

**** Inquiry ****

For any inquiry of this controller, after checking the following as to the controller, please contact your shop where purchased, or our agent.

Model	[Example]
Temperature specification	PC-635-A/B
Kinds of input	0 to 400°C
Power source voltage	K
	AC 110/220V

Please let us know the details of malfunction of the instrument, if any, and the operating conditions specifically on job site.

SHINKO TECHNOS CO., LTD.
OVERSEAS DIVISION

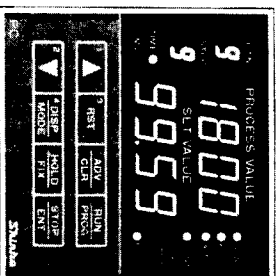
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No. P C 6 I E 8 2000. 09

SHINKO TECHNOS CO., LTD. OSAKA, JAPAN

INSTRUCTION MANUAL
FOR

MICROCOMPUTER BASED
PROGRAMMABLE
TEMPERATURE CONTROLLER
PC-600 SERIES



Thank you for purchasing our Programmable Temperature Controller, PC-600 series. This instrument is delivered after its production and inspection on the basis of exact quality control in our factory. Further to confirmation of the model name and specifications of the instrument, please this instruction manual before operation. For your information, the model of this instrument is manifested on the lower side of the inner equipment.

Note:
Make sure to hand over this instruction manual to the hand of the operator who uses the instrument at site.

SHINKO TECHNOS CO., LTD. OSAKA, JAPAN

••• Notes to users •••
 Before operating this controller, you should understand about following matters.

< Warning >

Turn the power supplied to the instrument OFF before wiring or checking. If working or touching the terminal on the power ON status, there is a possibility of Electric Shock which can cause severe injury or death.

< Notices >

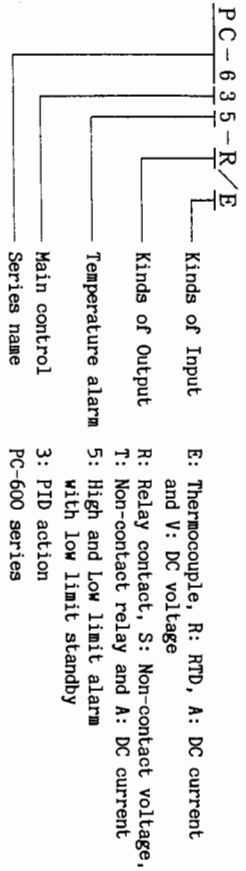
- The instrument must be grounded.
- Do not operate the keys during warm-up status (for approx. 6 seconds after the power on), and do not turn the power on while the key is pressing, or the specification contents of the instrument will have possibiles to change.
- Do not apply the voltage between the terminals ⑦ and ⑧ (See page 6), or there is a possibility that the transformer can be burning.

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1. EXPLANATION OF MODEL NAMES
1.1 Standard model names



1.2 Optional specifications

Optional name	Code	Description
Step temperature setting value display	SS	Displays the Step temperature programmed.
Cooling control action	CM	OFF in the range in which the input value is lower than the setting value, ON in the range higher than that.
Process value alarm setting	AA	Acts the temperature alarm set by process value.
Low limit standby not applied	LN	Low limit standby of temperature alarm not applied.
High limit standby applied	HM	High limit standby of temperature alarm is applied.
External control function	EC	Operable various functions closing the contact (or by open collector*).
Time signal output	TS	7 circuits, open collector, capacity DC 24V max.50mA
Process variable transmitting output	PVT	Process variable (actual temperature) transmitting output DC 0 to 1V or DC 4 to 20mA.
Setting value transmitting output	SVT	Setting value transmitting output DC 4 to 20mA or DC 0 to 1V.
Serial communication interface	C	Transmits the data by EIA RS-232C.
Serial communication interface	C5	Transmits the data by EIA RS-485.
Automatic starting form	AST	After the power turned ON, starts the program at once.
PV starting form	PST	Begins the start of program at PV value.
Stop function after restored from power failure	PS	Turns to standby status after the power failure restored.
Hold function after restored from power failure	PRH	After restored, executes the program at the time of power failure and turns to hold status.

[Optional code indication]
Specify the optional codes mentioned above following the model names.
When two or more functions specified, delimit with comma.

Note: Following optional specifications can not be applied with each other. (i.e. Only one function in each item can respectively be applied.)

- Process variable transmitting output (PVT) and Setting value transmitting output (SVT).
- Automatic starting form (AST), Stop function after restored from power failure (PS) and Hold function after restored from power failure (PRH).
- Serial communication (C) and (C5).

2. BEFORE USE
2.1 Unpacking

Unpack with great care not to shock the instrument.
Check whether the appearance has any trouble (damage) or not.

Confirm following accessories: Mounting bracket, 1 set. Instruction manual, 1 copy. Operation flow chart, 3 copies.

2.3 Confirmation of specifications

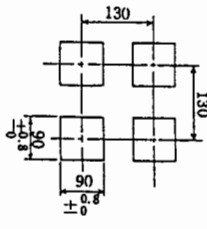
The model name of this instrument is manifested on the lower side of the inner equi and the rated range is shown on the front face of the instrument.

3. MOUNTING TO CONTROL PANEL

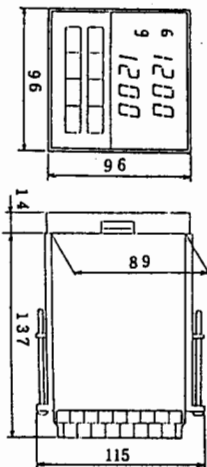
3.1 Selection of location

- Mount the controller in a location with:
- (1) A minimum of dust and an absence of corrosive gases.
 - (2) An ambient humidity is not high.
 - (3) An ambient temperature is within 0°C to 55°C.
 - (4) No exposure to direct sunlight.
 - (5) Neither mechanical vibration nor shock.
 - (6) The controller is away from the electromagnetic switch of large capacity or wiring through which large current flows.

3.2 Panel cutout

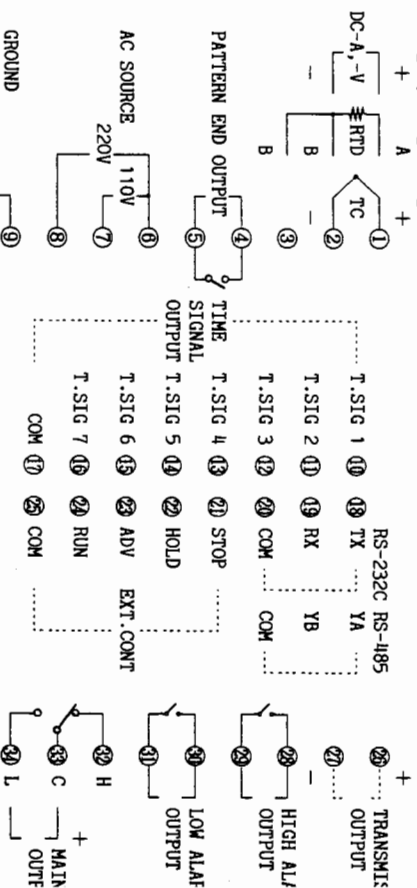


3.3 Dimensional outline drawing



4. WIRING CONNECTION

4.1 Terminal arrangements



*Terminals indicated within dot line are arranged at the optional specifications, no terminals are applied if the option is not applied.

Fig. 4.1 Terminal arrangements

4.2 Example of wiring

(1) Control output terminal

<p>-R/I (Relay contact)</p> <p>Single phase AC voltage 3 phase AC electro-magnetic relay Heater</p>	<p>-S/I (Non-contact voltage)</p> <p>DC 0-15V SSR Single phase heater</p>	<p>-T/I (Non-contact relay)</p> <p>Single phase AC voltage 3 phase AC electro-magnetic relay Heater</p>	<p>-A/I (Current)</p> <p>DC 0-20mA Trigger unit Single phase heater</p>
<p>Relay contact 1c AC 220V 3A (resistive load) AC 220V 1A (inductive load $\cos\phi=0.4$)</p>	<p>DC 15 \pm3V at load resistance 1.5kΩ. Use our SA-100 series for SSR.</p>	<p>Exciting current of AC electromagnetic relay should be: 20mA < Exciting < 1A</p>	<p>DC 4 to 20mA at load resistance max. 600Ω Use our PA-200 series as trigger unit.</p>

Fig. 4.2 Examples of wiring for control output terminals

(2) Power source for instrument and ground terminals

<p>AC 110V</p> <p>AC voltage 110V Ground Class 3</p>	<p>AC 220V</p> <p>AC voltage 220V Ground Class 3</p>
--	--

Fig. 4.3 Wiring examples of power source for instrument and ground terminal

Notes:

1. Power switch is not provided for this instrument. Therefore, both power switch and fuse (220V 2A) should be provided on the external circuit near this instrument.
2. Ground without fail, and use the wire as thick as possible.
3. With relay contact type of controller, auxiliary relay should be provided on the external of this instrument to protect the built-in relay.
4. To prevent the instrument from a bad influence owing to the unexpected level noise, it is recommended that the surge absorber be provided between the coil of the external relay.
5. For the improvement of the withstand noise, a noise filter is set between the power source circuit and ground terminal. (Leak current AC 200V 1mA)
6. Voltage must not be applied to the terminals between ⑦ and ⑧.

