INSTRUCTION MANUAL
FOR
MICROCOMPUTER BASED
PROGRAMMABLE CONTROLLER

PC-700 SERIES

Thank you for your purchase of our Microcomputer based, Interactive mode, High function type Programmable Controller PC-700 Series.
This controller is delivered after its production and inspection on the basis of severe quality control in our factory.
Further to your confirmation of the model and specifications of the controller, peruse this instruction manual before starting operation.

> **Note:**
> Please arrange to give this manual into the hands of the operator who actually uses our product.

SHINKO TECHNOS CO., LTD.   OSAKA,   JAPAN

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Note to users

The basic matters are described in page 3 through 19 of this manual. Before operating this controller, you should thoroughly read them first.

1. **Models referred to in this manual**

◆ Model name example

$$P C - 7 3 5 - R / E$$

```
                         └──── Thermocouple input
                    └──────── Relay contact output
              └────────────── Alarm output (4 alarms)
```

• In the case of PC-735-[]/[], 4 alarm outputs and 16 time signals are applied.
• In the case of PC-730-[]/[], no alarm output and 20 time signals are applied.

◆ Standard model name

P C − 7	3	□−□/□	Series name: PC-700
Control action	3		PID control
Alarm output	0		No alarm action
	5		4 outputs
Output		R	Relay contact 1c
		S	Non-contact voltage 15Vdc
		A	DC current 4 to 20mAdc
Input		E	Thermocouple K, J, R, B, S
		R	RTD Pt100 (JIS'89, IEC), JPt100 (JIS'81)
		A	4 to 20mAdc
		V	0 to 1Vdc

◆ Optional specification

Code	Optional specification	
P T N	Pattern number external selecting function	
C C 4 C 5	Communication functions	• RS-232C • RS-422A • RS-485
D M D M O	External memory functions	• Memory-card is applied. • Memory-card is not applied.

P V T□
 	
S V T□
 	
M V T□
	Transmission output
	functions
		• Process variable transmission output
		   (Current: PVTA, Voltage: PVTV)
		• Setting value transmission output
		   (Current: SVTA, Voltage: SVTV)
		• Manipulating value transmission output
		   (Current: MVTA, Voltage: MVTV)

M S	Time unit	

• Refer to [12. Optional specifications, page 58] for the detail.

2. When unpacking

2.1 Unpacking

Take care to avoid excessive shocks when unpacking.

2.2 Checking of Instrument and Accessories

• Checking of instrument
Check visually if any external damage has occurred during shipment.

• Checking of accessories
Confirm that all standard accessories are supplied. The accessories undermentioned should be applied with the instrument. Check that nothing is missing.

Mounting bracket	1 set
Instruction manual (this manual)	1 copy
Memory-card [When applied the External memory function (Option DM)]	1 unit
Exclusive cable [When applied the Pattern number external selecting function (Option PTN)]	1 set

2.3 Confirmation of specification

Before use, confirm whether the instrument is the ordered one. The model name of this controller is indicated on the nameplates at the right side of the case and the internal assembly. Pull out the internal assembly by following manner and confirm it.

① Remove the locking screw at the bottom of case for internal assembly.   (See Fig. 1)

> When transporting, internal assembly should be locked again with the screw to protect it from vibrations or shocks during transportation.

② Swing open the front door to the left, and pull out the internal assembly pushing down the first hook. (See Fig. 2 ① and ②)
Then it can be pulled out about the half of it.

> In this status, the Model name and Function selecting switch can be confirmed.
> **Do not pull out internal assembly releasing the second hook.**

③ When putting the assembly into the case, put it into the case (Fig. 2 ③), and make sure that the first hook is certainly hung *(click)* to the case.

How to draw the internal assembly out

Function selecting switch (1) — Display contrast adjusting resistor
Function selecting switch (2)
Memory-card slot [Option]
Internal assembly
Nameplate
Nameplate
The second hook
Assembly fixing screw
④
①
The first hook
② Fig. 2
Fig. 1
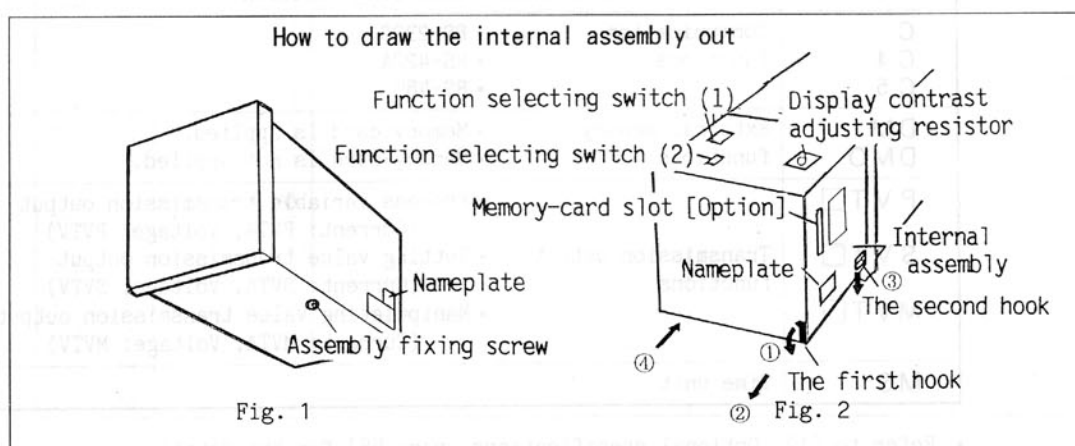
- Model nameplate

