High/Low limits with pendent alarm) is selected in [Event output EV1 allocation] - excluding $\square \square \square \square$ h alarm) and $\square \square \square \square$ (Process low alarm).
8 :89 0 00 0	 EV1 alarm Sets EV1 Setting ra DC voltag 	hysteresis alarm hysteresis. nge: 0.1 to 1000.0°C (°F), e, current inputs: 1 to 10000 (The placement of the decimal point follows the selection.)
	standby ind	hen any alarm from DDD 1 (High limit alarm) to DD 12 (High/Low limits with ependent alarm) is selected in [Event output EV1 allocation].
8 122	 Sets EV1 When set alarm is a Setting ra Available w 	delay time alarm action delay time. ting time has elapsed after PV enters the alarm output range, the ctivated. nge: 0 to 10000 seconds hen any alarm from 200 / (High limit alarm) to 20 /2 (High/Low limits with pendent alarm) is selected in [Event output EV1 allocation].

Characters,	Setting Item, Function, Setting Range		
Factory Default			
A X A	EV1 alarm Energized/De-energized		
0 noñL	• Selects Energized/De-energized status for EV1 alarm.		
	When Energized is selected, and Event output EV1 is conductive (ON) while the $\Gamma_{1}(4)$ is not conductive (OEF) while the $\Gamma_{1}(4)$		
	the EV1 indicator is lit. Event output EV1 is not conductive (OFF) while the EV1 indicator is not lit.		
	n 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)		
	EV1 hysteresis EV1 hysteresis		
	Δ		
	SV +EV1 value SV +EV1 value		
	(Fig. 8.6-1) (Fig. 8.6-2)		
	Selection item:		
	nonic Energized		
	rEB5 De-energized		
	Available when any alarm from $\square \square \square \square \dashv$ (High limit alarm) to $\square \square \square \dashv \square$ (High/Low limits with		
	standby independent alarm) is selected in [Event output EV1 allocation].		
EBod	Event output EV2 allocation		
0 0000	 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:		
	EICCC No event		
	LICC / Alarm output, High limit alarm		
	Alarm output, Low limit alarm		
	Alarm output, High/Low limits alarm		
	티호한국 Alarm output, High/Low limits independent alarm		
	LICCS Alarm output, High/Low limit range alarm		
	Alarm output, High/Low limit range independent alarm		
	Alarm output, Process high alarm		
	IODB Alarm output, Process low alarm IODB Alarm output, High limit with standby alarm		
	Image: Constraint on the standby and the standb		
	LE C Alarm output, High/Low limits with standby independent alarm		

Characters, Factory Default		Setting Item, Function, Setting Range
	0 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.
	00 /4	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 band setting within the time allotted to assess 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 "□ロごご 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 band setting 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,		Setting Item, Function, S	otting Pango	
Factory Default		- · · ·		
	00 /5	Time signal output:		
		Turns ON during program control		
	00 %	output OFF time and ON time with	nin total time in one pattern.	
		Output during AT:		
	0:17	Turns ON during AT. Pattern end output:		
		Turns ON when Program control e	ands, and remains ON during	
		the time set in [Pattern end outpu	•	
	00 /8	Output by communication commar	-	
		Communication command 8004H	B0 EV1 output 0: OFF, 1: ON	
			B1 EV2 output 0: OFF, 1: ON	
			B2 EV3 output 0: OFF, 1: ON	
	00 /9	RUN output	•	
		Turns ON during program control	RUN.	
	0200	Heating/Cooling control output		
		Works as Heating/Cooling control		
		¦ { (High limit alarm) to ∷[] {⋛ (High/Low	••••	
		Γime signal output) is selected, one output {∃ (Heater burnout alarm output), [][[] 기식 (
		$[] \square $ (RUN output) are selected, each		
	outputs.			
	-	hen the EV2 or EV3(DR) option is ordered	1.	
A2EA	EV2 alarm	value 0 Enabled/Disabled		
	• When EV2 alarm value is 0 (zero), alarm action can be Enabled or Disabled.			
	 Selection 	Selection item:		
	nolli	Disabled		
	YESU	Enabled		
	Available wh	nen any alarm from $\square \Box \square \square \square$ (High limit a	alarm) to $\square \mathcal{D} \mathrel{{:}_{\!$	
		ependent alarm) is selected in [Event out		
	· · ·	h alarm) and IIOO8 (Process low alarm).		
8289		hysteresis		
0 00 10		alarm hysteresis.		
	0	nge: 0.1 to 1000.0°C (°F)	less ment of the desired resist	
	DC voltag	e, current inputs: 1 to 10000 (The plants)	•	
	Available w	follows the selecti hen any alarm from $\square \mathcal{OO}$; (High limit ala	,	
		ependent alarm) is selected in [Event outp	, , , ,	
8239	-			
	EV2 alarm delay time Sets EV2 alarm action delay time.			
		ting time has elapsed after PV enter	s the alarm output range, the	
	alarm is a	ctivated.	-	
	-	nge: 0 to 10000 seconds		
		hen any alarm from $\square \square \square \square \square \square$ (High limit ala		
	standby ind	ependent alarm) is selected in [Event outp	out EV2 allocation].	

Characters, Factory Default	Setting Item, Function, Setting Range	
AZĽA O noňl	 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 not conductive (OFF) while the EV2 indicator is not lit. 	
	High limit alarm (Energized) High limit alarm (De-energized)	
	EV2 hysteresis EV2 hysteresis ON Image: Constraint of the second	
	(Fig. 8.6-3) (Fig. 8.6-4)	
	Selection item: Available when any alarm from IOD / (High limit alarm) to IO /2 (High/Low limits with standby independent alarm) is selected in [Event output EV2 allocation].	
E Ho 3 0 000	Event output EV3 allocation • Selects Event output EV3, refer to Section "9.6 Items to be Initialized by Changing Settings" (p.109). • Selection item: IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	
	IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	

Characters, Factory Default		Setting Item, Function, Setting Range
	013	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.
	00 /4	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 "説などは 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,			
Factory Default		Setting Item, Function, Setting Range	
	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 %	Output during AT:	
		Turns ON during AT.	
	017	Pattern end output:	
		Turns ON when Program control ends, and remains ON during	
	00 /8	the time set in [Pattern end output time].	
	1	Output by communication command: Communication command 8004H B0 EV1 output 0: OFF, 1: ON	
		Communication command 8004H B0 EV1 output 0: OFF, 1: ON B1 EV2 output 0: OFF, 1: ON	
		B1 EV2 output 0: OFF, 1: ON B2 EV3 output 0: OFF, 1: ON	
	00 /9	RUN output:	
	····i '=-' ' ='	Turns ON during program control RUN.	
	When inter	(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.	
		금 (Heater burnout alarm output), [] [] 가식 (Loop break alarm), and [] [] 가들 (Output	
	during AT) to	(RUN output) are selected, each output is common to multiple event	
	outputs.		
	Available wh	en the EV3D \Box or EI option is ordered.	
ABEA	EV3 alarm value 0 Enabled/Disabled		
0 no00	• When EV3 alarm value is 0 (zero), alarm action can be Enabled or Disabled.		
	Selection item:		
	YESU	Enabled	
		when any alarm from $\Box \Box \Box \Box \downarrow$ (High limit alarm) to $\Box \Box \Box \downarrow \downarrow$ (High/Low limits with	
	-	lependent alarm) is selected in [Event output EV3 allocation] - excluding	
		gh alarm) and IIIII (Process low alarm).	
REHA		hysteresis alarm hysteresis.	
		nge: 0.1 to 1000.0℃ (°F),	
	-	e, current inputs: 1 to 10000 (The placement of the decimal point	
		follows the selection.)	
	Available w	hen any alarm from $\Box \Box \Box \Box \downarrow$ (High limit alarm) to $\Box \Box \downarrow Z$ (High/Low limits with	
		ependent alarm) is selected in [Event output EV3 allocation].	
8324		delay time	
		alarm action delay time.	
···· ·································		ting time has elapsed after PV enters the alarm output range, the	
	alarm is a		
	-	nge: 0 to 10000 seconds	
		hen any alarm from $\square \square \square \square $ (High limit alarm) to $\square \square \square \square 2$ (High/Low limits with	
	standby ind	ependent alarm) is selected in [Event output EV3 allocation].	

Characters, Factory Default	Setting Item, Function, Setting Range		
83LA O noñt	 EV3 alarm Energized/De-energized Selects Energized/De-energized status for EV3 alarm. When Energized is selected, and Event output EV3 is conductive (ON) while the EV3 indicator is lit. Event output EV3 is not conductive (OFF) while the EV3 indicator is not lit. When De-energized is selected, Event output EV3 is not conductive (OFF) while the EV3 indicator is lit. Event output EV3 is not conductive (OFF) while the EV3 indicator is not lit. 		
	High limit alarm (Energized)High limit alarm (De-energized)EV3 hysteresisEV3 hysteresis		
	OFF OFF OFF SV +EV3 value		
	(Fig. 8.6-5) (Fig. 8.6-6)		
	Selection item		
	► E B 5 De-energized Available when any alarm from □00 + (High limit alarm) to □0 + C (High/Low limits with		
	standby independent alarm) is selected in [Event output EV3 allocation].		

Characters, Factory Default	Setting Item, Function, Setting Range					
EHS :	Event input DI1 allocation					
	Selects Event input DI1 from the table below.					
	 Selection 	Selection item:				
		Eve	ent Input Fun	ction	Input ON (Closed)	Input OFF (Open)
	0000	No event				
	100	Pattern n	umber selection	on	Refer to "Abou	t Event input".
	5000	Direct/Re	everse action		Direct action	Reverse action
	0003	-	control RUN/S	STOP	RUN	STOP
	004		Not holding		Holding	Not holding
	0005	Program	control Advan	ce function	Advance function	Usual control
	Available v	when C5W,	EIW, EIT, C5 or I	El option is orde	ered.	
	[Event inp any one is An action If DD 1 selected b Pattern nu selected b To select in OFF (O When D 1 DI1 alloca Patter	function). If the same item – except □00 / (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 □00 / (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 □00 / (Pattern number selection) is selected only in [Event input D1 allocation] Pattern number * 2 Event input DI1 OFF(Open) ON(Closed)				
			ern number s	election) is s	elected only in	n [Event input
	DI2 alloca	-		-		
	Pattern number * 2					
	Event input DI2 OFF(Open) ON(Closed)					
	* This number will be selected by keypad.					
			ern number s ent input DI2		selected in [Evo	ent input DI1
		number	*	2	3	4
	Event in		OFF(Open)	ON(Closed)		ON(Closed)
	Event in	-	OFF(Open)	OFF(Open)		ON(Closed)
	L	-	be selected b	, i ,		

Characters, Factory Default	Setting Item, Function, Setting Range						
EH: 2	Event input DI2 allocation						
	Selects Event input DI2 from the table below.						
	 Selection 	item:					
		Even	t Input Funct	ion	-	out ON losed)	Input OFF (Open)
		No event				,	
		Pattern nun	nber selection		Refe	r to "About E	Event input".
		Direct/Reve	rse action		Direc	t action	Reverse action
	0003	Program co	ntrol RUN/ST	OP	RUN		STOP
	0004	Program co Holding/Not			Holdi	ng	Not holding
	0005	•	ntrol Advance	function	Adva functi		Usual control
	Available	when C5W, EIV	V, EIT, C5 or EI	option is ord	ered.		
	Signal edge action from OFF to ON / ON to OFF is engaged. When power is turned ON, level action is engaged except IOOS (Program control Advance function). If the same item – except IOO / (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 IOO / (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, make sure all Event inputs are in OFF (Open) status. When IOO / (Pattern number selection) is selected only in [Event input						
	DI1 alloca Patter	rn number	*	2			
	Event in		OFF(Open)	ON(Clos	sed)		
			ll be selected				
		When IIII (Pattern number selection) is selected only in [Event input DI2 allocation]					
	Patter	rn number	*	2			
	Event in	Event input DI2 OFF(Open) ON(Closed)					
		* This number will be selected by keypad.					
	When EL DI2 alloca		n number sele	ection) is a	select	ed in [Even	nt input DI1,
	Patter	n number	*	2		3	4
	Event in	put DI1	OFF(Open)	ON(Close	ed) C)FF(Open)	ON(Closed)
	Event in	put DI2	OFF(Open)	OFF(Ope	n) C	N(Closed)	ON(Closed)
	* Th	is number wi	ll be selected	by keypad	•		

Characters, Factory Default	Setting Item, Function, Setting Range				
1-05	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:				
	PU transmission				
	58 SV transmission				
	A MV transmission				
	Available when EIT option is ordered.				
[-L]	Transmission output high limit				
	 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%				
<u> </u>	Available when EIT option is ordered.				
_	Transmission output low limit				
0 -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.				
ā_50	Step time unit				
0 73 40	Selects the Step time unit.				
	Selection item: TO				
	שב ב Minutes : Seconds				

Characters,	Detting How Franching Detting Dense				
Factory Default	Setting Item, Function, Setting Range				
0 550P	 Power restore action Selects the program status restored. 	if a power failure occurs mid-program, and it is			
	 Selection item: 				
		r is restored. restored, stops current program control, and program control STOP (in Standby).			
	เกิดการ์Continues (resumes) after power is restored.Continues (resumes) previous program control after p restored.				
	After power is reperforms Fixed suspension.	oower is restored. estored, suspends (on hold) current program, and value control using the step SV at the time of JN key cancels suspension, and program control			
5_58 0 0000	 Sets the step SV when Prog Setting range: Scaling low I 	b SV when program control starts ts the step SV when Program control starts. tting range: Scaling low limit to Scaling high limit (The placement of the decimal point follows the selection.)			
5_5L 0 P800	 Program control start type Selects the Program control start type. Selection item: 				
	-	Time ol starts, the step SV is then Program control			