(3) Input terminal

<p>-I/E (Thermocouple input)</p> <p>Thermocouple Compensating lead wire</p> <p>Use Thermocouple and compensating lead wire applicable to this controller. (K, J, etc.)</p>	<p>-I/R (RTD input)</p> <p>RTD 3-core cable cord</p> <p>Use 3-wire system of RTD applicable (Pt100) to this controller.</p>
<p>-I/A (DC current input)</p> <p>DC 0~1V Copper lead wire</p>	<p>-I/V (DC voltage input)</p> <p>DC 4~20mA Copper lead wire</p>

Note: To avoid the influence of noise, keep input signal wire of thermocouple, RTD, DC current or DC voltage away from power source line for the instrument and the load.

Fig. 4.4 Example wiring for input terminal

(4) Alarm output terminal

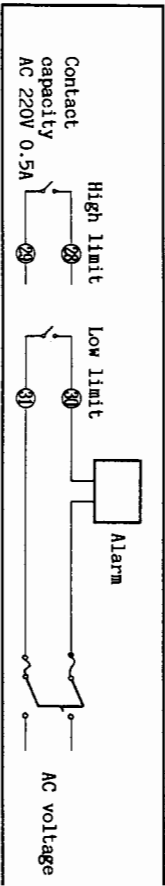


Fig. 4.5 Alarm output terminals

(5) Pattern end output terminal

Pattern end outputs when the final step of program terminated. To cancel the output, press **STOP** key.

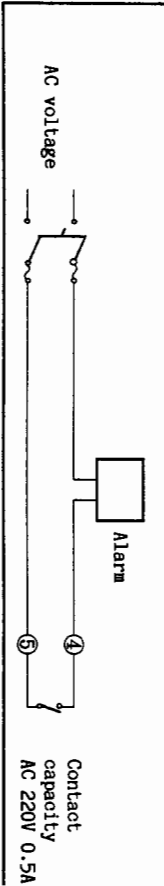


Fig. 4.6 Pattern end output terminals

(6) Time signal output terminals (Option code: TS)

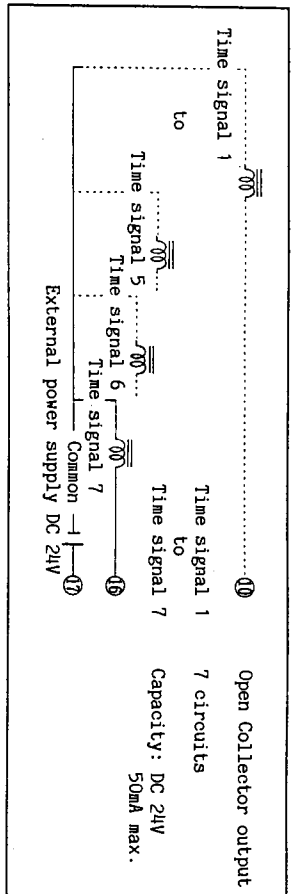


Fig. 4.7 Pattern end output terminals

(7) External operating input (Option code: EC)

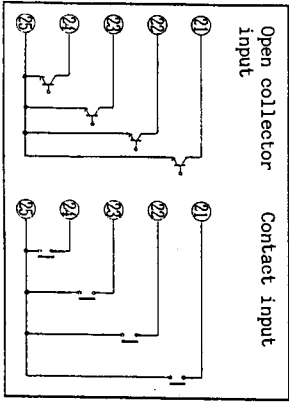


Fig. 4.8 External operating input

(8) External transmission output (Option code: PVT, SVT)
(9) Serial communication (Option code: C, CS)

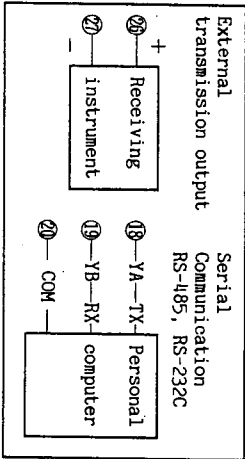


Fig. 4.9 External transmission output and Serial Communication

5. OPERATING PRINCIPLE

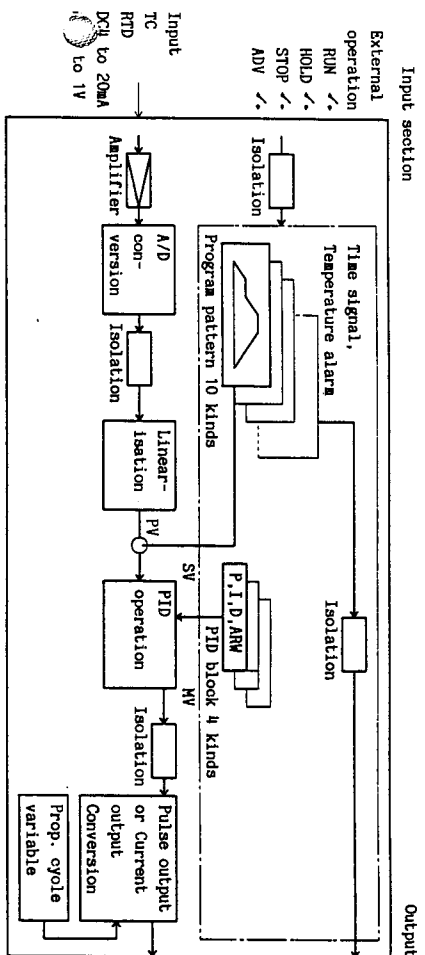


Fig. 5.1 Block diagram

Block diagram of this instrument is shown on Fig 5.1. This instrument is a digital programmable controller based on a microcomputer. This instrument can store 10 kinds of program patterns and 10 steps per pattern (total 100 steps), and it has many functions such as External operating input and Fixed value control, besides its original controlling functions. The action is: Program, such as Pattern setting or PID setting, which has been set by key operation becomes RUN situation by key operation or External operation input. Then, SV value of the specified pattern No. (operated at any time by the specified temperature and time) operated by PID together with A/D conversion and PV value linearised. The manipulating variable (MV) operated by PID is converted into the switching signal or the current signal and is converted by pulse conversion circuit.

Explanation of words

Pattern : Program composed of several steps.

Step : Smallest unit which sets time and temperature.

PID block : Aggregate of four parameters: P (Proportional band), I (Integral time), D (Derivative time) and ARW (Anti-reset windup).

Processing time: The rest of time on control execution.

Processing temperature

: Temperature of process performed. (Input temperature).

Wait : The function which waits for the next step until the deviation between processing temperature and the final setting value at the end of a gradient step has been within Wait setting value. At that time, the progress of programming time is suspended.

Hold (Advance) : It skips per step unit and carries forward a program of control.

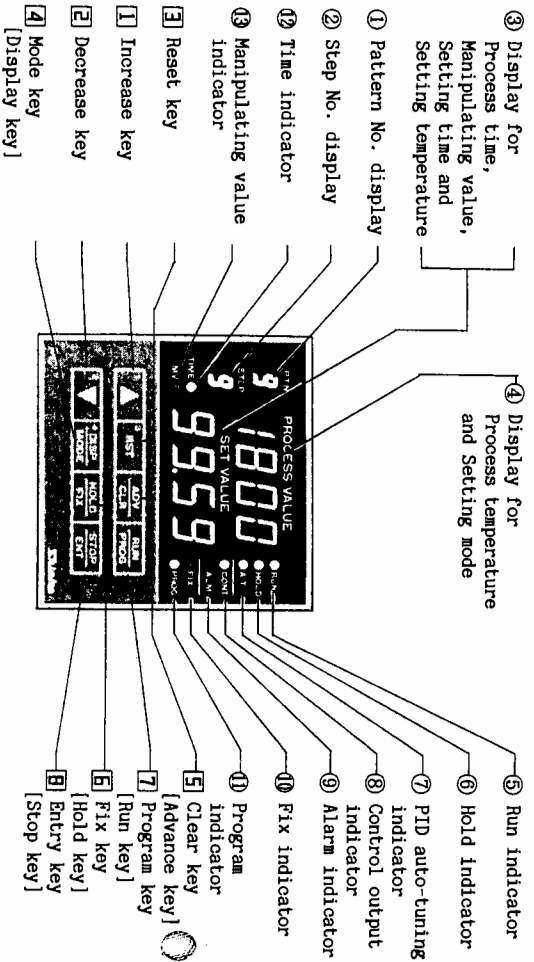
Repeat : It repeats the execution per pattern unit. (After the termination of all linked patterns when linked.)

Time signal : The function which can set an optional time (OFF time and ON time) within a total time range of set pattern and can output time signal.

Temperature alarm

: It can be set to each (individual) step. Individual set for both high and low limit. The function which outputs signal when processing temperature exceeds the setting range.

6. EXPLANATION OF FUNCTION



Notes: (1) [] key is used when operation mode.
 (2) The content of display is changed on the setting mode. As for the details, refer to each item.