$$P C - 7 3 5 - R / E, \; DM, \; P T N, \; P V T V$$

            Process variable transmission output (voltage)

            Pattern number external selecting function

            External memory function

Standard model name	735-R/E
Option code, Special order number .... {	DM, PTN
	PVTV
Instrument number .... (Indicated only internal assembly)	No. ☐☐☐☐☐☐

How to indicate the Optional specification
- Optional codes are to be indicated as well as model name.
- When two or more functions are specified, the codes are delimited with comma.

3. Glossary of terms

- Pattern   (PTN)   ....   A program consist of plural steps.
- Step   (STEP) ...   Minimum unit to set Time, Temperature and Time signal.
- PID block (^P_B) .....   A block consist of 4 parameters. [P (Proportional band),
  I (Integral time), D (Derivative time) and ARW (Anti-reset windup)].
- Wait block (^W_B) ....   A block of wait setting values.
  (Wait function: A function which waits the progress to the next
  step until the process variable becomes within the beginning
  temperature of the next step $\pm$ wait temperature at the end of
  the step. Step time progress is halted during waiting.)
- Alarm block (^A_B) ...   A block of setting values for 4 alarm outputs. [High limit,
  Low limit, Process value alarm 1 and 2].
- Time signal ....   ON signal for each step.
- Sensor correction ..   A function to correct the process variable from the sensor.
- PV ....   Process variable. (Actual temperature.)
- SV ....   Setting value.
- Clear   (CLR)   ....   Cancels the setting content partially.
- Entry   (ENT)   ....   Registers the setting content.
- End   (END)   ....   Termination of the setting.
- Advance   (ADV)   ....   Advances the program control to the next step.
- Fast   (FAST) ...   Makes the step time progress fast. (60 times)
- Hold   (HOLD) ...   Interrupts the time progress, and controls with the setting
  value at the point.
- Run   (RUN)   ....   Starts the program control.
- Stop   (STOP) ...   Stops the program control.
- Cursor   ....   A mark to point to a position selectable or settable by key input.
  (Indicated by " [   ] " frame or "_" underline.)
- Insert   (INS.) ...   Writing.   (Insert the program step)
- Change   (CHANG) ..   Changing. (Changes the program [Step setting value].)
- Delete   (DELET) ..   Deletion. (Deletes the program [Step setting value].)
- Set   (SET)   ....   Setting mode.
- Control   (CONT) ...   Controlling mode. (**CON** lights when generated the control output.)
- PV start   (PV ST) ..   It starts the control at the Process variable (actual temperature)
  at which the control is started.
- Zero start(Z ST) ...   It starts the control at the beginning of the pattern.
- Memory-card ....   External program memory.
- Save   (SAVE) ...   It writes (SAVE) the data from the controller (PC-700) to
  Memory-card.
- Load   (LOAD) ...   It reads (LOAD) the data from Memory-card to the controller
  (PC-700).
- Baud rate (bps) ....   Unit to show the transfer rate. (bits per second)
- Ending signal ......   Works when the controlling pattern terminated.

4. Name and functions of the sections
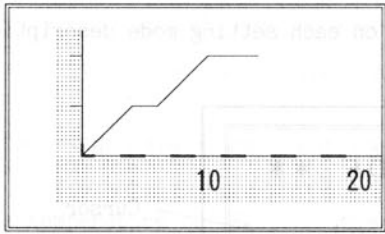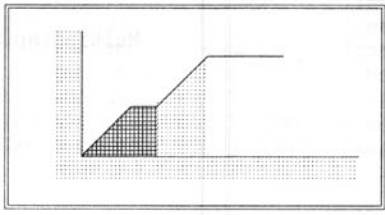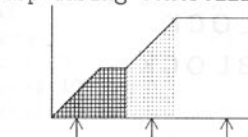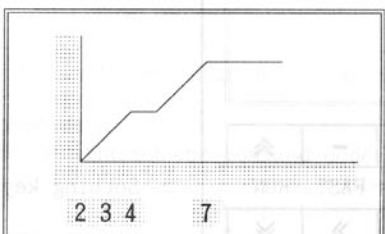
4.1 Explanations of Multidisplay