Characters, Factory Default	Setting Item, Function, Setting Range					
	SV start					
	100°⊂					
	_ •					
		Time				
		1:00				
	1	rogram control RUN starts.				
	-	am control starts from the Step SV set in SV when Program start starts].				
	1					
	Selection	(Fig. 8.6-8) item:				
	PBIII	PV start:				
		Only when Program control starts, the step SV and step time are				
	₽8-0	advanced to the PV, then Program control starts. PVR start:				
	, <u>c</u> ,	When Program control starts and in pattern repeating, the step SV				
		and step time are advanced to the PV, then the 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].				
PECA		d output time				
0 0000		ern end output retention time after program control is finished.				
	If 'Pattern end output' is selected in [Event output $EV\square$ 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				
	• •	the unit returns to program control STOP (in Standby).				
		ting the time to 1 to 10000 seconds: Pattern end output is				
		ally turned OFF after Pattern end output time has elapsed, and the is to program control STOP (in Standby).				
	unitrotun					
	ON					
		∱ ↓				
	OFI	Pattern end output time				
		$ \longleftrightarrow \rangle \longrightarrow$ Time				
		Program control ends (Fig. 8.6-9)				
		(i ig. 0.0-9)				
	 Setting rate 	nge: 0 to 10000 seconds				

Characters,					
Factory Default	Setting Item, Function, Setting Range				
85 5	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°C (0 to 100°F)				
	Thermocouple, RTD inputs with decimal point: 0.0 to 50.0℃ (0.0 to 100.0°F)				
	Available when Thermocouple or RTD input is selected in [Input type].				
Eall	Output status when input errors occur				
0 0880	Selects the output status when input errors (overscale, underscale) occur.				
	・Selection item: ロデチニ Output OFF				
	Available for direct current and voltage inputs, and direct current output.				
, ,	Indication time				
51 AE	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.				
EdiF	Error indication				
0 000	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).				
	E The strong of th				
	(Scaling low limit value for DC voltage, current inputs).				
	E - I Input burnout, or PV has exceeded, or dropped below				
	the Indication range and Control range.				
	See pages 129, 130. Selection item:				
	· · · · · · · · · · · · · · · · · · ·				
	BESE Enabled				

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

Press the $\ensuremath{\mathsf{RST}}$ 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.

\land 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 A, 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. 			
	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			
	i 🗗 i for approx. 3 seconds, and all data will return to factory default values.			
	After that the unit automatically reverts to RUN mode.			
	Selection item:			
	Data clear No			
	SE SE 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 PTN key.

Using Event input

If **IIOO** (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

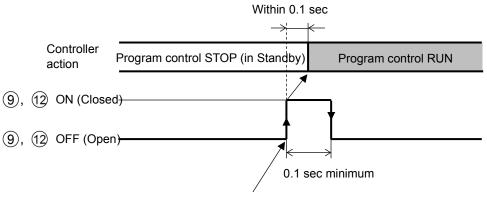
In program control STOP (in Standby), press the RUN key. Program control starts.

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)

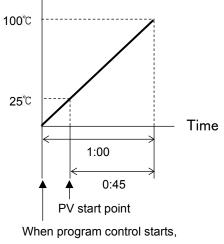
[Program control start type]

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].



step SV is advanced to PV (25°C).

(Fig. 9.1.1-2)

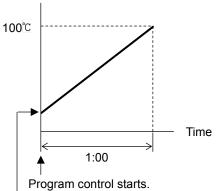
PVR start:

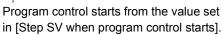
When program control starts and in pattern repeating, the step SV and step time are advanced to the PV, then the program control starts.

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].





(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.

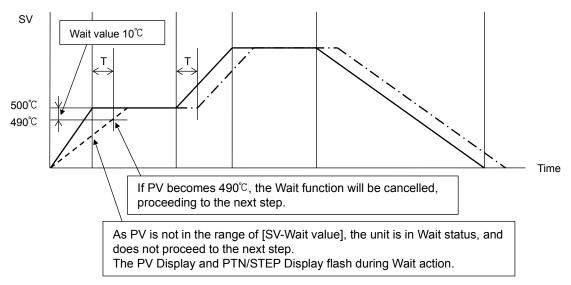
Pressing the RUN key cancels suspension, and program control resumes.

[Wait function]

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

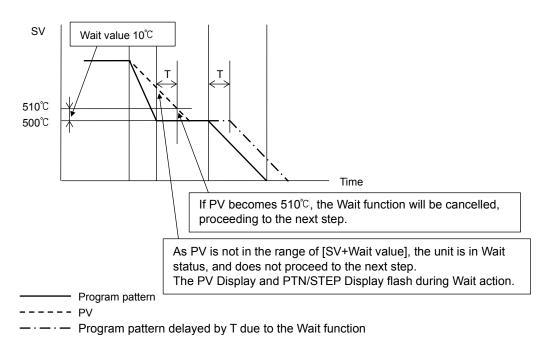
Explanation of Wait function

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.

The Wait function can also be cancelled by selecting $\square \square \square \square \square$ (Program control ADVANCE function) in [Event input DI □ allocation], and closing (ON) any terminal of Event input DI □ and SG terminal.

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

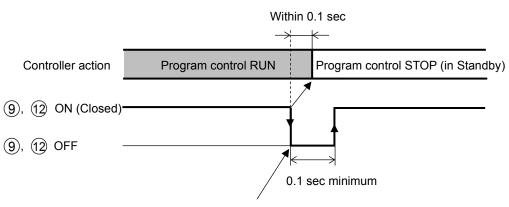
Press the STOP key for approximately 1 second during Program control RUN. Program control will stop, and revert to program control STOP (in Standby) status.

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 A key, or using Event input

• Using the \land key

During program control RUN, press the A 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.

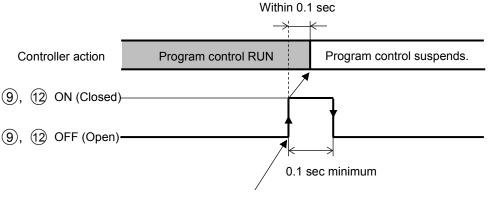
Using Event input

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

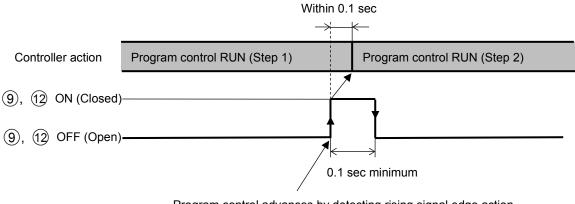
During program control RUN, press the RUN key for approx. 1 second. Current step is stopped, and the unit proceeds to the beginning of the next step. Each time the RUN key is pressed for approx. 1 second, the unit proceeds to the next step.

Using Event input

If **[] [] [] G** (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 **DD** (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)

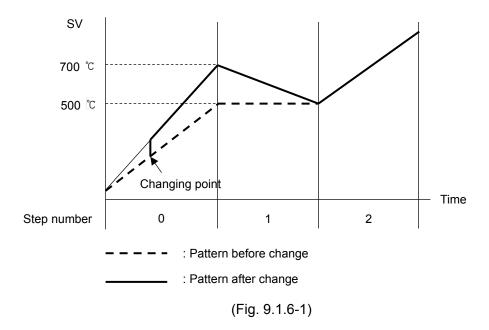
To make program step time progress faster, press the FAST key during program control RUN. While the FAST key is pressed, the step time progress is made 60 times faster.

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

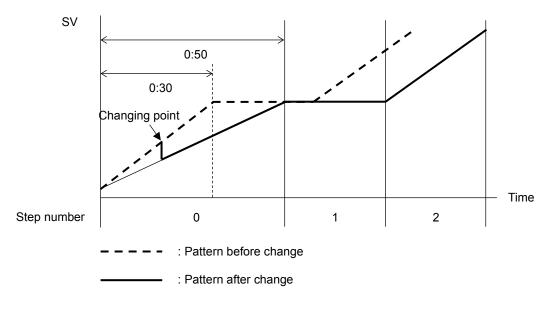
9.1.6 Changing Program Step SV and Step Time

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





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



(Fig. 9.1.6-2)

9.1.7 Ending Program (Pattern End Function)

If $\square \square \square \square \square$ (Pattern end output) is selected in [Event output EV \square allocation], Pattern end output is turned ON after program control is finished, and the SV Display flashes $\square \square \square \square$.

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 value with the value of the

(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

Using Event input

If $\square \square \square \square \square$ (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
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 9.2.1-2)

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
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) 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 RUN indicator flashes during Fixed value control.

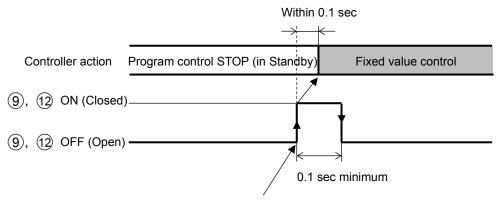
Using Event input

If IIII (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 $\square \square \square \square$ (Program control RUN/STOP) is selected in [Event input DI □ allocation], close (ON) (9) and (12).

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).

```
(Fig. 9.2.1-1)
- 101 -
```

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

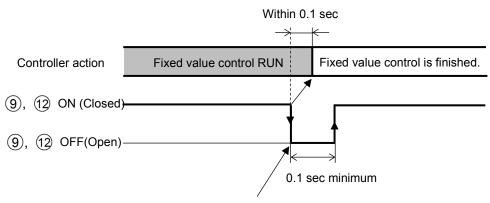
During Fixed value control, press the STOP key for approximately 1 second. Fixed value control will stop, and the unit will revert to program control STOP (in Standby).

Using Event input

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

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

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

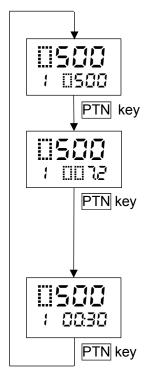


Fixed value control is finished by detecting falling signal edge action from ON (Closed) to OFF (Open) of terminals (9) and (12).

(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 "IIIII 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

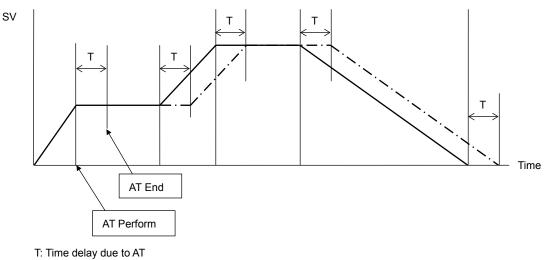
Notice

- 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.



----- : Program pattern before AT is performed.

- · - · · · Program pattern after AT is performed.

(Fig. 9.4.1-1)

9.4.2 AT Action

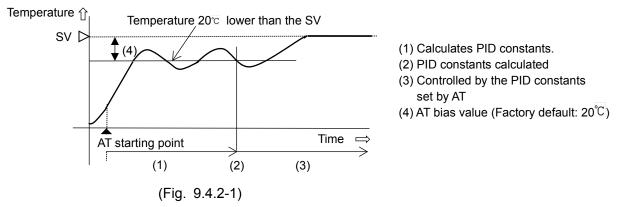
In order to set each value of P, I, D and ARW automatically, the AT process should be made to fluctuate to obtain an optimal value.

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.

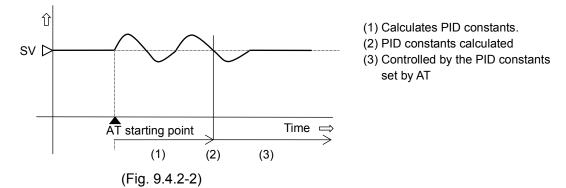
[A] If there is a large difference between the SV and PV as the temperature is rising

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



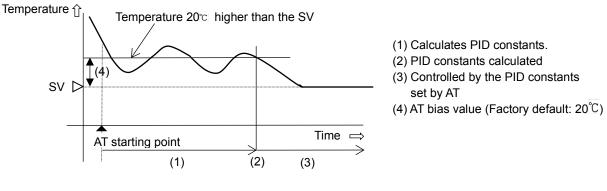
[B] When the control is stable

The AT process will fluctuate around the SV.



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

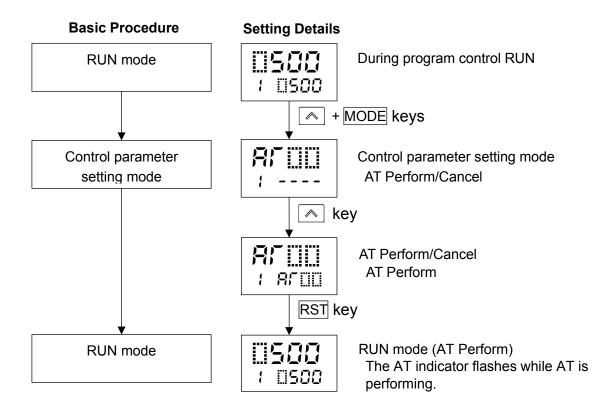
When AT bias is set to 20° C, AT process will fluctuate at the temperature 20° C higher than the SV.