Fig. 6.1 Explanation of Front function

6.1 Explanation of display function

Display	Name	Explanation of function
① 5 Red LED lights	Pattern number	Shows pattern number on Pattern number display (No.0 to 9)
② B Green LED lights	Step number	Shows step number on Step number display (No.0 to 9)
③ B Green LED blinks	Wait indication	Indicates that the program control is being waiting. (Indicates on Step number display.)

Display	Name	Explanation of function
③ BBBB Green LED lights	Process time display	«In control mode, when ⑫ TIME (Red LED) lights.» Shows the remaining time per step. (hour: minute (0 to 99:59))
③ BBBB Green LED lights	Manipulating value display	«In control mode, when ⑬ MV (Red LED) lights.» Shows the value (M) of control output. 0 to 100 however, -10 to 110% for -A/D (4 to 20mA correspond to 0 to 100%). Shows duty factor in case -R, S and T/D, output current in case of -A/D.
③ BBBB Green LED lights	Setting time display	«In setting mode, when setting the time.» Shows the time setting value per step (hour: minute or proportional cycle, integral time, derivatively time. 0 to 99:59 or 0 to 3600 seconds)
③ BBBB Green LED lights	Setting temperature display	«In setting mode, when setting the temperature.» Shows the temperature setting value per step. (On control mode, it shows the setting temperature according to each time.)
④ BBBB Red LED lights	Processing temperature display	«In control mode» Shows the processing temperature.
④ ---- Red LED lights	Burnout display	«In control mode» Lights when thermocouple or RTD burnout. (Lightholds also when input exceeds 112.5% of rated value.)
④ BBBB Red LED lights	Setting mode display	«In setting mode» Shows each mode by the characters on setting mode display
⑤ RUN Red LED lights	Run indicator	Shows that the program is running.
⑥ HOLD Red LED blinks	Hold indicator	Shows that the program time is suspended.
⑦ AT Yellow LED blinks	PID auto-tuning indicator	Shows the execution of PID auto-tuning. When terminated, it turns to unlit.
⑧ CONT Green LED lights	Control output indicator	Lights when the control action (control output ON). (However, with -A/D type, it blinks according to the output.)
⑨ ALM Red LED lights	Alarm indicator	Lights when Temperature alarm output ON.

Display	Name	Explanation of function
⑩ ○ FIX Red LED lights	Fix indicator	Shows the fixed value control status.
⑪ ○ PROG Red LED lights	Program indicator	Shows the program value control status.
⑫ ○ TIME Red LED lights	Time indicator	Shows that the step time remaining is being displayed.
⑬ ○ MV Red LED lights	Manipulation indicator	Shows the manipulating value status on SV value.

6.2 Explanation of key function

(1) Keys used when setting (Program keys)

It turns to setting mode by pressing keys in the order of **[▲]**, **[▼]**, **[FST]**, **[MODE]**.

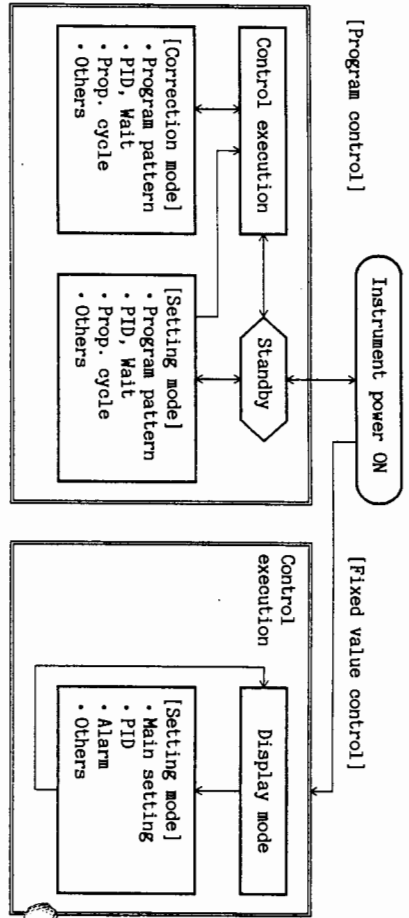
Key	Name	Explanation of function
① [▲]	Increase key	Increases the numeric value.
② [▼]	Decrease key	Decreases the numeric value.
③ [FST]	Reset key	Returns the setting mode to the standby mode. (Simultaneously, it registers the numeric value.)
④ [MODE]	Mode key	Switches the setting mode. (Simultaneously, it registers the numeric value.)
⑤ [CLR]	Clear key	Clears the program. Note: This key should be pressed 3sec. or more.
⑥ [SVCP]	Fix key	Changes the mode to the fixed value control. (Simultaneously, it registers the numeric value.)
⑦ [PRG]	Program key	Changes the mode to the program control. (Simultaneously, it registers the numeric value.)
⑧ [ENT]	Entry key	Registers the numeric value.

(2) Keys used when operation

Key	Name	Explanation of function
④ [MODE]	Display key	Switches SV display into the Setting temperature value → the Remaining step time → the Manipulating value → the Setting temperature value
⑤ [FWD]	Advance key	Interrupts the program step being executed and moves to the next step.
⑥ [HOLD]	Hold key	Interrupts the program time being executed. As for control, fixed value control is executed with the value at that time.
⑦ [PRG]	Run key	Starts the Program or cancels the Hold.
⑧ [ENT]	Stop key	Stops the program being executed. Otherwise, cancels the pattern end output signal at the termination of final step of the program. This key should be pressed for 1sec. or more.

Note: Press **[PRG]** key to run the program, however, it starts from the beginning of the program pattern. To start the program from the middle of the pattern, or to omit the pattern end signal, press **[FWD]** key to advance the step.

7. FLOW OF BASIC OPERATION



When the setting lock is not designated, program can be corrected even if the control is executing. (However, the number of Repeat during control cannot be changed, although the setting value for the number of Repeat can be changed.)

Selection of the "Program control" and the "Fixed value control".

- (1) Change the situation into setting mode by pressing key according to the order of **[▲]**, **[▼]**, **[FAS1]**, **[FAS2]**.
- (2)-1 The program control (when PROG lamp lighted) can be changed into the fixed value control by further pressing **[FAS2]** key.
- (2)-2 The fixed value control (when FIX lamp lighted) can be changed into the program control by further pressing **[FAS2]** key.

8. HOW TO SET PROGRAM

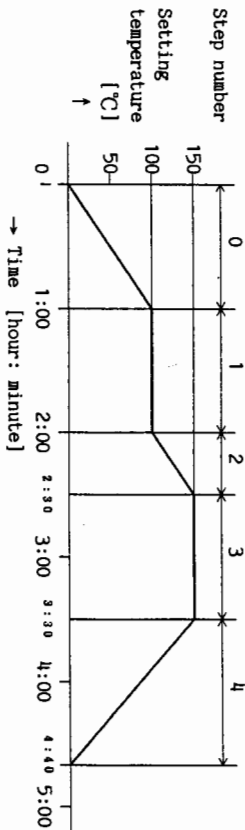
8.1 Before key operations
Make the data before starting the setting. Arrange the data on data table to enter pattern programming on the graph table.

- (1) For the graph table, put the temperature [°C] on vertical line and the time [hour: minute] on horizontal line.
- (2) Plot in order from the data of step 0, and connect the plot.
- (3) Enter each block No. of PID, Wait and Alarm.
- (4) Enter the block No. at the position of necessary channel No. in the time signal (Applicable to only in case the option is designated.)

* It is possible to set up to 10 steps per pattern, each 10 blocks for PID, Wait and Alarm block, 16 time signal blocks and 7 circuits for channel. However, the following data abridged to make the example simply.

8.2 Data example

(1) Program pattern (Example: Pattern No. 0)



* Numeral shows block number.

Block number	PID	Wait	Alarm
1	1	1	1
2	2	0	2
3	1	2	0
4	3	0	3
5	1	1	1

Time signal	Signal CH1	Signal CH2	Signal CH3	Signal CH7
0	20/80	0/0	0/60	5
1	0/75	0/60	20/20	5
2	0/60	0/0	0/75	5
3	30/80	20/20	0/60	5
4	0/80	0/75	0/60	5

(2) Data table

Pattern No. 0	Step No.	Main program		Block number									
		Step temperature	Step time [Hour:Min]	PID	Wait	Alarm	CH 1	CH 2	CH 3	CH 4	CH 5	CH 6	CH 7
0	0	100 [°C]	1:00	1	1	1	5	0					
1	1	100	1:00	2	0	2	3	2					
2	2	150	0:30	1	2	1	2	0					
3	3	150	1:00	3	0	3	1	4					
4	4	0	1:10	1	0	1	2	3					
5	5												
6	6	When desired to reach to the setting temperature(e.g. 180°C) in minimum time.											
7	7	180	0:00	set the step time to 0 hour 0 minutes as 180°C, 0:00.									
8	8												
9	9												

In this example, up to step No.4 are used, and with time signal (Option) only CH1, CH2 are used.

◎ PID block setting

No.	P[$\%$]	I[s]	D[s]	A[$\%$]
*10	0	0	0	0
1	4.0	300	95	50
2	3.0	350	90	40
3	2.5	320	85	30

Each block PID, Wait and Alarm has 10 blocks, however, example is described with 4 blocks.