(Fig. 9.4.2-3)

9.4.3 Performing AT

To perform AT, select **F** [1] [] (AT Perform) in [AT Perform/Cancel] in Control parameter setting mode. And press the **RST** key.



9.5 Input Value Correction

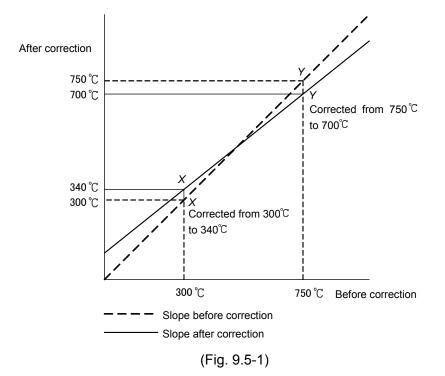
Input value can be corrected in [Sensor correction coefficient] and [Sensor correction] in Engineering setting mode 1.

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 → 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°C 240°C = 100°C
- (7) Set Step (6) value as a Sensor correction value.
- (8) Enter an electromotive force or resistance value equivalent to 750°C using an mV generator or dial resistor.
- (9) Read the PV, and confirm that 700° C is indicated.

Basic procedure Setting details 0500 RUN mode RUN mode During program control RUN 1 [[500 ✓ + MODE keys (3 sec) Lock Engineering setting Engineering setting mode 1 Set value lock mode 1 Π MODE key (2 times) Sot Sensor correction coefficient Π 1000 \land or 🔽 key Sensor correction coefficient Sat Set to 0.800. 0800 MODE key 5000 Sensor correction \land or 🔽 key Soll Sensor correction Set to 100.0[°]C. Π 1000 RST key RUN mode RUN mode During program control RUN : 0500

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

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

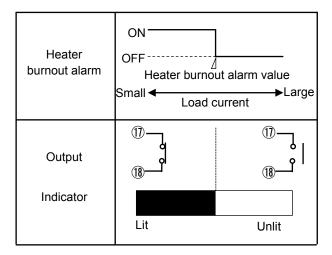
Action	Reverse (Heating)	Action	Dire	Direct (Cooling) Action	
Control action	ON OFF	A SV	Z	< P-band V	ON OFF
Relay contact output	(5) (6) Cycle action is per according to dev	formed iation.		15 16 e action is perfo ording to deviat	
Non-contact voltage output	+ $(5 - 12 \vee DC)$ - $(6 - 16)$ Cycle action is per according to dev	0 V DC - 16	0 V DC - 16 Cyc	+ (15)	12 V DC - 16
Direct current output	+ (15)	C 4 mA DC - 16	4 mA DC -16 -16 Ch	+ (15)	20 mA DC – usly
Indicator (OUT) Green	Lit	Unlit	Unlit		Lit

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

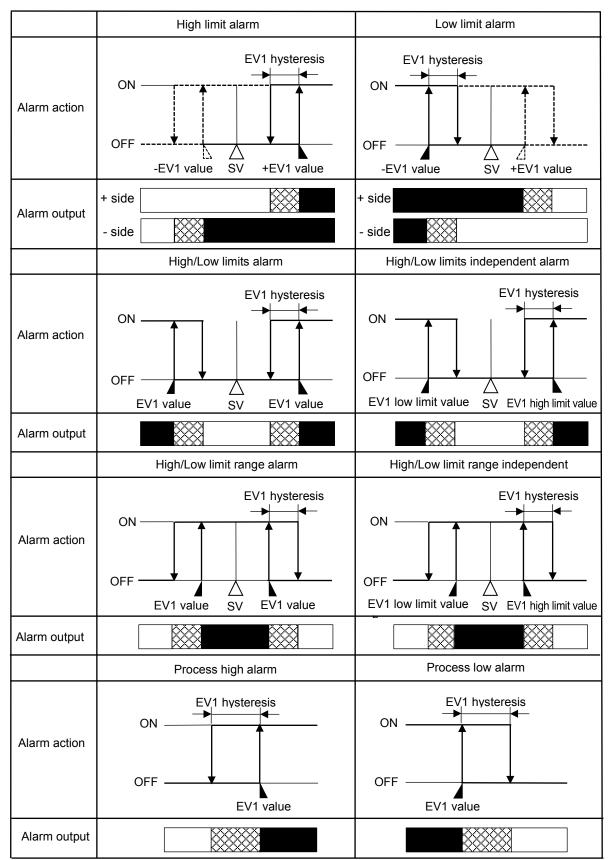
10.2 OUT1 ON/OFF Control Action

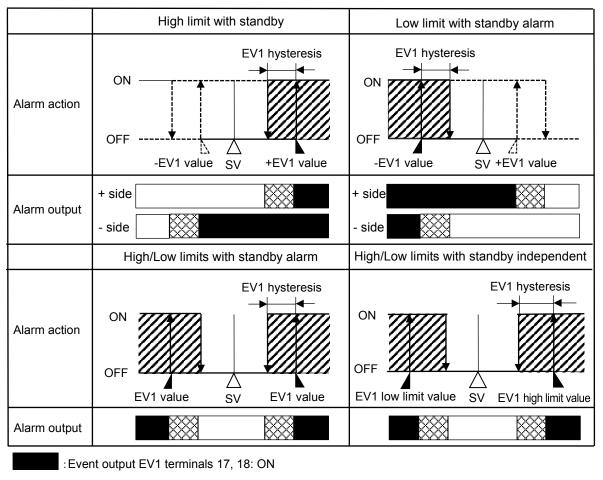
Action	Reverse (Heating	g) Action	Dire	ct (Cooling) A	ction
Control action	ON Hysteresi	s		Hysteresis ◀	ON
		SV	Z	X V	OFF
Relay contact output	(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	(B) (B)	(15) (16)		چ ا
Non-contact voltage output	+15	+ (15) 0 V DC - (16)	+(15)		+ 15 T 12 V DC - 6
Direct current output	+ ⓑ - 20 mA DC - ⓑ -	+ (15)	+ (15		+ (15) 20 mA DC - (16)
Indicator (OUT) Green	Lit	Unlit	Unlit		Lit

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



Event output EV1 terminal numbers: 17, 18 Event output EV2 terminal numbers: 19, 20 Event output EV3 terminal numbers: 6, 7





🔆 :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.

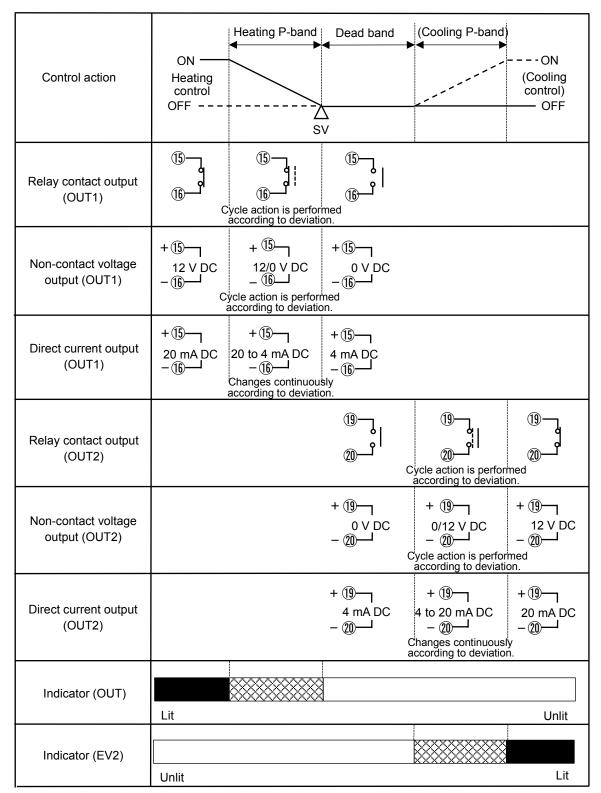
10.5 OUT2 (Heating/Cooling Control) Action

		Heating P-band	(Cooling P-band)	
	ON			ON
Control action	Heating control			(Cooling control)
	OFF		$\overline{\left(\begin{array}{c} \cdot \cdot \end{array}{} \right)}$	OFF
		S	/	
	15–	15-,	15-7	
Relay contact output (OUT1)	(16) (16)			
	Č	ycle action is perfor	med on.	
	+ (15)		+ (15	
Non-contact voltage	12 V DC	12/0 V DC	0 V DC	
output (OUT1)	- <u>16</u> c	vcle action is perfor	— 16	
		ycle action is perfor according to deviati	on.	
Direct current output		+15-	+ (15)	
(OUT1)	20 mA DC _ 16	20 to 4 mA DC - 16	4 mA DC - 16	
	(Changes continuous according to deviation	ly on.	
		19-7	19-7.	19–
Relay contact output (OUT2)		ൢ഻ഀ		₂₀
		C	ycle action is perfor according to deviat	med io.
		+ (19	(19	19
Non-contact voltage output (OUT2)		0 V DC	0/12 V DC	12 V DC
		C (U)	vcle action is perfor	med
		+ (19)	according to deviat	
Direct current output		+ (19)	+ (19)	+ (<u>1</u> 9)
(OUT2)		- 20	- 20	- 20
		a	ccording to deviatio	n.
Indicator (OUT)				
	Lit		<u>. </u>	Unlit
Indicator (EV2)				
	Unlit			Lit

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

. Represents Heating control action.

____ : Represents Cooling control action.



 \boxtimes

: 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)

Control action	ON Heating control OFF ON OVerlap band OVerlap band Cooling control OFF ON (Cooling control) OFF
Relay contact output (OUT1)	15 15 16 15 15 15 15 15 15 15 15 15 15
Non-contact voltage output (OUT1)	$\begin{array}{c c} + \textcircled{15} \\ 12 \lor DC \\ - \textcircled{16} \\ \end{array} \begin{array}{c} + \textcircled{15} \\ 12/0 \lor DC \\ - \textcircled{16} \\ \end{array} \begin{array}{c} + \textcircled{15} \\ 0 \lor DC \\ - \textcircled{16} \\ \end{array} \begin{array}{c} - \textcircled{16} \\ - \textcircled{16} \\ \end{array}$
Direct current output (OUT1)	$\begin{array}{c cccc} + 15 & & + 15 & & + 15 \\ 20 \text{ mA DC} & 20 \text{ to 4 mA DC} & & 4 \text{ mA DC} \\ - 16 & & & -16 & & -16 \\ & & & & \\ & &$
Relay contact output (OUT2)	(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)
Non-contact voltage output (OUT2)	$\begin{array}{c ccc} + \textcircled{19} & + \textcircled{19} & + \textcircled{19} & + \textcircled{19} \\ 0 \lor DC & 0/12 \lor DC & 12 \lor DC \\ - \textcircled{10} & - \textcircled{20} & - \textcircled{20} & - \textcircled{20} \\ \end{array}$ Cycle action is performed according to deviation.
Direct current output (OUT2)	+ $(9$ + (9 + $(9$ + $(9$ + $(9$ + $(9$ + $(9$ + $(9$ + $(9$ + $(9$ + (
Indicator (OUT)	Lit Unlit
Indicator (EV2)	Unlit Lit

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

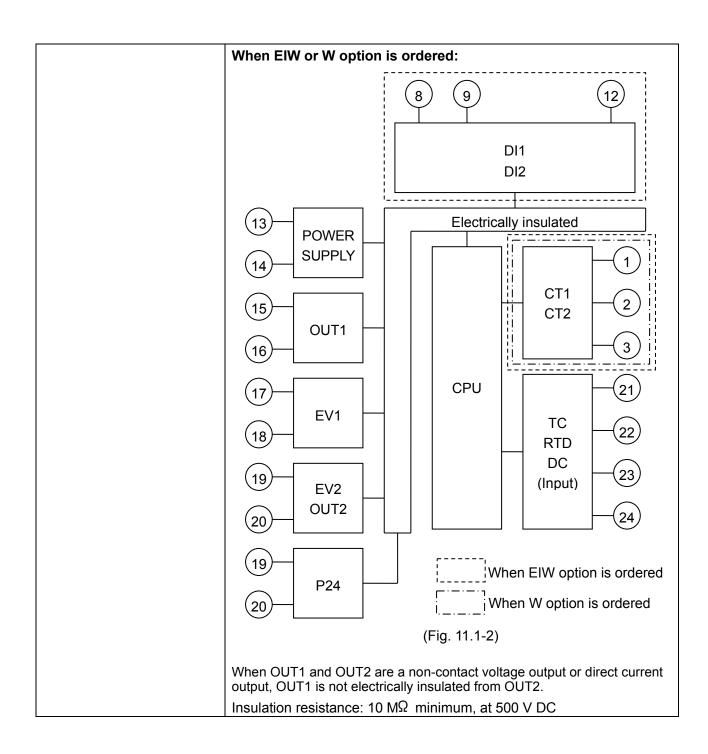
Input

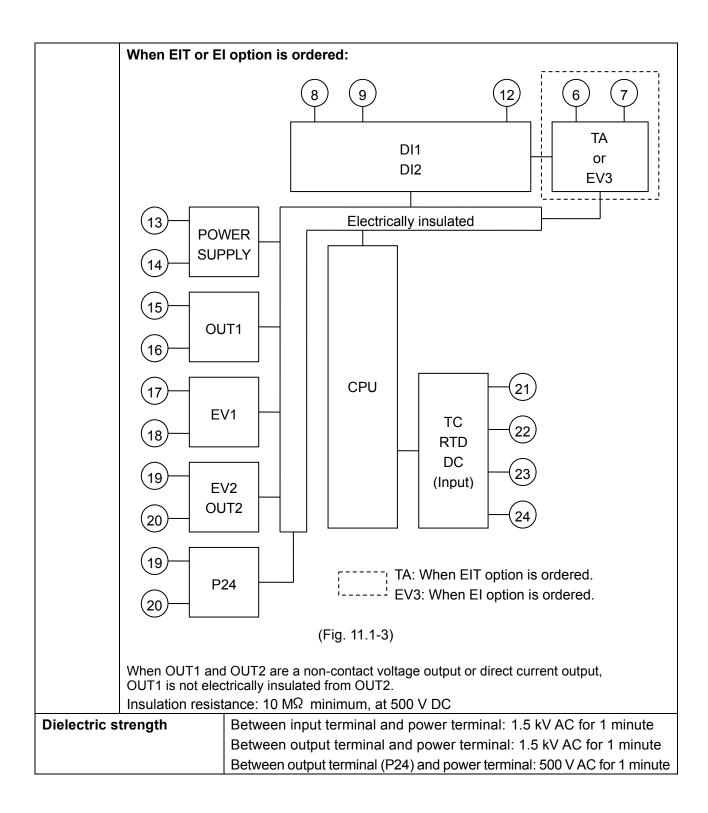
-		· · · · · · · · · · · · · · · · · · ·
Input	Thermocouple	K, J, R, S, B, E, T, N, PL-Ⅱ, C(W/Re5-26)
		External resistance: 100 Ω max.
		However, for B input, External resistance: 40 Ω max.
	RTD	Pt100, JPt100 3-wire type
		Allowable input lead wire resistance: 10 Ω max. per wire
	Direct current	0 to 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 k Ω 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	ıt	
(C5W, EIW, I	EIT, C5, El 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.