◎ Wait block setting

No.	Wait value [°C]
*10	0
1	± 10
2	± 5
3	0

◎ Alarm block setting

No.	H[°C]	L[°C]
*10	+max.	-min.
1	+max.	-5
2	+5	-min.
3	+2	-2

◎ Time signal block setting (Settable only when option designated.)

No.	OFF	ON	No.	OFF	ON	No.	OFF	ON
*10	0	0	4	20	20	8	20	20
1	30	30	5	20	60	9	60	13
2	0	60	6			10		14
3	0	75	7			11		15

Notes: *1, In case of ON-OFF action, make all of PID block, Wait block and Alarm block to "0".

*2, When Wait is not used, it is easy if 0°C is set to No.0 block.

[i.e. If 0°C is set to Wait block No.0, others also become to 0°C (no wait).]

*3, When Alarm is not used, set the block setting of No.0 as high limit (H) maximum value and low limit (L) minimum value.

[i.e. If set the Alarm block as above, others also become to no alarm the same as Alarm block No.0.]

• No.0 block setting value is factory adjusted as high limit (H) to maximum value and low limit (L) to minimum value considering in case the alarm is not used.

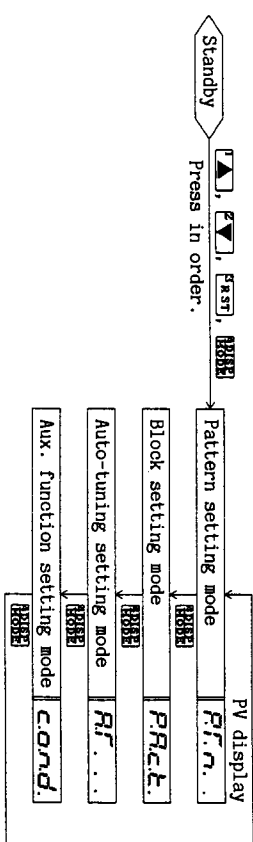
*4, When Time signal is not used, set both ON and OFF in No.0 block to "0".

[i.e. If set the Time signal block No.0 to "0", others also become to "0" (no Time signal).]

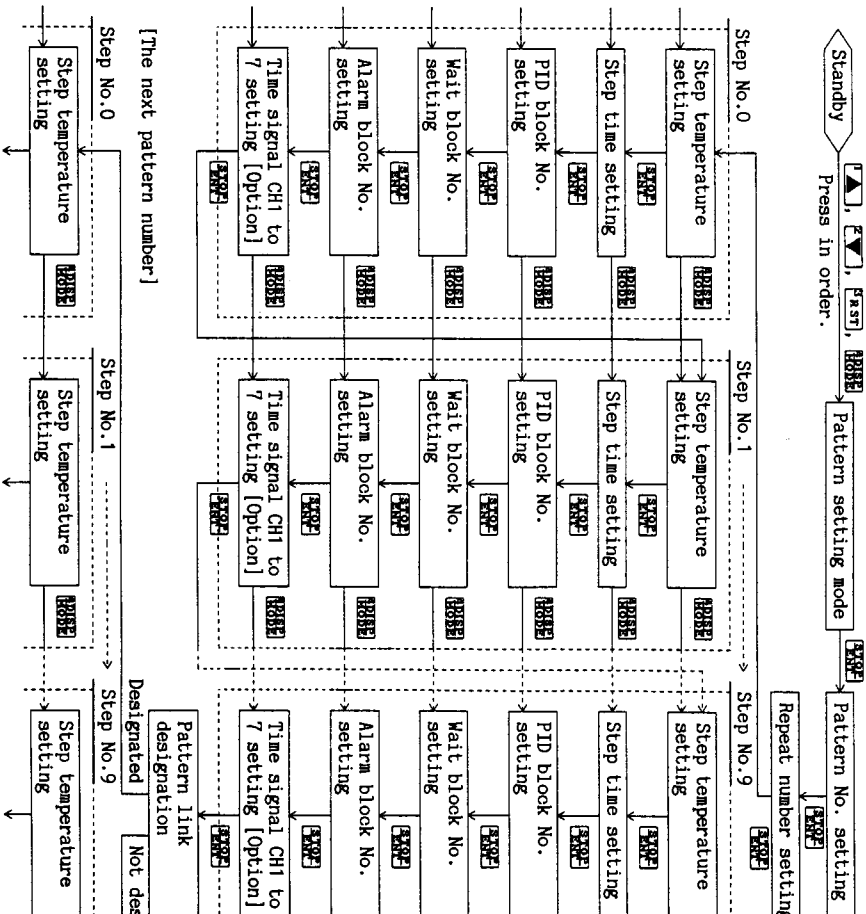
8.3 Programming

Program setting is composed of Pattern setting mode, Block setting mode, Auto-tuning setting mode and Auxiliary function setting mode, and the Pattern setting mode can selected pressing keys in the order of [F \blacktriangle], [F \blacktriangledown], [F \rightarrow], [F \leftarrow]. Every pressing the [F \rightarrow] key, changes the mode to Block setting mode, Auto-tuning setting mode and Aux function setting mode. Press [F \leftarrow] key at the mode to be set.

* Flow of setting mode



8.4 Flow of program pattern setting



8.5 Setting of Program pattern

Press **[F10]** key when **[P.F.N.]** is displayed.

No.	Key operation	Display	Description
1	[F10] or [F11] , [F12] , [F13]	P.F.N. 0	Shows the Pattern number. If the number is correct press [F10] key. When it should be changed, select by [F11] , [F12] keys and press [F13] key.
2	[F10] or [F11] , [F12] , [F13]	REP.F 0	Shows the number of Repeat. Press [F10] key if the number is correct. When it should be changed, use [F11] , [F12] keys and press [F13] key. (0: no repeat)
3	[F10] or [F11] , [F12] , [F13]	TEMP 0	Shows the Step number on Step number display. Input the Step Temperature by [F11] , [F12] keys, and then press [F13] key.
4	[F11] , [F12] , [F13]	TIME 0000	Input the Step time by [F11] , [F12] keys, and then press [F13] key.
5	[F11] , [F12] , [F13]	PID 0	Input the PID block number by [F11] , [F12] keys, and then press [F13] key.
6	[F11] , [F12] , [F13]	URF 0	Input the Wait block number by [F11] , [F12] keys, and then press [F13] key.
7	[F11] , [F12] , [F13]	RL 0	Input the Alarm block number by [F11] , [F12] keys, and then press [F13] key.
Advance to procedure 15, in case the specification is standard.			
(*) In case Time signal [Option code: TS] is applied, perform the next operations.			
8	[F11] , [F12] , [F13]	-F4 1 0	Input the Time signal block number to the time signal output CH1 by [F11] , [F12] keys, and then press [F13] key.
9	[F11] , [F12] , [F13]	-F4 2 0	Input the Time signal block number to the time signal output CH2 by [F11] , [F12] keys, and then press [F13] key.
10	[F11] , [F12] , [F13]	-F4 3 0	Input the Time signal block number to the time signal output CH3 by [F11] , [F12] keys, and then press [F13] key.

No.	Key operation	Display	Description
11	[F11] , [F12] , [F13]	-F4 4 0	Input the Time signal block number to the time signal output CH4 by [F11] , [F12] keys, and then press [F13] key.
12	[F11] , [F12] , [F13]	-F4 5 0	Input the Time signal block number to the time signal output CH5 by [F11] , [F12] keys, and then press [F13] key.
13	[F11] , [F12] , [F13]	-F4 6 0	Input the Time signal block number to the time signal output CH6 by [F11] , [F12] keys, and then press [F13] key.
14	[F11] , [F12] , [F13]	-F4 7 0	Input the Time signal block number to the time signal output CH7 by [F11] , [F12] keys, and then press [F13] key.
15	[F11] , [F12] , [F13]	TEMP 0	Step number turns to 1. Input the Step Temperature by [F11] , [F12] keys, and then press [F13] key.

Perform the same setting continuously, and up to No.9 of steps can be set. If step numbers to be used are less than 10, it is unnecessary for remaining steps to input the values 0. When correcting the patterns already set, only necessary parts are required to correct. When reducing the step number, display the unnecessary step number and then press **[F10]** key for 3 seconds, and setting value on and after the step number will turn to initial value.

- To return standby mode, press **[F10]** key.
- To return the beginning of pattern setting mode, press **[F10]** key.

8.6 Link of patterns

In case the number of steps are more than 10 in a pattern, the number of steps can be increased by linking the pattern with the next pattern and then the new pattern can be used. (maximum 100 steps)
After all settings of step No.9 have been finished, decide whether the patterns should be linked or not.

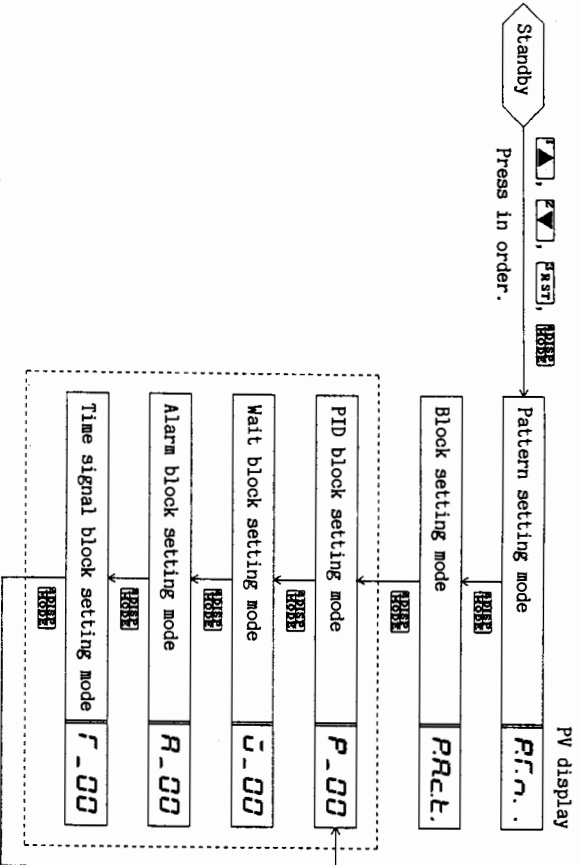
No.	Key operation	Display	Description
1	[F11] , [F12] , [F13]	CH.F 0	Display asks whether the pattern should be linked or not. If Linked, press [F11] (displays 1) and if not, press [F12] (displays 0), and then press [F13] key.
2	[F11] , [F13]	TEMP 0	Pattern number increases by 1, and displays Step No.0.

- To return standby mode, press **[F10]** key.
- To return the beginning of pattern setting mode, press **[F10]** key.

8.7 Program clear

When **[F2]** key is pressed for 3 seconds in setting mode, setting value on and after the Step number within displaying pattern turns to initial value.
Pattern link is also cancelled.

8.8 Setting of the blocks (PID, Wait, Alarm, Time signal)



Note: Initial values of each block and setting values are adjusted as "0". Therefore, if a setting value is input to the block No.0, the setting value also becomes the input for the block not yet used.
It is useful that each block should be used from block No.1, and block No.0 should be used so that each mode can not be operated.
(In this manual, it is explained with block No.0 for convenience sake.)
For example: PID block No.0 for ON-OFF action (P,I,D and ARW values "0")
Wait block No.0 for Wait function not designated.

(1) Setting of PID block

Press **[F2]** key when **P_00** is displayed.
(Block No. will be changed if **[▲]** or **[▼]** key is pressed.)

No.	Key operation	Display	Description
1	[▲] , [▼] , [F2] PID block Block Number	P0_00	Input Proportional band value of PID block No.0 by [▲] , [▼] keys, and then press [F2] key.
2	[▲] , [▼] , [F2]	PD_!0	Input Integral time value of PID block No.0 by [▲] , [▼] keys, and then press [F2] key.

No.	Key operation	Display	Description
3	[▲] , [▼] , [F2]	PD_d0	Input Derivative time value of PID block No.0 by [▲] , [▼] keys, and then press [F2] key.
4	[▲] , [▼] , [F2]	PD-R0	Input Anti-reset windup value of PID block No.0 by [▲] , [▼] keys, and then press [F2] key.
5	[▲] , [▼] , [F2]	PI_P00	Input Proportional band value of PID block No.0 by [▲] , [▼] keys, and then press [F2] key.

Perform the same setting continuously, and up to No.9 of blocks can be set.
It is not required to set all of the blocks, set necessary blocks only.

- To return standby mode, press **[F2]** key.
- To return the beginning of pattern setting mode, press **[F2]** key.

(2) Setting of Wait block

Press **[F2]** key when **U_00** is displayed.
(Block No. will be changed if **[▲]** or **[▼]** key is pressed.)

No.	Key operation	Display	Description
1	[▲] , [▼] , [F2] Wait block Block Number	U0_00	Input Wait value of Wait block No.0 by [▲] , [▼] keys, and then press [F2] key.
2	[▲] , [▼] , [F2]	U1_00	Input Wait value of Wait block No.1 by [▲] , [▼] keys, and then press [F2] key.

Perform the same setting continuously, and up to No.9 of Wait blocks can be set.
It is not required to set all of the blocks, set necessary blocks only.

- To return standby mode, press **[F2]** key.
- To return the beginning of pattern setting mode, press **[F2]** key.

(3) Setting of Alarm block

Press **[F2]** key when **[F-00]** is displayed.
 (Block No. will be changed if **[▲]** or **[▼]** key is pressed.)

No.	Key operation	Display	Description
1	[▲] , [▼] , [F2] Alarm block Block Number	RD-H High limit RD-L Low limit	Input Alarm H (high limit alarm) value of Alarm block No.0 by [▲] , [▼] keys, and then press [F2] key.
2	[▲] , [▼] , [F2]	RD-L Low limit	Input Alarm L (low limit alarm) value of Alarm block No.0 by [▲] , [▼] keys, and then press [F2] key.

Perform the same setting continuously, and up to No.9 of Alarm blocks can be set.
 It is not required to set all of the blocks, set necessary blocks only.

- To return standby mode, press **[FRT]** key.
- To return the beginning of pattern setting mode, press **[FMS]** key.

Notes: 1. No.0 block setting value is factory adjusted as high limit (H) to maximum value and low limit (L) to minimum value considering in case the alarm is not used.

2. In the case of alarm L (low limit alarm) "RD-L", it displays the value normally "199.9" up to -199.9, however, when it becomes -200.0, it displays "200.0".

• "2.00.0"

It indicates the decimal point.
 It means minus (-).

(4) Setting of Time signal block (Option: TS)

The parts related with Program pattern and Time signal in "8.2 Data example" are shown below.

Program pattern	Step No.	0	1	2	3	4
	Step time	1:00	1:00	0:30	1:00	1:10

Time signal	Signal CH1	20/80 (*2)	0/75 (*2)	0/80 (*2)	0/30 (*3)	0/80 (*3)
	No.	5	3	2	1	2
Signal CH2	0/0	0/80	0/0	20/20 (*3)	0/75 (*1)	
	No.	0	2	0	4	3

Notes: 1. When Time signal is set with longer time than the step time, it obeys the next step setting. (*1)

2. When setting ON signal continued to the next step, set the ON time to exceed to the next step. (*2)

If time setting is set the same as the step time, time signal momentarily turns once OFF at a change of step.
 3. Time signal automatically turns OFF signal after ON time passed. (*3)

Press **[F2]** key when **[F-00]** is displayed.
 (Block No. will be changed if **[▲]** or **[▼]** key is pressed.)

No.	Key operation	Display	Description
	[F2]	F-00	Time signal block setting mode.
1	[▲] , [▼] , [F2] Time signal Block No.	00-F ON/OFF	Input OFF time of Time signal block No.0 by [▲] , [▼] keys, and then press [F2] key.
2	[▲] , [▼] , [F2]	00-H 0000	Input ON time of Time signal block No.0 by [▲] , [▼] keys, and then press [F2] key.
3	[▲] , [▼] , [F2]	01-F 0000	Input OFF time of Time signal block No.1 by [▲] , [▼] keys, and then press [F2] key.
4	[▲] , [▼] , [F2]	01-H 0000	Input ON time of Time signal block No.1 by [▲] , [▼] keys, and then press [F2] key.

Perform the same setting continuously.

It is not required to set all of the blocks, set necessary blocks only.

- To return standby mode, press **[FRT]** key.
- To return the beginning of pattern setting mode, press **[FMS]** key.

(5) Setting of PID auto-tuning (AT)

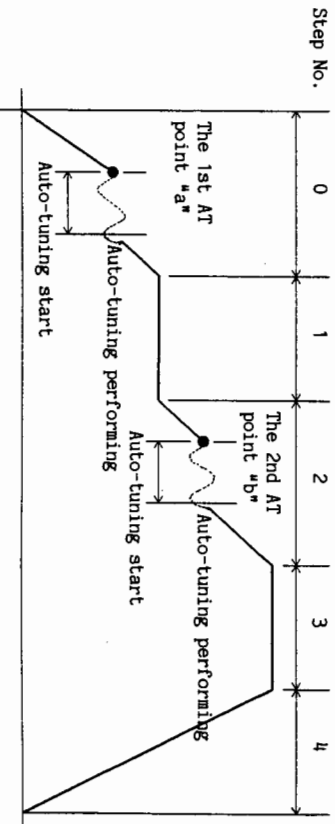
Constant setting by PID auto-tuning (AT) is effective only during control.

Press **[F2]** key in the correcting mode during control

PI
AUTO

Auto-tuning is started at the setting value (temperature setting) when AT has started (operation), and the setting value in PID block is rewritten.

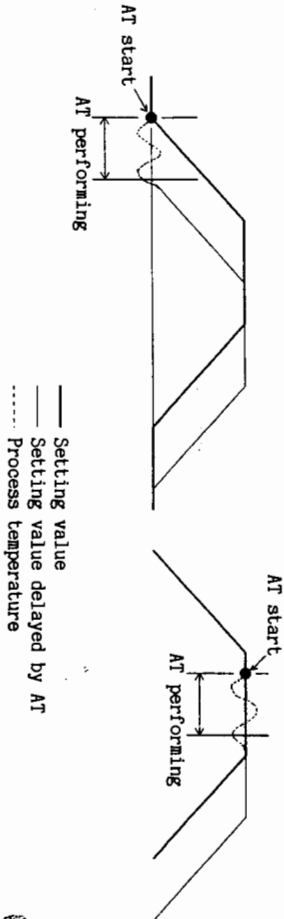
It has the influence with the other patterns which designates the block No. (Program time is suspended during auto-tuning.)