Out	put		
	ontrol	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)	
		Direct current	4 - 20 mA DC (Resolution: 12000)
			Load resistance: Max. 550 Ω
Eν	ent out	put 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
	-	p ut EV2 DR) options]	
י ייז	· -, -	Relay contact	Control capacity: 3 A 250 V AC (resistive load)
		1a	1 A 250 V AC (inductive load $\cos\phi$ =0.4)
		14	Electrical life: 100,000 cycles
			Minimum applicable load: 10 mA 5 V DC
Εv	ent out	put EV3	
	-	l options)	
		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
Со	ntrol ou	tput OUT2	
(E\	/2, EV3D	options)	
	•	ontact 1a	Control capacity: 3 A 250 V AC (resistive load)
	[EV2, E	V3(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
		ntact voltage	12 V DC±15 %
	-	R drive)	Max. 40 mA (short circuit protected)
╞	•	3DS options)	4 20 mA DC (Decelution: 42000)
			4 – 20 mA DC (Resolution: 12000) Load resistance: Max. 550 Ω
 Tre		3DA options)	
Transmission output (EIT Resolution		Resolution	12000
option) Output			$4 - 20 \text{ mA DC}$ (Load resistance: Max. 550 Ω)
		Output	Within $\pm 0.3\%$ of Transmission output span
		accuracy	
		Response time	400 ms + Input sampling period (0%→90%)
Insulated power output			
(P2		Output voltage	24 ± 3 V DC (when load current is 30 mA DC)
•	tion)	Ripple voltage	Within 200 mV DC (when load current is 30 mA DC)
1	,	Max. load	30 mA DC

PCB1_00-____ PCB1 10-Model **Power supply** Power supply 100 - 240 V AC, 50/60 Hz 24 V AC/DC, 50/60 Hz 20 – 28 V AC/DC Allowable 85 – 264 V AC fluctuation range **Power consumption Power supply Power consumption** Approx. 8 VA max. (When the maximum number of 100 – 240 V AC options are ordered: Approx. 11 VA max.) 24 V AC Approx. 5 VA max. (When the maximum number of options are ordered: Approx. 8 VA max.) 24 V DC Approx. 5 W max. (When the maximum number of options are ordered: Approx. 8 W max.) Inrush current **Power supply** Inrush current 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 C5 option is ordered: configuration 9 10 8 11 12 DI1 DI2 **RS-485** Electrically insulated 13 POWER SUPPLY 1 14 CT1 2 CT2 15 OUT1 3 16 _ _ _ _ _ _ _ _ CPU 21 17 EV1 TC 22 18 RTD DC 23 19 (Input) EV2 OUT2 24 20 19 When C5W option is ordered P24 When C5 option is ordered 20 (Fig. 11.1-1) When OUT1 and OUT2 are a non-contact voltage output or direct current output, OUT1 is not electrically insulated from OUT2. Insulation resistance: 10 M Ω minimum, at 500 V DC

Power





Recommended Environment

Ambient temperature -10 to 55°C (However, non-condensing or no icing)			
Ambient humidity	35 to 85 %RH (However, non-condensing)		
Environmental	RoHS directive compliant		
specification			

Performance

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

General Structure

Weight		Approx. 220 g		
External d	imensions	96 x 96 x 68 (W x H x D) (Depth of control panel interior: 60 mm)		
Mounting		Flush (Applicable panel thickness: 1 to 7 mm)		
Case		Flame-resistant resin, Color: Black		
Front pane	el	Membrane sheet		
Drip-proof	/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],
		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 $\square \Box \Box \Box \Box$ is selected in
		Event output EV2 allocation), EV3D \Box 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.
		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
		$\square \square \square \square \square \square$ is selected in Event output EV2 allocation), EV3D \square options] is
		ON. For direct output type (DA EV(2DA options) fleeboo
		For direct current output type (DA, EV3DA options), flashes
		corresponding to the MV in 125 ms cycles. Lights up when Event output EV3 (EV3D□, EI options) is ON.
	EV3 (Red)	
	AT (Orange)	Flashes while AT is performing.
	T/R (Orange)	Lights up during Serial communication (C5W, C5 options)
		TX (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,
			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
			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/st	
	(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

Solition renormance		
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 [°] C ([°] F)	
	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 doop not proceed to the post stor
wait function	During program control, the program does not proceed to the next step
	until the deviation between PV and SV enters $SV \pm Wait$ value at the end
	of step.
	The PV Display and PTN/STEP Display flash while the Wait function is
	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.
	Progressing time error when power is restored: 1 minute or 1 second
Step time speed-up	During program control RUN, makes step time progress 60 times faster
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,
Set value	totaling 24 alarm types. No alarm action can also be selected. 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 placement of t	
point follows the selection.)	
Output	EV output for which Alarm output (001 to 012) is selected in [Event
	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 F.F. a.d. 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 \land , \checkmark and STOP keys (in that order) are pressed together for approx. 3 seconds, the PV Display indicates $\neg \downarrow \neg \square$, and the unit enters [Data clear Yes/No]. Select $\exists \Xi \exists \square$ (Data clear Yes), and press the MODE key. The PV Display indicates $\uparrow \neg \downarrow \uparrow$ for approx. 3 seconds, and all data will return to factory default values.	

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 $0^{\circ}C$ (32°F).	
Indication range,	Thermocouple input:	
Control range	[Input range low limit value – 50℃ (100°F)] to	
U	[Input range high limit value + 50℃ (100°F)]	
	RTD input:	
	[Input range low limit value – (Input span x 1%)] to	
	[Input range high limit value + 50℃ (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 $\xi = \frac{1}{2} \frac{1}{2}$ 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 $\mathcal{E} = \mathcal{D}\mathcal{E}$ 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 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,	OU	T1	OUT2	
when input	Indication	Direct (Cooling)	Reverse (Heating)	·	Reverse (Heating)
errors occur		action	action	action	action
on	[] flashes.	ON (20 mA) or OUT1 high limit value (*)	OFF (4 mA) or OUT1 low limit value	OFF or OUT2 low limit value	ON or OUT2 high limit value (*)
oFF		OFF (4 mA) or OUT1 low limit value			OFF or OUT2 low limit value
n	[] flashes.	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 OUT2 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 \Box and $\Xi - \Box$ 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 $\mathcal{E} \cap \mathcal{Q}$ 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 $\mathcal{E} - \mathcal{Q}^{-1}$ alternately.

If the following DC voltage or current input is disconnected:

4 – 20 mA DC, 1 – 5 V DC inputs: The PV Display indicates $_$ $_$ $_$ and $\overleftarrow{\epsilon} = \overleftarrow{0}$ 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 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, Indication	OUT1		OUT2	
when input errors occur		Direct (Cooling) action	Reverse (Heating) action	Direct (Cooling) action	Reverse (Heating action
0 n	Indicates [] and [E - []]] alternately.	ON (20 mA) or OUT1 high limit value (*)	OFF (4 mA) or OUT1 low limit value		ON or OUT2 high limit value (*)
oFF[]		OFF (4 mA) or OUT1 low limit value			OFF or OUT2 low limi value
0	Indicates [] and [E-D] alternately.	OFF (4 mA) or OUT1 low limit	ON (20 mA) or OUT1 high limit value (*)		OFF or OUT2 low limi
off[]		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.

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 tool cable 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