For example: In the preceding figure, the first AT is performed at "a" point. This point is in Step No.0, and PID block No.0 is selected, and the value in the block is as follows. After Auto-tuning the contents of block No.0 is replaced with the value found by Auto-tuning.

	Before AT	After AT
PID block No.0 P	0 %	3 %
I	0 sec	200 sec
D	0 sec	50 sec
ARM	0 %	40 %
PID block No.0 P	3 %	2.4 %
I	200 sec	80 sec
D	50 sec	20 sec
ARM	40 %	50 %

When executing Auto-tuning during RUN, program time is interrupted (execute AT on HOLD status) and after AT is terminated, performs the program time remaining.



No.	Key operation	Display	Description
1	[F5] [F6], [F7], [F8]	Rf...	PID auto-tuning setting mode.
2	[F9]	Rf Rurlo	Press [F9] to select PID auto-tuning setting mode. Press [F6] key to set Auto-tuning.
3	[F10]		Press [F10] key to enter Auto-tuning. Press [F11] key at the termination.

(6) Cancellation of PID auto-tuning.

Press [F9] key in the correcting mode when [Rf...] is displayed. It is set during PID auto-tuning.

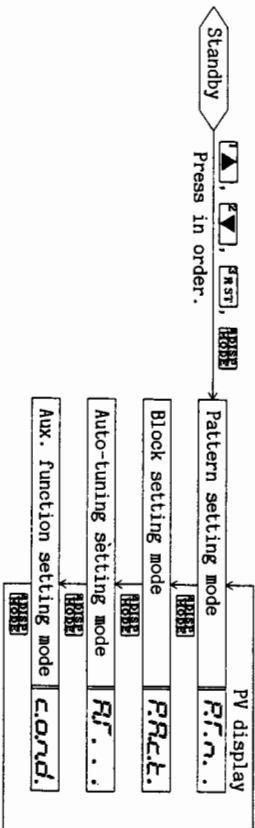
No.	Key operation	Display	Description
1	[F9]	Rf Rurlo	PID auto-tuning setting mode. Press [F9] to select PID auto-tuning setting
2	[F6]	Rf	Press [F6] key to cancel PID auto-tuning.

To cancel the PID auto-tuning, press [F11] key. Then, the control will be continued. To return the beginning of pattern setting mode, press [F9] key.

8.9 Correction and confirmation of program during execution of control

Program can be corrected and called (confirmation) during control as well as the setting mode. Auto-tuning should be carried out during control.

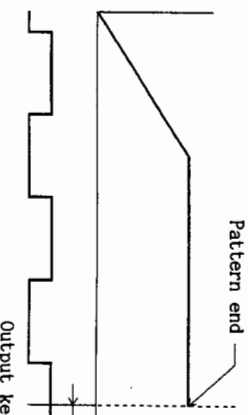
Flow of setting mode



The operation is the same as the setting mode (8.3 to 8.5).

Note: (1) As for correction of the number of repeat, the setting value can be corrected, however, the number of repeat during control can not be corrected.

(2) As for time division ON-OFF output, (-R/I, -S/I, -T/I) if the step is terminated at the status control output is ON, the output is continued until the ON period terminates.



9. AUXILIARY FUNCTION SETTING

9.1 Setting
 Proportional cycle, Output high limit limiter, Output low limit limiter, Main setting high limit limiter, Main setting low limit limiter, Serial communication instrument number setting and setting lock are settable in this Auxiliary function setting mode. Press **[F1]** key when **[Candl]** is displayed (Auxiliary function setting mode).

No.	Key operation	Display	Description
1	[F1]	CHC	Input the Proportional cycle by [▲] , [▼] keys and then press [F1] key. (Initial value: In case of -R/D 30S, -S/I/ 3S.) This item is not available for the type -A/I/.
2	[▲] , [▼] , [F1]	oF1h 100	To change the High limit limiter of the output, input with [▲] , [▼] keys, and then press [F1] key. (Initial value: 100)
3	[▲] , [▼] , [F1]	oF1L	To change the low limit limiter of the output, input with [▲] , [▼] keys, and then press [F1] key. (Initial value: 0)
4	[▲] , [▼] , [F1]	4F1h 1200	To change the High limit limiter of the Main setting, input with [▲] , [▼] keys, and then press [F1] key. (Initial value: Maximum of the range)
5	[▲] , [▼] , [F1]	4F1L	To change the Low limit limiter of the Main setting, input with [▲] , [▼] keys, and then press [F1] key. (Initial value: Minimum of the range)
6	[▲] , [▼] , [F1]	dBn0	Set the Instrument number for serial communication. Apply the number with [▲] , [▼] keys, and then press [F1] key. (Initial value: 0)
7	[▲] , [▼] , [F1]	Lock	Specify whether all setting values (excepting pattern number) are locked or not. If locked, press [▲] key, and if not, press [▼] key. SV display indicates [L] when locked, and [-] when not lock.

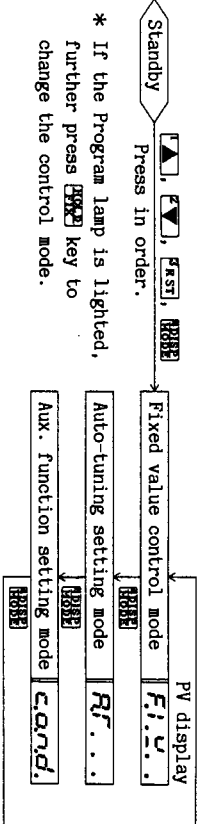
Notes: Press **[F1]** key at the items the setting is not required, and the item will move to the next. Proportional band will not be changed even if high limit limiter or low limit limiter of main setting is changed.

9.2 Setting of control output High and Low limit limiter

The high and low limit of control output can be set from 0 to 100% (-10 to 110% for -A/I/type). Set the most suitable value according to the heater capacity or the processing condition. (Initial value: 100% for high limit and 0% for low limit)

10. FIXED VALUE CONTROL

10.1 Flow of setting



* If the Program lamp is lighted, further press **[F1]** key to change the control mode.

10.2 Setting

Press **[F1]** key when **[F.V.]** is displayed. Set the values in order of Main setting, High limit alarm, Low limit alarm, Proportional band, Integral time, Derivative time and ARW.

No.	Key operation	Display	Description
1	[F1]	4 0	Input Main setting value by [▲] , [▼] keys, and then press [F1] key.
2	[▲] , [▼] , [F1]	Rh 0	Input High limit alarm setting value by [▲] , [▼] keys, and then press [F1] key.
3	[▲] , [▼] , [F1]	Rl 0	Input Low limit alarm setting value by [▲] , [▼] keys, and then press [F1] key.
4	[▲] , [▼] , [F1]	P 00	Input Proportional band setting value by [▲] , [▼] keys, and then press [F1] key.
5	[▲] , [▼] , [F1]	I 0	Input Integral time setting value by [▲] , [▼] keys, and then press [F1] key.
6	[▲] , [▼] , [F1]	D 0	Input Derivative time setting value by [▲] , [▼] keys, and then press [F1] key.
7	[▲] , [▼] , [F1]	ARW 0	Input ARW setting value by [▲] , [▼] keys, and then press [F1] key.
8	[▲] , [▼] , [F1]	4 0	Press [F1] key at the termination.

10.3 Setting of PID auto-tuning (AT)

* Operate the setting during fixed value control.

No.	Key operation	Display	Description
	[F1] [F2] [F3] [F4] [F5] [F6] [F7] [F8] [F9] [F10] [F11] [F12] [F13] [F14] [F15] [F16] [F17] [F18] [F19] [F20] [F21] [F22] [F23] [F24] [F25] [F26] [F27] [F28] [F29] [F30] [F31] [F32] [F33] [F34] [F35] [F36] [F37] [F38] [F39] [F40] [F41] [F42] [F43] [F44] [F45] [F46] [F47] [F48] [F49] [F50] [F51] [F52] [F53] [F54] [F55] [F56] [F57] [F58] [F59] [F60] [F61] [F62] [F63] [F64] [F65] [F66] [F67] [F68] [F69] [F70] [F71] [F72] [F73] [F74] [F75] [F76] [F77] [F78] [F79] [F80] [F81] [F82] [F83] [F84] [F85] [F86] [F87] [F88] [F89] [F90] [F91] [F92] [F93] [F94] [F95] [F96] [F97] [F98] [F99] [F100]	Rf...	PID auto-tuning mode.
1	[STOP]	Rf	Press [STOP] key.
2	[F1]	Rf Rur o	Press [F1] key to set the PID auto-tuning.
3	[F2]		PID auto-tuning starts. (AT indicator blinks.) Press [F2] key at the termination.

10.4 Cancellation of PID auto-tuning (AT)

* Operate the setting during fixed value control.