[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	r	optional opecifications			
One output can be selected from the following: Alarm output, Heater burnout alarm output, Loop break alarm output, Time signal output, Uotput during AT, Pattern end output, Output by communication command, RUN output, Heating/Cooling control Relay contact output Heating/Cooling control output (EV2(DR), DS, DA, EV3DD options) Performs Heating/Cooling control. OUT2 proportional band Thermocouple, RTD inputs with decimal point: 0 to Input span [™] (°) DC voltage, current inputs: 0 to 1000.0% (ON/OFF control when set to 0.0) Integral time (I) 0 to 3800 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 integral time) OUT2 proportional cycle 0.5. 1 to 120 seconds Overlap/Dead band Thermocouple, RTD inputs: -2000.0 to 2000 (°) DC voltage, current inputs: -2000.0 to 2000 (°) DC voltage, current inputs: -2000.0 to 2000 (°) DC voltage, current inputs: 1 to 10000 (°) DC voltage, current inputs: 1 to 10000 (°) DC voltage, current inputs: 1 to 10000 (DA, EV3DA: –5 to 105%) OUT2 towlimit 0 to 100% (C) DC voltage, current inputs: 1 to 10000 (DA, EV3DA: –5 to 105%) OUT2 towlimit 0 to 100% CP Output woltage 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 Verstor utput EV3 (CY3DL I, El options) Output will be tumed ON or OF	Event output EV2		Output will be turned ON or OFF depending on the Event conditions		
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 Heating/Cooling control output [EV2(DR), DS, DA, EV3D_options] Performs Heating/Cooling control. OUT2 proportional band Thermocouple, RTD inputs without decimal point: 0 to Input span [®] C (F) DC voltage, current inputs: 0.0 to 1000.0% (CN/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 120 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: -2000 to 2000 (TF) placement of the decimal point follows the selection.) OUT2 ON/OFF hysteresis 0 to 1000 w C (F) DC voltage, current inputs: -2000 to 2000 (The placement of the decimal point follows the selection.) OUT2 high limit, OUT2 kigh limit, OUT2 cooling method 0 to 100% (DA, EV3DA: -5 to 105%) OUT2 cooling method (1) Air cooling (Linear characteristics) (2) Ui cooling (1.5th power of the linear characteristics) (3) Water cooling (2nd power of the linear characteristics) (3) Water cooling (2nd power of the linear characteristics) (3) Water cooling (2nd power of the linear characteristics) (2) Output woltage Max. Load current 30 mA DC Max. Load current 30 mA DC	[EV2, EV3(DR) options]				
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communication command, RUN output, Heating/Cooling control Relay contact output Heating/Cooling control output [EV2(DR), DS, DA, EV3DL_ options] OUT2 proportional band Thermocouple, RTD inputs without decimal point: 0 to Input span [®] (P) Thermocouple, RTD inputs with decimal point: 0.0 to Input span [®] (P) 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) OUT2 proportional cycle 0.5. 1 to 120 seconds Overlap/Dead band Thermocouple, RTD inputs: -2000 to 200.0° (P) DC voltage, current inputs: -2000 to 200.0° (P) DC voltage, current inputs: -2000 to 2000 (The placement of the decimal point follows the selection.) OUT2 ON/OFF hysteresis Thermocouple, RTD inputs: -2000 to 2000 (The placement of the decimal point follows the selection.) OUT2 N/OFF hysteresis 0 to 100% (DA, EV3DA: -5 to 105%) OUT2 low limit 0 to 100% (DA, EV3DA: -5 to 105%) OUT2 low limit (1) Air cooling (Linear characteristics) (2) Oil cooling (1.5th power of the linear characteristics) (3) Water cooling (2nd power of the linear characteristics) (2) Oil cooling (2nd power of the linear characteristics) (2) Output will be turned ON or OFF depending on the Event conditions selected in [Event output EV3 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			Alarm output, Heater burnout alarm output, Loop break alarm output,		
Relay contact output Heating/Cooling control output [EV2(DR), DS, DA, EV3D_ options] Performs Heating/Cooling control. OUT2 proportional band Thermocouple, RTD inputs without decimal point: 0 to Input span [®] C (°) DC voltage, current inputs: 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 derivative time) OUT2 proportional cycle 0.5, 1 to 120 seconds Outrap/Dead band Thermocouple, RTD inputs: -200.0 to 200.0°C (°) DC voltage, current inputs: -200.0 to 100.0°C (°) DC voltage, current inputs: -200.0 to 100.0°C (°) DC voltage, current inputs: -200.0 to 100.0°C (°) DC voltage, current inputs: -200.0 (DA, EV3DA: –5 to 105%) OUT2 low limit 0.1 to 100% (DA, EV3DA: –5 to 105%) OUT2 cooling method (1) Air cooling (Linear characteristics) (2) Oil cooling (1.5th power of the linear characteristics) (3) Water cooling (2d power of the linear characteristics) Insulated power output (P24 option) 0utput will be turned ON or OFF depending on the Event conditions selected in [Event output EV3 ailoccation].			Time signal output, Output during AT, Pattern end output, Output by		
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output [EV2(DR], DS, DA, EV3D_uptions] Thermocouple, RTD inputs with decimal point: 0 to Input span [®] (°) DUT2 proportional band Thermocouple, RTD inputs with decimal point: 0 to Input span [®] (°) 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: -2000 to 2000.0° (°F) DC voltage, current inputs: -2000 to 2000 (The placement of the decimal point follows the selection.) OUT2 ON/OFF Thermocouple, RTD inputs: -2000 to 2000 (The placement of the decimal point follows the selection.) OUT2 tigh limit, OUT2 tigh limit, OUT2 toolong (1.5th power of the linear characteristics) (2) Oil cooling (1.5th power of the linear characteristics) (2) Oil cooling (2.1ch power of the linear characteristics) (3) Water cooling (2.nd power of the linear characteristics) (3) Water cooling (2.nd power of the linear characteristics) (2) Output will be turned ON or OFF depending on the Event conditions selected in [Event output EV3 Alarm output, Heater bumout alarm output, Loop break alarm output, Time signal output, Output during AT, Pattern end output, Output by communication command, RUN output Serial communication (C5W, C5 options) The following operations can be carried out from an external computer. (1) Reading and writing of the step SV, step time, PID values and various set			Relay contact output		
EV3D□ options] Thermocouple, RTD inputs without decimal point: 0 to Input span [®] C (F) band Thermocouple, RTD inputs with decimal point: 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) 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: 0.1 to 1000.0°C (F) hysteresis 0.1 to 1000.0°C (F) DC voltage, current inputs: 0.1 to 10000 (The placement of the decimal point follows the selection.) OUT2 low limit 0 to 100% (DA, EV3DA: -5 to 105%) OUT2 cooling method (1) Air cooling (Linear characteristics) (2) Oil cooling (1.5th power of the linear characteristics) Insulated power output (P24 option) 24 ± 3 V DC (when load current is 30 mA DC) Max. load current 30 mA DC Event output EV3 (EV3DL, El options) Output will be turned ON or OFF depending on the Event conditions selected in [Event output EV3 allocation]. One output can be selected from the following: Alarm outp	Н	eating/Cooling control	Performs Heating/Cooling control.		
OUT2 proportional band Thermocouple, RTD inputs with decimal point: 0 to Input span [®] C (F) 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: -2000 to 200.0°C (F) DC voltage, current inputs: -1 to 10000 (The placement of the decimal point follows the selection.) OUT2 Inpl Imit, OUT2 low limit 0 to 10% (DA, EV3DA: –5 to 105%) OUT2 low limit (1) Air cooling (1.5th power of the linear characteristics) (2) Oil cooling (2.1 by power of the linear characteristics) (3) Water cooling (2.1 by power of the linear characteristics) Insulated power output (P24 option) Output will be turned ON or OFF depending on the Event conditions selected in [Event output EV3 (EV3D_, El options) Serial communication (C5W, C5 options) The following of the step SV, step time, PID values and various set values Communication line (2) Reading of the PV and action status (3) Function change Communication nembed Half-duplex communication	οι	utput [EV2(DR), DS, DA,			
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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 2000.0° (F) DC voltage, current inputs: -200.0 to 2000 (F) DC voltage, current inputs: -200.0 to 2000 (C) OUT2 ON/OFF Thermocouple, RTD inputs: -200.0 to 2000 (C) Nysteresis 0.1 to 1000 0° (F) DC voltage, current inputs: 1 to 10000 (The placement of the decimal point follows the selection.) OUT2 ligh limit, OUT2 low limit 0 to 100% (DA, EV3DA: –5 to 105%) 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) (3) Water cooling (2nd power of the linear characteristics) Max. load current 30 mA DC Event output EV3 (EV3DD, El option) Output will be turned ON or OFF depending on the Event conditions selected in [Event output EV3 allocation]. One output table burnout alarm output, Loop break alarm output, Time signal output, Output during AT, Pattern end output, Output by communication command, RUN output Serial communication (C5W, C5 options) The following operations can be carried out from an external computer. (1) Rea		OUT2 proportional	Thermocouple, RTD inputs without decimal point: 0 to Input span [°] C ([°] F)		
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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 Thermoccuple, RTD inputs: -200.0 to 2000 (The placement of the decimal point follows the selection.) OUT2 ON/OFF Thermoccuple, RTD inputs: -200.0 to 2000 (The placement of the decimal point follows the selection.) OUT2 N/OFF Thermoccuple, RTD inputs: 0.1 to 10000 (The placement of the decimal point follows the selection.) OUT2 high limit, 0UT2 low limit 0 to 100% (DA, EV3DA: -5 to 105%) OUT2 cooling method (1) Air cooling (Linear characteristics) (2) Oil cooling (1.5th power of the linear characteristics) Qutput 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 Event output EV3 (EV3DD, EI options) Output will be turned ON or OFF depending on the Event conditions selected in [Event output EV3 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 Serial communication The following operations can be carried out from an e			DC voltage, current inputs: 0.0 to 1000.0%		
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(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 hysteresis 0.1 to 1000.0°C (F) DC voltage, current inputs: 0.1 to 10000 (The placement of the decimal point follows the selection.) OUT2 high limit, 0UT2 cooling method 0 to 000% (DA, EV3DA: -5 to 105%) 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) Insulated power output (P24 option) Within 200 mV DC (when load current is 30 mA DC) Ripple voltage Within 200 mV 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 Event output EV3 Output will be turned ON or OFF depending on the Event conditions selected in [Event output EV3 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 Serial communication (C5W, C5 options) The following operations can be carried out from an external computer. (1) Reading and writing of the step SV, step time, PID values and various set values (2) Reading of the PV and action status (3) Function chan		Derivative time (D)			
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Communication speed 9600, 19200, 38400 bps (Selectable by keypad)					
			· · ·		
Synchronization method Start-stop synchronization					
		Synchronization method	Start-stop synchronization		

Communication protocol		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 (Selectal	• • •		
		Parity: Even, Odd, No	parity (Selectable by key	pad)	
Stop bit		1, 2 (Selectable by ke	/pad)		
Data format	Communication Protocol	Shinko Protocol	Modbus ASCII	Modbus RTU	
	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)	1 (2)	1 (2)	
		Selectable	Selectable	Selectable	
Respon	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	transmission	When 'SV digital transmission (Shinko protocol)' is selected in			
		[Communication protocol], step SV can be digitally transmitted to the connected Shinko digital indicating controllers with the communication function (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]).			
PCE	31	Controllers wit	n communication function	(Max. 31 units)	
YA(·	-) 10	YA(-)	YA(-)	YA(-)	
YB(+	-) 11	YB(+)	YB(+)	YB(+)	
S	G 12	SG	SG	SG	
		(Fig. ²	11.2-1)		

Heater burnout alarm	Monitors heater current with CT (current transformer), and detects
	heater burnout.
(C5W, EIW, W options)	
	EV output, for which Heater burnout alarm is selected in [Event output
	EV allocation], will be turned ON or OFF.
	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	$DI\square$ 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
L	Program control Advance function.

12. Troubleshooting

🕂 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.

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

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 두 - []	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 ⊢ D ₽.	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 = OS (*) 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 $\boldsymbol{\xi} \in \overline{\boldsymbol{U}} \overline{\boldsymbol{\delta}} (*)$ 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 E - I (*) 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 Ω 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°C (32°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.

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.
The DV Display	range.	How to check whether the input signal
The PV Display	Check whether input signal wire	wire is disconnected:
indicates [] and [ᢄ᠇] (*)	for direct current (4 to 20 mA DC)	[Direct current (4 to 20 mA DC)]
alternately.	or DC voltage (1 to 5 V DC) is	If the input to the input terminals of the
allematery.	disconnected.	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
		signal wire may be disconnected.
	Check whether input signal wire for	Connect the input signal wire to the terminals
	direct current (4 to 20 mADC) or DC	of this instrument securely.
	voltage (1 to 5 V DC) is securely	
	connected to the instrument input	
	terminals.	
	Check if polarity of thermocouple	Wire them correctly.
	or compensating lead wire is	
	correct.	
	Check whether codes (A, B, B) of	
	RTD agree with the instrument	
The PV Display	terminals. Hardware malfunction	Contact our agency or us.
indicates $[\Xi - II]$.		3 , , , , , , , , , ,
The indicates [2 7 12].	Chook whother concertion it or	Select the sensor input and temporature
	Check whether sensor input or temperature unit ($^{\circ}C$ or $^{\circ}F$) is	Select the sensor input and temperature unit ($^{\circ}C$ or $^{\circ}F$) correctly.
PV Display is 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
		specifications.
	specification is correct. AC leaks into the sensor	Use an ungrounded type sensor.
	circuit.	eee an angrounded type sensor.
	There may be equipment that	Keep the instrument clear of any potentially
	interferes with or makes noise near	disruptive equipment.
	the instrument.	
	abled' is calcoted in [Error indication]	

(*) 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.		
The control output OUT1 or OUT2	OUT1 or OUT2 high limit value is set to 0% or less.	Set it to a suitable value.
remains in an OFF	set to 0 % of less.	
status.		
The PV Display	AT has not been completed even if	Manually set P, I, D and ARW values.
indicates Er 20	approx. 4 hours have elapsed	
	since AT started.	
L		

13. Character Table

Explanation of Setting Item

(e.g.) Setting Step 1 SV

Upper left: PV Display

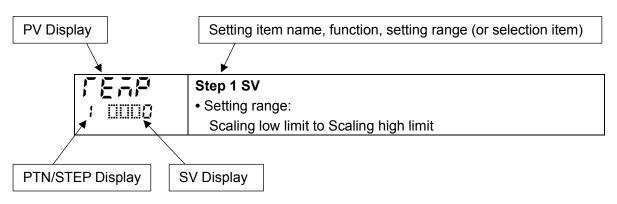
Indicates setting item characters.

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 - 0 1 ; 0500 (*1)	Internal non-volatile IC memory (EEPROM) is defective.	When power is turned ON
E-02 ; []500(*1)	Data writing error when power failure occurs.	When power is turned ON
E-05 : 0500 (*2)	PV has exceeded Input range high limit value (Scaling high limit value for DC voltage, current inputs).	When operating
E-05 ; 0500 (*2)	PV has dropped below Input range low limit value (Scaling low limit value for DC voltage, current inputs).	When operating
E - 0 1 ; 0500 (*2)	Input burnout or disconnection. Input value is outside of the Indication range and Control range.	When operating
E- ¦0 ∤ ⊡500	Hardware malfunction or errors (This error cannot be cancelled.)	When operating
E - 20 1 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, Factory Default	Setting Item, Setting Range	Data		
	Step 1 SV			
FEAP	Scaling low limit to Scaling high limit			
1 0008	Scaling low limit to Scaling high limit			
PTN/STEP				
indicator 1 lights.				
{` AE	Step 1 time			
1 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.			
	If is set, Fixed value control will be performed using Step 1 SV.			
_P; d	Step 1 PID block number			
	1 to 10			
PTN/STEP				
indicator 1 lights.				
I E A P	Step 2 SV			
	Scaling low limit to Scaling high limit			
PTN/STEP				
indicator 2 lights.				
51 AE	Step 2 time			
	, 00:00 to 99.59 (Time unit follows the selection in [Step time			
1 0000	unit].)			
PTN/STEP	If the will be indicated.			
indicator 2 lights.	If $$ is set, Fixed value control will be performed using Step 2 SV.			
	Step 2 PID block number			
	1 to 10			
PTN/STEP indicator 2 lights.				
	Step 3 SV			
	Scaling low limit to Scaling high limit			
PTN/STEP				
indicator 3 lights.				
	Step 3 time			
1 0000	, 00:00 to 99.59 (Time unit follows the selection in [Step time			
PTN/STEP	unit].)			
indicator 3 lights.	If the \checkmark key is pressed at 00:00, $$ will be indicated.			
	If is set, Fixed value control will be performed using Step 3 SV.			
_~~~ d	Step 3 PID block number			
	1 to 10			
PTN/STEP				
indicator 3 lights.				

Characters,	Outling Hans Outling Day of	Dete
Factory Default	Setting Item, Setting Range	Data
leap	Step 4 SV	
	Scaling low limit to Scaling high limit	
PTN/STEP		
indicator 4 lights.		
17 AE	Step 4 time	
1 0000	, 00:00 to 99.59 (Time unit follows the selection in [Step time	
PTN/STEP	unit].)	
indicator 4 lights.	If the 🔛 key is pressed at 00:00, will be indicated.	
	If is set, Fixed value control will be performed using Step 4 SV.	
_	Step 4 PID block number	
	1 to 10	
PTN/STEP		
indicator 4 lights.		
l eap	Step 5 SV	
	Scaling low limit to Scaling high limit	
PTN/STEP		
indicator 5 lights.		
17 AE	Step 5 time	
	, 00:00 to 99.59 (Time unit follows the selection in [Step time	
PTN/STEP	unit].)	
indicator 5 lights.	If the 🔛 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.		
FEAP	Step 6 SV	
1 0000	Scaling low limit to Scaling high limit	
PTN/STEP		
indicator 6 lights.		
17: AE	Step 6 time	
: 0000	, 00:00 to 99.59 (Time unit follows the selection in [Step time	
PTN/STEP	unit].)	
indicator 6 lights.	If the w key is pressed at 00:00, will be indicated.	
	If is set, Fixed value control will be performed using Step 6 SV.	
_~~~ d	Step 6 PID block number	
1 000 1	1 to 10	
PTN/STEP		
indicator 6 lights.		

Characters,		Data
Factory Default	Setting Item, Setting Range	Data
reap	Step 7 SV	
	Scaling low limit to Scaling high limit	
PTN/STEP		
indicator 7 lights.		
F: 75	Step 7 time	
	, 00:00 to 99.59 (Time unit follows the selection in [Step time	
PTN/STEP	unit].)	
indicator 7 lights.	If the 💌 key is pressed at 00:00, will be indicated.	
	If is set, Fixed value control will be performed using Step 7 SV.	
_ <u>-</u> F; d	Step 7 PID block number	
1 000 1	1 to 10	
PTN/STEP		
indicator 7 lights.		
FEAP	Step 8 SV	
	Scaling low limit to Scaling high limit	
PTN/STEP		
indicator 8 lights.		
	Step 8 time	
	, 00:00 to 99.59 (Time unit follows the selection in [Step time	
PTN/STEP	unit].)	
indicator 8 lights.	If the 💟 key is pressed at 00:00, will be indicated.	
	If is set, Fixed value control will be performed using Step 8 SV.	
_ F' d	Step 8 PID block number	
	1 to 10	
PTN/STEP		
indicator 8 lights.		
FEAP	Step 9 SV	
1 0000	Scaling low limit to Scaling high limit	
PTN/STEP		
indicator 9 lights.		
17: AE	Step 9 time	
1 0800	, 00:00 to 99.59 (Time unit follows the selection in [Step time	
PTN/STEP	unit].)	
indicator 9 lights.	If the \checkmark key is pressed at 00:00, $$ will be indicated.	
	If is set, Fixed value control will be performed using Step 9 SV.	
	Step 9 PID block number	
1 000 1	1 to 10	
PTN/STEP		
indicator 9 lights.		

Characters,	Setting Item, Setting Range	Data	
Factory Default	octaing item, octaing range		
IFEAP	Step 10 SV		
1 0000	Scaling low limit to Scaling high limit		
PTN/STEP			
indicator 10 lights.			
17 AE	Step 10 time		
1 0000	- $ -$, 00:00 to 99.59 (Time unit follows the selection in [Step time		
PTN/STEP	unit].)		
indicator 10 lights.	If the w key is pressed at 00:00, will be indicated.		
	If is set, Fixed value control will be performed using Step 10 SV.		
	Step 10 PID block number		
	1 to 10		
PTN/STEP			
indicator 10 lights.			
-695	Number of repetitions		
: 0008	0 to 10000		
PTN/STEP			
indicator turns off.			
	Pattern link		
{	Pattern link Disabled		
PTN/STEP	르뮌 효 Pattern link Enabled		
indicator turns off.			

13.3 Event Setting Mode

3 Event Setting Mode			
Characters,	Setting Item, Setting Range	Data	
Factory Default			
	EV1 alarm value		
1 0000	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 alarm0 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 $\square \square \square \square \square$ (High limit alarm) to $\square \square \square \square \square$ (High/Low limits with standby		
	independent alarm) is selected in [Event output EV1 allocation].		
	EV1 high limit alarm value		
10000	Setting range: Same as those of EV1 alarm value.		
	Available when $\square \square \square \square \square \square$ (High/Low limits independent alarm), $\square \square \square \square \square \square \square \square \square \square \square$ (High/Low		
	limit range independent alarm) or $\mathbb{Z} \not \in$ (High/Low limits with standby		
	independent alarm) is selected in [Event output EV1 allocation].		
5 6-5	TS1 output OFF time		
1 0000	Setting range:		
	00:00 to 99:59 (Time unit follows the selection in [Step time unit].)		
	Available when $\blacksquare \mathcal{G} \not \!$		
	allocation].		
l lan	TS1 output ON time		
	Setting range:		
	00:00 to 99:59 (Time unit follows the selection in [Step time unit].)		
	Available when $\blacksquare \mathcal{G} \mathrel{\!\!\!/}{s}$ (Time signal output) is selected in [Event output EV1		
	allocation].		
8200	EV2 alarm value		
	Setting range: Same as those of EV1 alarm value.		
·	Available when $\square \square \square \square$ (High limit alarm) to $\square \square \square \square 2$ (High/Low limits with standby		
	independent alarm) is selected in [Event output EV2 allocation].		
AZK []	EV2 high limit alarm value		
	Setting range: Same as those of EV1 alarm value.		
· · · · · · · · · · · · · · · · · · ·	Available when $\square \square \square \square \square $ (High/Low limits independent alarm), $\square \square \square \square \square \square$ (High/Low		
	limit range independent alarm) or $\mathbb{H} \mathcal{G} \not \in$ (High/Low limits with standby		
	independent alarm) is selected in [Event output EV2 allocation].		
	independent alarm) is selected in [Event output EV2 allocation].		

Characters, Factory Default	Setting Item, Setting Range	Data
FZaF	TS2 output OFF time	
1 0000	Setting range:	
	00:00 to 99:59 (Time unit follows the selection in [Step time unit].)	
	Available when $\square \square I$ (Time signal output) is selected in [Event output EV2	
	allocation].	
lidan	TS2 output ON time	
1 0000	Setting range:	
	00:00 to 99:59 (Time unit follows the selection in [Step time unit].) Available when 🛄 35 (Time signal output) is selected in [Event output EV2	
	allocation].	
8300	EV3 alarm value	
	Setting range: Same as those of EV1 alarm value.	
	Available when $\square \square \square$	
	independent alarm) is selected in [Event output EV3 allocation].	
RBHII	EV3 high limit alarm value	
	Setting range: Same as those of EV1 alarm value.	
(L.I.I.IL.D_(Available when 티요요닉 (High/Low limits independent alarm), 티요요동 (High/Low	
	limit range independent alarm) or $\square \mathcal{D} \not\in$ (High/Low limits with standby	
	independent alarm) is selected in [Event output EV3 allocation].	
r Baf	TS3 output OFF time	
	Setting range:	
	00:00 to 99:59 (Time unit follows the selection in [Step time unit].)	
	Available when $\mathbb{H}\mathcal{D}/\mathcal{B}$ (Time signal output) is selected in [Event output EV3	
	allocation].	
1300 10000	TS3 output ON time	
	Setting range:	
	00:00 to 99:59 (Time unit follows the selection in [Step time unit].)	
	Available when $\square \mathcal{G} $ /5 (Time signal output) is selected in [Event output EV3	
	allocation].	

13.4 Control Parameter Setting Mode

Characters,	Setting Item, Setting Range				
Factory Default		Data			
	AT Perform/Cancel				
<u> </u>	AT Cancel				
	AT Perform				
Fale	PID block number				
0 000 {	1 to 10				
PIIII	OUT1 proportional band				
	Setting range:				
	Thermocouple, RTD input without decimal point: 0 to input span $^{\circ}\mathbb{C}$ ($^{\circ}\mathbb{F}$)				
	Thermocouple, RTD input with decimal point: 0.0 to input span $^{\circ}\mathbb{C}$ ($^{\circ}\mathbb{F}$)				
	DC voltage, current inputs: 0.0 to 1000.0%				
	Integral time				
1 0200	Setting range: 0 to 3600 seconds				
	Derivative time				
7 0050	Setting range: 0 to 1800 seconds				
8-50	ARW				
1 0050	Setting range: 0 to 100%				
	OUT1 proportional cycle				
	Setting range: 0.5, 1 to 120 seconds				
	Available when OUT1 is relay contact output or non-contact voltage output type.				
H45	OUT1 ON/OFF hysteresis				
	Setting range:				
	0.1 to 1000.0℃ (°F)				
	DC voltage, current inputs: 1 to 10000 (The placement of the decimal				
	point follows the selection.)				
ol Hi	OUT1 high limit				
0 0 80	Setting range:				
	OUT1 low limit to 100%				
	Direct current output type: OUT1 low limit to 105%				
oll 🗌	OUT1 low limit				
	Setting range: 0% to OUT1 high limit				
	Direct current output type: -5% to OUT1 high limit				
	OUT1 rate-of-change Setting range: 0 to 100 %/sec				
cRcF	OUT2 cooling method				
0 88 -0	Air cooling (Linear characteristics)				
	Oil cooling (1.5th power of the linear characteristics)				
	Under Cooling (2nd power of the linear characteristics)				
	Available when EV2 option (if " $\square \square \square \square \square \square \square \square \square \square \square$ 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, Setting Range	Data
P_60	OUT2 pro	portional band	
	Setting rai	nge:	
	Thermoc	ouple, RTD input without decimal point: 0 to Input span [°] C (°F)	
	Thermoc	ouple, RTD input with decimal point: 0.0 to Input span [°] C ($^\circ$ F)	
	DC volta	ge, current inputs: 0.0 to 1000.0%	
	Available w	hen EV2 option (if " $\square \square \square \square \square$ Heating/Cooling control output" is selected	
	in [Event ou	tput EV2 allocation]) is ordered, or when DS, DA or EV3D \Box option is	
	ordered.		
c_80		portional cycle	
0 0003	-	nge: 0.5, 1 to 120 seconds	
		hen EV2 option (if " $\square \square \square \square \square$:Heating/Cooling control output" is selected	
	-	utput EV2 allocation]) is ordered, or when DS, EV3(DR), EV3DS option	
	is ordered.		
H456		OFF hysteresis	
	-	nge: 0.1 to 1000.0℃(℉) 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	
		Itput EV2 allocation]) is ordered, or when DS, DA or EV3D option is	
	ordered.		
olhb	OUT2 high	ı limit	
	-	nge: OUT2 low limit value to 100%	
	-	Irrent output type (DA, EV3DA options):	
		2 low limit value to 105%	
	Available w	hen EV2 option (if "ICCC: Heating/Cooling control output" is selected	
	in [Event ou	Itput EV2 allocation]) is ordered, or when DS, DA or EV3D \Box option is	
	ordered.		
ollb	OUT2 low	limit	
0 0000	-	nge: 0% to OUT2 high limit value	
		irrent output type (DA, EV3DA options):	
		OUT2 high limit value	
		hen EV2 option (if " $\square \square \square \square \square$ Heating/Cooling control output" is selected	
	-	itput EV2 allocation]) is ordered, or when DS, DA or EV3D \Box option is	
() :"::":	ordered.		
dolli.	Overlap/D		
	-	nge: -200.0 to 200.0°C (°F)	
		ge, current inputs: -2000 to 2000 (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.		
cont	1	verse action	
	HERI	Reverse (Heating) action	
	cool	Direct (Cooling) action	

Characters, Factory Default	Setting Item, Setting Range	Data
	Heater burnout alarm 1 value	
	Setting range:	
H III 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.	
HZIII	Heater burnout alarm 2 value	
	Setting range:	
HELLI 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 $\square \square \square \cap$ (Loop break alarm output) is selected in [Event output EV \square	
	allocation].	
	Loop break alarm band	
	Setting range:	
	Thermocouple, RTD input without decimal point: 0 to 150° (°F)	
	Thermocouple, RTD input 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.)	
	Available when $\square \square ~ ''$ (Loop break alarm output) is selected in [Event output EV \square	
	allocation].	

13.5 Wait Parameter Setting Mode

Characters, Factory Default		Setting Item, Setting Range	Data	
	Wait value			
	Setting r	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	USEO	Enabled		
indicator 1 lights up.	Not availa	ble if Wait value is set to 0 or 0.0.		
LA _c (Step 2 wai	t function Enabled/Disabled		
}		Disabled		
PTN/STEP	85ED	Enabled		
indicator 2 lights up.	Not availa	ble if Wait value is set to 0 or 0.0.		
J.Ac (Step 3 wai	t function Enabled/Disabled		
		Disabled		
PTN/STEP	USED	Enabled		
indicator 3 lights up.	Not availa	ble if Wait value is set to 0 or 0.0.		
<u>LAc</u> l	Step 4 wai	t function Enabled/Disabled		
<u> </u>		Disabled		
PTN/STEP	USEO	Enabled		
indicator 4 lights up.	Not availa	ble if Wait value is set to 0 or 0.0.		
J.A.F.		t function Enabled/Disabled		
{		Disabled		
PTN/STEP	USED	Enabled		
indicator 5 lights up.	Not availa	ble if Wait value is set to 0 or 0.0.		
LAGE [Step 6 wai	t function Enabled/Disabled		
1		Disabled		
PTN/STEP	USEO	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	USED	Enabled		
indicator 7 lights up.	Not availa	ble if Wait value is set to 0 or 0.0.		
	Step 8 wait function Enabled/Disabled			
<u>-</u>		Disabled		
PTN/STEP	USED	Enabled		
indicator 8 lights up.	Not available if Wait value is set to 0 or 0.0.			
JA _c /	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				
LACE C	Step 10 wa	ait function Enabled/Disabled			
		Disabled			
PTN/STEP	USEO	Enabled			
indicator 10 lights up.	Not availa	ble if Wait value is set to 0 or 0.0.			