No.	Key operation	Display	Description
	[F1] [F2] [F3] [F4] [F5] [F6] [F7] [F8] [F9] [F10] [F11] [F12] [F13] [F14] [F15] [F16] [F17] [F18] [F19] [F20] [F21] [F22] [F23] [F24] [F25] [F26] [F27] [F28] [F29] [F30] [F31] [F32] [F33] [F34] [F35] [F36] [F37] [F38] [F39] [F40] [F41] [F42] [F43] [F44] [F45] [F46] [F47] [F48] [F49] [F50] [F51] [F52] [F53] [F54] [F55] [F56] [F57] [F58] [F59] [F60] [F61] [F62] [F63] [F64] [F65] [F66] [F67] [F68] [F69] [F70] [F71] [F72] [F73] [F74] [F75] [F76] [F77] [F78] [F79] [F80] [F81] [F82] [F83] [F84] [F85] [F86] [F87] [F88] [F89] [F90] [F91] [F92] [F93] [F94] [F95] [F96] [F97] [F98] [F99] [F100]	Rf...	PID auto-tuning mode.
1	[STOP]	Rf	Press [STOP] key.
2	[F1]	Rf Rur o	Press [F1] key to cancel the PID auto-tuning.
3	[F2]		PID auto-tuning is cancelled. (AT indicator goes off.) Press [F2] key at the termination.

10.5 Setting of Auxiliary function

Auxiliary function setting of Fixed control is the same as Program control.
Settable: Proportional cycle, Output high limit limiter, Output low limit limiter, Main control high limit limiter, Main control low limit limiter and Setting lock.

11. OPERATION

After setting, start the operation with following procedure.

- Turn the power supply ON
Turn the power supply to this instrument and to controlling circuit ON.
Do not turn the power supply on while key is pressing, or instrument specification may be changed.

- Instrument is in warming up status.

PC-600
600
is displayed for approximately 6 seconds.

If a key is operated during this time, the instrument specifications may be changed. Therefore, key operations must not be performed during this time.

- Pattern number setting
Press the keys in order of [F1], [F2], [F3], [F4] and then press [STOP] key.
Input the Program pattern number to be operated with [F1], [F2] keys and then set the number with [STOP] key.
The setting is completed if [F3] key is pressed.
(The instrument turns to standby situation.)

- Control performance
Press [STOP] key, and the instrument starts control.
(On the displays, the setting value, process variable, etc. will be displayed.)

- Control termination
When the execution of program has been finished, the status of instrument becomes termination and the pattern end output turns ON.
Pattern end output will not be generated if [STOP] or [STOP] key is pressed before program termination.

Note:

If instantaneous power failure (approx. 30ms. or less) occurred and restored, this instrument will perform the continuation of the program.
If interrupted approximately 30ms or more, this instrument will continue the control after the power failure is restored, passing the warmup status [②].
(However, if the option "Stops after power failure restored" or "Holds after power failure restored" is designated, it complies with the function designated.)

12. EXPLANATION OF CONTROLLING OPERATION

12.1 Explanation of PID

(1) Proportional band (P)

Proportional action is the action of which the control output varies in proportion to the deviation between setting value and processing temperature. If the proportional band is narrowed, the output changes according to even by a slight variation of the processing temperature, and better control result can be obtained as the offset decreases. However, if when the proportional band is extremely far too narrowed, it may cause variation in the processing temperature even by slight disturbance, and turns into control such as ON/OFF action of the so called hunting phenomenon.

Therefore, when the processing temperature comes to the balanced position near the setting value and a constant temperature is maintained, the most suitable value is selected by gradually narrowing the proportional band while observing the control results.

(2) Integral time (I)

Integral action is to eliminate offset. When the integral time is shortened, the returning speed to the setting point is quickened. However, the cycle of oscillation is also quickened and stability becomes unfavorable.

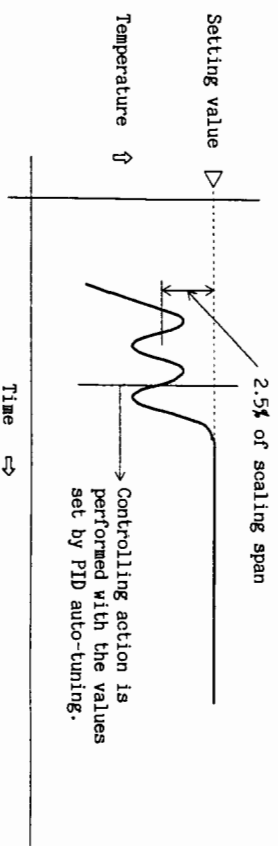
(3) Derivative time (D)

Derivative action is to restore the change of processing temperature according to the changing rate. It reduces the amplitude of overshoot and undershoot width. If the derivative time is shortened, restoring value comes small, and if the derivative time is adjusted longer, a phenomenon of returning too much may occur and the control system may be oscillated.

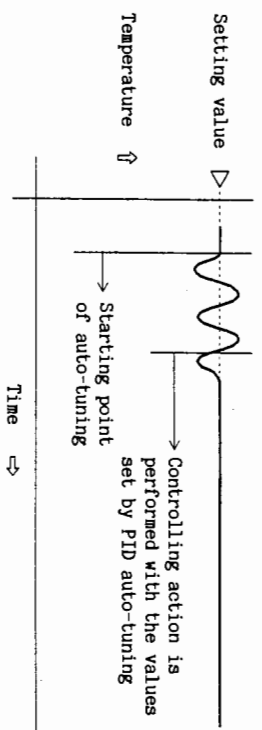
12.2 PID auto-tuning of this instrument

In order to decide each value of P, I, D and ARM automatically, this system gives the fluctuation to the control object by force. Three kinds of undermentioned systems are automatically selected by an instrument.

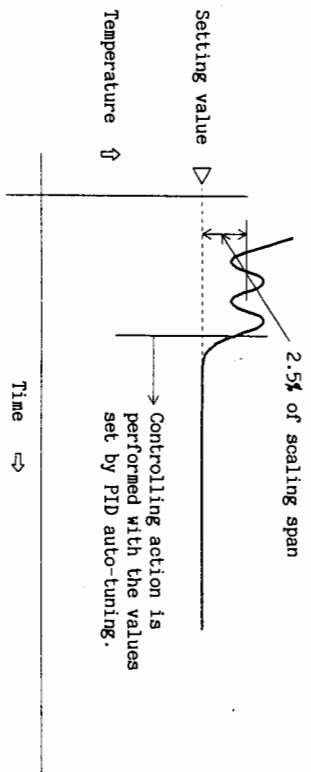
- (1) In case the difference between setting value and the processing temperature is large when the temperature rises. Fluctuation is given at the temperature 2.5% of scaling span lower than the setting value.



- (2) In case of the stable situation during control or the control temperature is within $\pm 5\%$ of scaling span: The fluctuation is given at the setting value.



- (3) When the control temperature is 5% of scaling span higher than the setting value: The fluctuation is given at the temperature 2.5% of scaling span higher than the setting value.



12.3 Explanation of ARM (Anti-reset windup)
 ARM prevents overshoot caused when responding the step. It is set automatically using PID auto-tuning. If operating by manual, duty factor of load for the setting is of standard value, to fix controlling aim.
 Duty factor is get as follows.

In case of SSR output and SSR driving output:

$$\text{Duty factor (\%)} = \frac{\text{ON time}}{\text{Proportional cycle}} \times 100$$

In case of Current output:

$$\text{Duty factor (\%)} = \frac{\text{Output current value (mA)} - 4}{16} \times 100$$

Set 50%, if duty factor is unknown.

3. MAINTENANCE AND CHECKING

The external factors when the controller acts malfunction are shown below:

Phenomenon	Status of instrument		Presumed trouble
	Digital display	Indicator	
Temperature does not rise.	Displays far above the setting value	CONT unlit	Burnout of thermocouple, compensating lead wire or RTD. Improper connection of input terminal.
	Displays the room temperature	CONT lit	Burnout or improper connection of heater. Troubles of electromagnetic switch or control device such as trigger.
Temperature rises too much	Displays (-) or around 0.	CONT lit	Short circuit of thermocouple or RTD. Wrong installation (insertion) of thermocouple or RTD. Reverse polarity of thermocouple or compensating lead wire. Wrong (low) specification of PID.
	Unstable display	Unstable	Influence of inductive fault or noise. AC leaks into thermometer detector. Wrong connection of terminals.

14. SPECIFICATIONS

14.1 Standard specifications

< Indicating section >

Temperature indicating accuracy : Within ±0.3% of full scale ±1digit.

Time indicating accuracy : Within ±0.1% of setting time.

Display

: Digital display with LED.