13.6 Engineering Setting Mode 1

Characters,	Sotting Itom Sotting Pango					
Factory Default			Setting Item, Setting Range	e	Data	
Lock	Set value	ock				
0			Change via Keypad	Change via Software Communication		
		Unlock	All set values can be	All set values can		
			changed.	be changed.		
	Loc /	Lock 1	Only 'Set value lock' can be changed. Other setting items cannot be changed.			
	Locð	Lock 2	Setting items selected in [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 changed.	Setting items – 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		
	LocS	Lock 5	Setting items selected in	communication.		
			[Changeable in Set value	However, if power is turned ON again, the		
			lock] can be changed. 'Set value lock' can be	set values revert to		
			changed. Other setting	the values before		
			items cannot be changed.	Lock 3, 4 or 5 was selected.		
1.255	Changeab	le in Set v	value lock			
	58	able in Set value lock Image: Step SV, Step time can be changed.				
0 5800	5888	-	Step time, EV alarm value	can be changed		
Sot	Sensor co			our so onungou.		
			00 to 10.000			
5000 0 0000	•	ange: -100	00.0 to 1000.0℃(℉) nt inputs: –10000 to 10000 (٦ decimal point follow			
F;;;	PV filter ti	me consta	ant			
		-	to 10.0 seconds			
cā5L	Communio	-				
0 noñL		Shinko p				
	5870	<u> </u>	I transmission (Shinko protoc	col)		
	586-		l reception (Shinko protocol)			
	AodA		ASCII mode			
	ñodr	1	RTU mode			
	Available	when C5W of	or C5 option is ordered.			

Characters, Factory Default	Setting Item, Setting Range					
gāng	Instrument number					
0 0000	Setting range: 0 to 95					
	Available when C5W or C5 option is o	ordered.				
c758	Communication speed					
0 0096	0600 bps					
	19200 bps					
	□ ∃8 ∀ 38400 bps					
	Available when C5W or C5 option is ord	ered.				
	Data bit/Parity					
0 788A	8 bits/No parity					
	Topo 7 bits/No parity					
	8 bits/Even					
	7 bits/Even					
	Bodd 8 bits/Odd					
	ੀਰਰੀਰੀ 7 bits/Odd					
	Available when C5W or C5 option is ord	ered.				
	Stop bit					
	IIII l bit					
	EEEE 2 bits					
	Available when C5W or C5 option is	ordered.				
	Response delay time					
	Setting range: 0 to 1000 ms					
	Available when C5W or C5 option is ordered.					
58_6	SVTC bias					
	Setting range: $\pm 20\%$ of input s					
	-	20% of scaling span (The placement of				
		e decimal point follows the selection.)				
	· •	lered, or when $\Xi \Xi \overline{} \overline{} \overline{}$ [SV digital reception				
	(Shinko protocol)] is selected in [Com	munication protocol].				

13.7 Engineering Setting Mode 2

Characters, Factory Default	Setting Item, Setting Range					
56-5	Input type					
	F005	К	-200 to 1370 ℃			
	FIIIC	К	-200.0 to 400.0 °C			
	3006	J	-200 to 1000 °C			
	- [][][R	0 to 1760 ℃			
	SUDE	S	0 to 1760 ℃			
	5000	В	0 to 1820 ℃			
	5005	E	-200 to 800 ℃			
	r iiiic	Т	-200.0 to 400.0 °C			
		N	-200 to 1300 °C	-		
	PL 25	PL-II	0 to 1390 °C	-		
	-000	C(W/Re5-26)				
	PF [][[Pt100	-200.0 to 850.0 ℃	-		
		JPt100	-200.0 to 500.0 °C	-		
	Priic	Pt100	-200 to 850 ℃	-		
		JPt100	-200 to 500 ℃	-		
	EUUF	K	-328 to 2498 °F	-		
	EUUF	K	-328.0 to 752.0 °F	-		
	F	J	-328 to 1832 °F			
	r IIIF	R	32 to 3200 °F			
	SOOF	S	32 to 3200 °F			
	600F	В	32 to 3308 °F			
	EUUF	E	-328 to 1472 °F			
	;" [] [] F	Т	-328.0 to 752.0 °F			
	n IIIF	Ν	-328 to 2372 °F			
	PL 2F	PL-II	32 to 2534 °F			
	CUUF	C(W/Re5-26)	32 to 4199 °F			
	PT OF	Pt100	-328.0 to 1562.0 °F			
	_:P(F,F	JPt100	-328.0 to 932.0 °F			
	PT DF	Pt100	-328 to 1562 °F			
	_:P(F F	JPt100	-328 to 932 °F			
	4208	4 to 20 mA	-2000 to 10000			
	8868	0 to 20 mA	-2000 to 10000			
	80 88	0 to 1 V	-2000 to 10000			
	0058	0 to 5 V	-2000 to 10000	4		
	1058	1 to 5 V	-2000 to 10000	4		
	0 108	0 to 10 V	-2000 to 10000			
5718	Scaling high					
0 1370	-	• •	w limit to Input range high limit			
	DC volt	age, current inp	uts: -2000 to 10000 (The placement of the			
			decimal point follows the selection.)			

Characters, Factory Default	Setting Item, Setting Range							
	Scaling lo							
005-0	-	nge: Input range low limit to Scaling high limit						
	DC voltage, current inputs: -2000 to 10000 (The placement of the							
<u></u>	decimal point follows the selection.) Decimal point place							
d P III		•						
		No decimal point 1 digit after decimal point						
		2 digits after decimal point						
		3 digits after decimal point						
		hen DC voltage or current input is selected in [Input type].						
)-) ((but EV1 allocation						
E80 1		No event						
		Alarm output, High limit alarm						
	5000	Alarm output, Low limit alarm						
	0003	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 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						
	00 12	Alarm output, High/Low limits with standby independent alarm						
	00 13	Heater burnout alarm output (When C5W, EIW or W option is ordered)						
	00 /4	Loop break alarm output						
	00 /5	Time signal output						
	00 %	Output during AT						
	00 :7	Pattern end output						
	00 /8	Output by communication command						
	00 /9	RUN output						
	When	; (High limit alarm) to ∷[]; ;≓ (High/Low limit with standby						
	-	t alarm) or 🏭 🕻 (Time signal output) is selected, one output can be						
		vent output.						
		{∃ (Heater burnout alarm output), □Ω /4 (Loop break alarm), □Ω /5						
	multiple eve	ing AT) to 10 / (RUN output) are selected, each output is common to						
8 :58		value 0 Enabled/Disabled						
	no	Disabled						
0000	YESU	Enabled						
		en any alarm from $\square \square \square \square$ (High limit alarm) to $\square \square \square \square$ (High/Low limits						
		v independent alarm) is selected in [Event output EV1 allocation] -						
	-	30 7 (Process high alarm) and ECOB (Process low alarm].						
	excluaing iii	ישי (Process nign alarm) and שישים (Process low alarm].						

Characters, Factory Default	Setting Item, Setting Range	Data				
ਸ ਸ਼ਿੰਬ	EV1 alarm hysteresis					
	Setting range: 0.1 to 1000.0℃ (°F)					
	DC voltage, current inputs: 1 to 10000 (The placement of the					
	decimal point follows the selection.)					
	Available when any alarm from $\square \square \square \square $ (High limit alarm) to $\square \square \square \square \square$ (High/Low limits					
	with standby independent alarm) is selected in [Event output EV1 allocation].					
R 197	EV1 alarm delay time					
	Setting range: 0 to 10000 seconds					
	Available when any alarm from $\Box \Box \Box \Box$ (High limit alarm) to $\Box \Box$ (High/Low limits					
	with standby independent alarm) is selected in [Event output EV1 allocation].					
A X_A	EV1 alarm Energized/De-energized					
0 noñL	nonic Energized					
	EBS De-energized					
	Available when any alarm from $\square \square \square \square $ (High limit alarm) to $\square \square \square \square \square $ (High/Low limits					
	with standby independent alarm) is selected in [Event output EV1 allocation].					
6802	Event output EV2 allocation	_				
	EBBB No event	_				
	IIII Alarm output, High limit alarm					
	EBBE Alarm output, Low limit alarm					
	III OOB Alarm output, High/Low limits alarm					
	티요한 Alarm output, High/Low limits independent alarm					
	☐☐☐5 Alarm output, High/Low limit range alarm					
	Alarm output, High/Low limit range independent alarm					
	IDD7 Alarm output, Process high alarm					
	IIIII Alarm output, Process low alarm					
	$\square \square \square \square \square \square \square \square$ Alarm output, High limit with standby alarm					
	III III Alarm output, Low limit with standby alarm					
	I Alarm output, High/Low limits with standby alarm					
	Alarm output, High/Low limits with standby independent alarm					
	$\square \square \square \square \square \square \square$ Heater burnout alarm output (When C5W, EIW or W option					
	is ordered)					
	비미 Loop break alarm output					
	III /5 Time signal output					
	III 15 Output during AT					
	Pattern end output					
	$\square \mathcal{O} / \mathcal{B}$ Output by communication command					
	EIG /9 RUN output					
	EB20 Heating/Cooling control output					
	When [] [] [] / (High limit alarm) to [] [] / ? (High/Low limit with standby					
	independent alarm) or 🏭 7 (Time signal output) is selected, one output can be					
	set to one event output.					
	When [] [] {] (Heater burnout alarm output), [] [] {] {] (Loop break alarm), [] [] {] [] (Output during AT) to [] [] {] [] (RUN output) are selected, each output is common to					
	multiple event outputs.					
	Available when the EV2 or EV3(DR) option is ordered.					
L		ı				

Characters, Factory Default		Setting Item, Setting Range	Data			
8218	EV2 alarm	value 0 Enabled/Disabled				
	ngIII	Disabled				
	98 S 🗆	Enabled				
	Available w	hen any alarm from $\square \square \square \square$ (High limit alarm) to $\square \square \square \square$ (High/Low limits				
		by independent alarm) is selected in [Event output EV2 allocation] -				
	excluding $\square \square \square$					
8289		hysteresis				
0 00 13	0	nge: 0.1 to 1000.0℃ (°F),				
	DC volt	age, current inputs: 1 to 10000 (The placement of the				
		decimal point follows the selection.)				
		when any alarm from $\square \square \square \square $ (High limit alarm) to $\square \square \square \square \square$ (High/Low standby independent alarm) is selected in [Event output EV2 allocation].				
717 0 0		delay time				
8244		nge: 0 to 10000 seconds				
	-	hen any alarm from $\Box \Box \Box \Box \downarrow$ (High limit alarm) to $\Box \Box \downarrow \Box$ (High/Low				
		tandby independent alarm) is selected in [Event output EV2 allocation].				
AZLA		Energized/De-energized				
	nani	Energized				
	-885	De-energized				
		hen any alarm from $\Box \Box \Box \Box i$ (High limit alarm) to $\Box \Box i i c$ (High/Low				
		tandby independent alarm) is selected in [Event output EV2 allocation].				
6803	Event outp	out EV3 allocation				
	0000	No event				
	100 (Alarm output, High limit alarm				
	5000	Alarm output, Low limit alarm				
	0003	Alarm output, High/Low limits alarm				
	0004	Alarm output, High/Low limits independent alarm				
	0005	Alarm output, High/Low limit range alarm				
	0005	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				
	00 12	Alarm output, High/Low limits with standby independent alarm				
	ER 80	Heater burnout alarm output (When C5W, EIW or W option is ordered)				
	00 /4	Loop break alarm output				
	00 /5	Time signal output				
	00 %	Output during AT				
		Pattern end output				
	00 18	Output by communication command				
	00 /9	RUN output				
		(High limit alarm) to				
		alarm) or 27 (Time signal output) is selected, one output can be set				
	to one event	-				
	(Output durin	∃ (Heater burnout alarm output), □□ ;५ (Loop break alarm), □□ ;5 ng AT) to □□ ;9 (RUN output) are selected, each output is common to nt outputs. Available when the EV3D□ or EI option is ordered.				
	·	·				

Characters, Factory Default		Setting Item, Se	etting Range		Data		
8358	EV3 alarm value 0 Enabled/Disabled						
	noIII	ng III Disabled					
	YESD	Enabled					
	Available w	hen any alarm from $\square \square \square \square$; (Hig	h limit alarm) to 🕮	} <i>}∂</i> (High/Low limits			
	with standt	by independent alarm) is selec	ted in [Event outp	ut EV3 allocation] -			
	excluding	요미 (Process high alarm) and	I 🗆 🛛 🕄 (Process le	ow alarm].			
8384	EV3 alarm	hysteresis					
	Setting ra	nge: 0.1 to 1000.0℃ (°F),					
	DC volt	age, current inputs: 1 to 10	000 (The placem	ent of the			
			al point follows th	,			
		hen any alarm from 🛄♫♫ ↓ (Hig					
		y independent alarm) is selected	d in [Event output E	V3 allocation].			
8344		delay time					
0 0008	-	ange: 0 to 10000 seconds					
		when any alarm from $\square \square \square \square$:		· •			
		standby independent alarm) is s	elected in [Event ou	utput EV3 allocation].			
ABLA		Energized/De-energized					
0 noñL		Energized					
	-685	De-energized					
		hen any alarm from	-				
		y independent alarm) is selecte	d in [Event output E	V3 allocation].			
	Event Inpl	It DI1 allocation	Input ON	Input OFF			
		Event Input Function	(Closed)	(Open)			
		No event					
	100 1	Pattern number selection					
	5000	Direct/Reverse action	Direct action	Reverse action			
	0003	Program control	RUN	STOP			
		RUN/STOP					
	0004	Program control Holding/Not holding	Holding	Not holding			
	0005	Program control	Advance	Usual control			
		Advance function	function				
	Available	when C5W, EIW, EIT, C5 or EI o	option is ordered.				