PV value : (Actual temperature and Characters)
 Red, Figure size 14.3mm X 8mm

SV value : (Setting temperature, Setting time, Remaining time or Manipulating value)
 Green, Figure size 14.3mm X 8mm

Pattern No. : Red, Figure size 8mm X 4mm

Step No. : Green, Figure size 8mm X 4mm

Control actions : At [CONT] ON Green LED lights.
 (-A/Type, blinks correspond to output)
 At [ALM] ON Red LED lights.
 At [PROG, FIX, RUN, TIME or MV] At [HOLD] Red LED lights.
 At [AT] Red LED blinks.
 Yellow LED blinks

< Program control section >

Setting

: By function keys

* Program pattern No. * Number of Repeat * Step No.
 * Time * Temperature * PID block
 * Wait * Auxiliary functions * Temperature alarm

* Auxiliary functions

Proportional cycle
 Output high limit limiter
 Output low limit limiter
 Main setting high limit limiter
 Main setting low limit limiter
 Setting value lock

* Optional functions

: By front face function keys

[▲] (Increase) [▼] (Decrease) [RST] (Reset)
 [MODE] (Mode/Display) [ADV] (Clear/Advance) [FIX] (Fix/Hold)
 [PRG] (Program/Run) [STOP] (Entry/Stop)

Operation system : 10 (Linkable)

Number of Steps : 10 steps/ pattern (Total 100 steps)

Number of Repeat : 9999 times

Program time range : 0 to 99 hours 59 minutes/step

Time setting accuracy : Within ±0.1% of setting time

Setting resolution : Temperature Refer to the [Rated scale table]
 Time 1 minute

< Controlling section >

Temperature setting

Main control action

: Within $\pm 0.3\%$ of full scale ± 1 digit
 : PID action (with Auto-tuning function)
 Proportional band, Integral time, Derivative time and ARW are automatically tuned.
 Proportional band: 0.1 to 200.0% variable

(ON-OFF action when set to 0.0)
 Integral time, 1 to 3600sec. variable (off when set to 0)
 Derivative time, 1 to 1800sec. variable (off when set to 0)
 Proportional cycle, 1 to 120sec. variable
 (Not available for current output)

Wait temperature, $\pm(1 \text{ to } 100)^\circ\text{C}$ (off when set to 0)
 Output limiter, 0 to 100%
 (Sets the high limit and low limit of control output)
 (However, -10 to +110% for -A/D type, and 4 to 20mA of the value correspond to 0 to 100%)

Control output

: -R/D Relay contact Lo AC 220V 3A (resistive load)
 AC 220V 1A (inductive load $\cos \phi = 0.4$)
 -S/D Non-contact voltage (for SSR drive) Isolated
 DC 15 $\pm 3\text{V}$ Load resistance 1.5k Ω
 -T/D Non-contact relay (SSR output) Isolated
 AC 220V 1A

Temperature alarm

: Deviation setting against main setting. Set by selection from 10 blocks (No.0 to 9)
 Setting range, High limit alarm, from (-) Maximum scale to (+) Maximum scale width
 Low limit alarm, from (-) Maximum scale to (+) Maximum scale width

Action, ON-OFF action Dead band (hysteresis) 2 $^\circ\text{C}$
 The low limit side is prevented until the input temperature comes higher than the alarm setting temperature.

Pattern end output

: Outputs when the program is terminated.
 Output, relay contact 1a
 Control capacity, AC 220V 0.5A (resistive load)

< General specification >

Mounting

: Flush

Rated scale

: Refer to [Rated scale table].
 (Multi-range system only for -D/E)

Input

: -D/E Thermocouple K, J, R, B and S (specified) below 100 Ω
 -D/R RTD Pt100 3-wire system
 (Resistance per wire less than 4 Ω)
 -D/V DC voltage DC 0 to 1V
 -D/A DC current DC 4 to 20mA

Power supply

: AC 110/220V, 50/60Hz
 Voltage fluctuation : Allowable $\pm 10\%$ of rated voltage
 Power failure : With power failure protecting function.

Ambient temperature

: 0 to 55 $^\circ\text{C}$

Ambient humidity

: 35 to 80%RH (non-condensing)
 Power Consumption : Approx. 5W

Weight

: Approx. 800g

Materials

: Front frame: Resin, Case: Resin
 Color : Front frame: Light gray, Case: Light gray

Insulation resistance

: 10M Ω or more at DC 500V (However, the voltage must not be applied to the terminals between input and to the terminals between input and Ground terminal, AC 500V for 1 min)

Auxiliary function

: Power failure countermeasure (Data memories are backed up with Lithium battery for 5 years or more)
 Automatic cold junction temperature compensator -D/E
 Burnout (up-scale)

[Rated Scale Table]

Scale range	Resolution	Input	Scale range	Resolution	Input
0 to 400 $^\circ\text{C}$	1 $^\circ\text{C}$	T/C K, J	0 to 1800 $^\circ\text{C}$	1 $^\circ\text{C}$	T/C B
0 to 800 $^\circ\text{C}$	1 $^\circ\text{C}$	T/C K, J	-100.0 to 400.0 $^\circ\text{C}$	0.1 $^\circ\text{C}$	RTD Pt1000
0 to 1200 $^\circ\text{C}$	1 $^\circ\text{C}$	T/C K	0 to 100.0	0.1	DC 0 to 1V
0 to 1600 $^\circ\text{C}$	1 $^\circ\text{C}$	T/C R, S	0 to 100.0	0.1	DC 4 to 20V

Note: With B type of thermocouple input, the accuracy guarantee range is 300 to 1800 $^\circ\text{C}$
 14.2 Optional specifications ([]: Optional code)

Setting value display

: [SS] Step temperature setting value display.
 Displays the Step temperature (temperature setting programmed on SV display).

Control action

: [CM] Cooling control action.
 OFF in the range in which the input value is lower than the setting value, ON in the range in which it is higher than that.

Alarm setting

: [AA] Process value alarm setting.

Alarm action

: [LN] Low limit alarm without low limit standby function
 [HW] High limit alarm with high limit standby function.

External operating function: [EC] Following functions can be operated by closing contact or open collector.

- (RUN) Starts the control of program or cancels the Hold.
- (STOP) Terminates the program performing.
- (HOLD) Suspends the progress of program time performing.
- (ADV) Interrupts the program step performing and shifts it to the next.

Time signal output : [TS] The time signal block (OFF time and ON time of the signal) is set per step.

The same number can be designated many time by selecting any number from 16 kinds of time signal blocks which have already been set in advance. Maximum 7 channels can be used per step.

Number of circuit: 7, Output: Open collector, Capacity: DC 24V, max. 50mA

Transmitting output : [PVT] Process variable (actual temperature) transmitting output.

- [SWT] Setting value transmitting output
DC 0 to 1V or DC 4 to 20mA
- DC 4 to 20mA (max. load resistance 600Ω)
or DC 0 to 1V

Serial communication : [C,OS]The following operations can be carried out from the external computer.

1. Registration and correction of program
 2. Reading of program
 3. Operation of RUN, STOP, HOLD, ADVANCE, etc.
 4. Reading of action status
- Communication line, EIA RS-232C [C] or RS-485 [OS]
Communication system, Half-duplex asynchronous
start-stop system
- Baud rate, 2400bps (changeable to 1200, 4800 and 9600bps)
Data configuration, Start bit : 1 bit
Data bit : 7 bits
Parity bit: Even number
Stop bit : 1 bit

Automatic start : [AST] After the power turned ON, the program automatically starts at once. (Input with **RESET** key is not required.)

PV start : [PST] Begins the program start at process variable.

Power failure restoring : [PS] Turns to standby status after the power failure restored.
[PRH] Performs the program at the time of power failure, after restored the power failure and turns to Hold status.

15. CHARACTER TABLE

Character	Description	Character	Description
PC-600	Warning up status	Rf . . .	PID auto-tuning setting
	[Program control]	Rf	PID auto-tuning setting
Pf.n . .	Pattern setting mode	- - *	No auto-tuning set design
Pfn	Pattern number	RUF0*	Auto-tuning setting design
REPf	Number of repeat	cond.	Auxiliary function
TEMP	Step temperature	cyC	Proportional cycle
TIME	Step time	ofLh	Output high limit limiter
-Pid	PID block number setting	ofLL	Output low limit limiter
-URf	Wait block number setting	ofLh	Main setting high limit limiter
-RLn	Alarm block number setting	ofLL	Main setting low limit limiter
-f y l	Time signal CH No. setting(No.1)	dBn	Serial communication instr number setting
chRi	Pattern link setting	Loct	Setting value look (excepting pattern number)
0 *	No pattern link specified	- - *	No setting value look design
l *	Pattern link specified	Loct*	Setting value look design
PRct.	Block setting mode		[Fixed value control]
P_00	PID block setting mode	Fi. v. .	Setting mode
PQ_P	Prop. band (PID block No.0)	y	Main setting
PQ_I	Integral time (PID block No.0)	Rh	High limit alarm
PQ_d	Derivative time (PID block No.0)	Rl	Low limit alarm
PQ_R	ARW (PID block No.0)	P	Proportional band
U_00	Wait block setting mode	l	Integral time
U_0_	Wait value setting (block No.0)	d	Derivative time
R_00	Alarm block setting mode	Rr U	Anti-reset windup (ARW)
RQ_h	High limit alarm (block No.0)		Characters such as Rf . . .
RQ_L	Low limit alarm (block No.0)	RUF0, cond, cyC, ofLh	
r_00	Time signal block setting mode	ofLL, ofLh, ofLL, Loct	
00_F	OFF time(Time signal block No.0)		are the same meaning as Program control
00_n	ON time (Time signal block No.0)		

Marked by *, these characters are displayed on the SV display (Green LED), and other on the PV display (Red LED). Numbers underlined indicate the block Nos. or channel No.