Characters, Factory Default		Setting Item, Sett	ting Range		Data		
EBI 2	Event input DI2 allocation						
		Event Input Function	Input ON (Closed)	Input OFF (Open)			
		No event					
	1000	Pattern number selection					
	5000	Direct/Reverse action	Direct action	Reverse action			
	0003	Program control RUN/STOP	RUN	STOP			
	0004	Program control Holding/Not holding	Holding	Not holding			
	0005	Program control Advance	Advance	Usual control			
		function	function				
		le when C5W, EIW, EIT, C5 or EI op	tion is ordered.				
Fras		ssion output type					
0 6800	PSUU	PV transmission					
	5800	SV transmission					
	7800	MV transmission					
	Available	e when EIT option is ordered.					
[-L]	Transmi	ssion output high limit					
0761	Setting	•					
	PV, SV	transmission: Transmission outp	•				
		Direct current, voltage input					
	• • • • •	(The placement of the decir	•				
		nsmission: Transmission outpu	it low limit to 10	5.0%			
		e when EIT option is ordered.					
[[- <u> </u>]		ssion output low limit					
005-0	Setting	•	-::	an an dar dai shi bi sh			
	PV, 5V	transmission: Input range low lin					
		Direct current, voltage input (The placement of the decir					
	M// tro	nsmission: -5.0% to Transmiss	•				
		e when EIT option is ordered.	non output nigh	mmt			
ā. 5	Step tim	•					
		Hours : Minutes					
0 50 50	58c0	Minutes : Seconds					
P-65		estore action					
	St of	Stops after power is restored.					
0 55oP				m control and			
	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.						
	Hold	Suspends after power is resto					
		After power is restored, suspe					
		control, and performs Fixed v	alue control usi	ng the step SV			
		at the time of suspension.	la auspansion	and Brogram			
		Pressing the <u>RUN</u> key cance control resumes.	is suspension, a	anu Frogram			

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						
0 2800	우성대표 PV start:						
	Only when Program control starts, the step SV and step						
	time are advanced to the PV, then Program control starts.						
	우닝- 🗄 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.						
	58대표 SV start:						
	When Program control starts, the Program control starts						
	from the step SV set in [Step SV when program control						
	starts].						
PECA	Pattern end output time						
0 0008	Setting range: 0 to 10000 seconds						
85_5	AT bias						
	Setting range:						
	Thermocouple, RTD inputs without decimal point: 0 to 50° C (0 to 100° F)						
	Thermocouple, RTD inputs with decimal point: 0.0 to 50.0° C (0.0 to 100.0° F)						
	Available when Thermocouple or RTD input is selected in [Input type].						
Eall	Output status when input errors occur						
	oFF⊡ Output OFF						
	ឆក🛄 Output ON						
	Available for direct current and voltage inputs, and direct current output.						
F: 56	Indication time						
0000	Setting range: 00:00 to 60:00 (Minutes : Seconds)						
	When set to 00:00, Displays remain ON.						
Edif	Error indication						
0 000	nolli Disabled						
	SESE Enabled						

13.8 Data Clear

Characters, Factory Default	Setting Item, Setting Range			
	Data clear	Yes/No		
	ngIII	Data clear No		
	98 S O	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

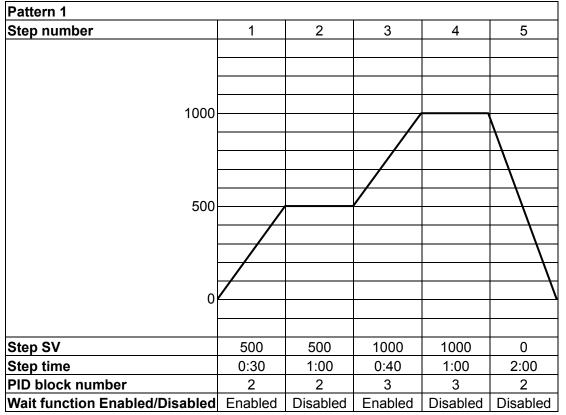
Please make a copy of the program pattern table (p.161), and follow the procedure below.

(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℃.
 - 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° to 1000° for 40 minutes.

Step 4: The control is performed so that SV is maintained at 1000 $^{\circ}\!\!\mathbb{C}$ for 1 hour.

Step 5: The control is performed so that SV drops from 1000° to 0° 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 number	OUT1 P-band	Integral time	Derivative time	ARW	OUT2 P-band
1	10 ℃	200 sec	50 sec	50%	10 ℃
2	30℃	240 sec	60 sec	35%	10°℃
3	50 ℃	340 sec	85 sec	40%	10 ℃

• Example of Wait value setting

Wait value 10°C

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										
Nait 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

Step 1 to 10 Wait function Enabled / Disat

---- Disabled

USE Enabled

---- Unlock

Loc / Lock 1

Loc2 Lock 2

Loc3 Lock 3

Loc Y Lock 4

Set value lock

19200 bps

8non 8 bits / No parity

7 bits / No parity

858n 8 bits / Even

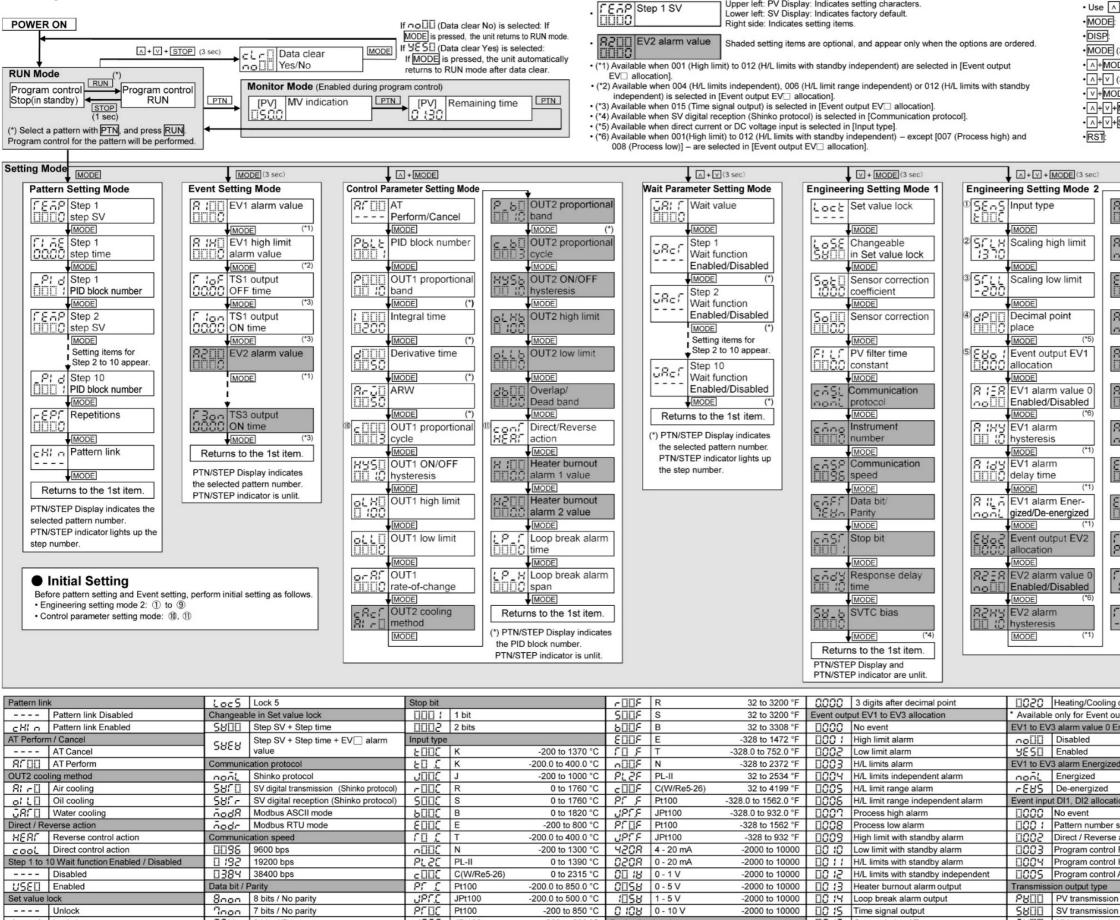
7EBn 7 bits / Even

Bodd 8 bits / Odd

Todd 7 bits / Odd

38400 bps

Data bit / Parity



About Setting Item

Upper left: PV Display: Indicates setting characters.

-2000 to 10000

C 19 RUN output

-2000 to 10000 📋 15 Time signal output

 -2000 to 10000
 □0
 12
 H/L limits with standby independent

 -2000 to 10000
 □0
 12
 H/L limits with standby independent

 -2000 to 10000
 □0
 12
 H/L limits with standby independent

 -2000 to 10000
 □0
 12
 H/L limits with standby independent

 -2000 to 10000
 □0
 12
 H/L limits with standby independent

 Image: Output during AT
 Output during AT

 Image: Output during AT
 Pattern end output

0 Utput by communication command

0 to 1390 °C 0208 0 - 20 mA

-200 to 850 °C 0 108 0 - 10 V

0018 0-1V

0058 0-5V

1058 1-5V

Decimal point place

-328.0 to 752.0 °F 1000 1 digit after decimal point -328 to 1832 °F 1000 2 digits after decimal point

-328 to 2498 °F IIII No decimal point

0 to 2315 °C

-200.0 to 850.0 °C

-200.0 to 500.0 °C

-200 to 500 °C

JPCC JPt100

Е∏ Я К

JUDF J

Key Operation

• Use \land and 🔍 for se	ettings, and register the settings with MODE or DISP.
•MODE:	Moves to the next item, illustrated by an arrow.
•DISP:	Moves back to the previous item (Opposite to MODE).
•MODE (3 sec):	Press MODE for approx. 3 seconds.
• A+MODE:	Press A and MODE (in that order) together.
• A+V (3 sec):	Press A and V (in that order) together for 3 seconds.
 V+MODE (3 sec): 	Press v and MODE (in that order) together for 3 seconds.
• A+V+MODE (3 sec):	Press A, V and MODE (in that order) together for 3 seconds
• A+V+STOP (3 sec):	Press A, V and STOP (in that order) together for 3 seconds.
•RST:	Returns to RUN mode from any setting items.

	•	· · · · ·	•
72 <i>6</i> 14	EV2 alarm delay time	6 6 5	Step time unit
	MODE (*1)		MODE
RZLA Nont	EV2 alarm Ener- gized/De-energized	© P-EF 51 oP	Power restore action
	MODE (*1)		MODE
1883	Event output EV3 allocation	® 5.58	Step SV when program control starts
	MODE		MODE
7358 1000	Enabled/Disabled	® S. S. Pann	Program control start type
2 20 10 1	MODE (*6)	Dece.	MODE
1083	EV3 alarm hysteresis	PEC 6	Pattern end output time
	MODE (*1)		MODE
134¥	EV3 alarm delay time	86.5	AT bias
	MODE (*1)		MODE
936A 10AU	EV3 alarm Ener- gized/De-energized	EoUF oFF[]	Output status when input errors occur
	MODE (*1)	1	MODE
1000	Event input DI1 allocation	0000	Indication time
	MODE		MODE
54/ 2 1000	Event input DI2 allocation	831 F no[][]	Error indication
	MODE		MODE
- 	Transmission output type		ns to the 1st item.
	MODE		EP Display and EP indicator are unlit.
1910	Transmission output high limit	PIN/SIL	P indicator are unlit.
	MODE		
-200	Transmission output low limit		
	MODE	1	

0200	Heating/Cooling control output *	Power res	tore action
* Available only for Event output EV2 allocation		SCOP	Stops after power is restored
EV1 to EV	3 alarm value 0 Enabled / Disabled	conf	Continues after power is restored
0000	Disabled	Hold	Suspends after power is restored
YESD	Enabled	Program c	ontrol start type
EV1 to EV	3 alarm Energized / De-energized	P800	PV start
nont	Energized	P8-0	PVR start
~E8S	De-energized	5800	SV start
Event inpu	t DI1, DI2 allocation	Output sta	tus when input errors occur
0000	No event	0550	Output OFF
0001	Pattern number selection	onOO	Output ON
5000	Direct / Reverse action	Error indic	ation
0003	Program control RUN / STOP	0000	Disabled
0004	Program control Holding / Not holding	YESD	Enabled
0005	Program control Advance function		
Transmiss	ion output type	1	
P800	PV transmission]	
5800	SV transmission]	
A800	MV transmission]	
Step time	unit		
ōi oli	Hours : Minutes	1	

Hours : Minutes 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

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