① During program pattern performing

Multi-display

Setting keys
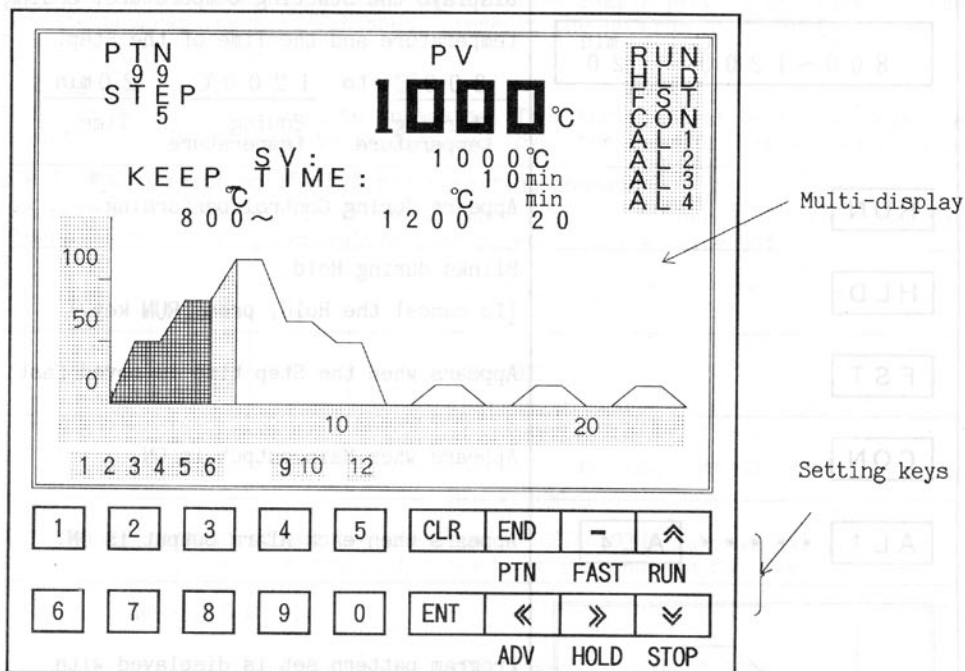
Multi-display	Description
PTN 99	Displays the Pattern number performing.
STEP 5	Displays the Step number performing.
1000℃	Displays the Process variable. (Actual temperature)
SV:1000℃	Displays the Setting temperature value. (If the step has temperature ramp, the displaying temperature changes with the progress of the time.)
KEEP_TIME:10min	Displays the Step time performing. Remain- ing time is reduced by the progress. (:) Colon blinks during performance.

Multi-display	Description
℃ ℃ min 8 0 0 ~ 1 2 0 0 2 0	Displays the Starting temperature, Ending temperature and the Time of the Step. <u>8 0 0 ℃</u> to <u>1 2 0 0 ℃</u> <u>2 0 min</u> Starting Ending Time temperature temperature
RUN	Appears during Control performing.
HLD	Blinks during Hold. (To cancel the Hold, press **RUN** key.)
FST	Appears when the Step time is moved fast.
CON	Appears when Main output is ON.
AL 1 · · · · · AL 4	Appears when each Alarm output is ON.
(program pattern graph)	Program pattern set is displayed with graph.
100 50 0 (graph)	Vertical line of the graph shows the temperature scale. For example, when displayed 100, it means 1000℃ (×10). ◆ Each input range is shown as below.

×100 3 2 1 0 0 to 400℃ (K)	×10 100 50 0 0 to 1200℃ (K)	×100 3 2 1 0 0 to 400℃ (J)	×10 100 50 0 0 to 1600℃ (R)	×10 100 50 0 0 to 1600℃ (S)
×10 150 100 50 0 300 to 1800℃ (B)	×1 100 50 0 0 to 150℃ (Pt100)	×100 2 1 0 0 to 250℃ (Pt100)	×100 4 2 0 -100 to 400℃ (Pt100)	×1 50 0 0 to 1vdc 4 to 20mAdc

Multi-display	Description
	Horizontal line of the graph shows the number of steps. [— , — , 10] shows the steps. If the pattern has many steps, the display will automatically be scrolled to the left. (25 steps of range can be displayed.)
	Displays the progressing statuses of the step during controlling. Unperformed Performing Performed
	Displays the Time signal output number when the output is ON in the performing step.

② Program pattern setting (Input)

Even if the program pattern is performing, setting mode initial display will be selected by changing the function selecting switch ② to SET side.
Select the mode with 《∧》 and 《∨》 keys.
For the details, refer to each page written on each setting mode description.

● Setting mode initial display

```
** PROGRAMMING    MODE **                    ← Cursor
SELECTION
┌─────────────────────────────┐
│ 1. PATTERN                  │
└─────────────────────────────┘
  2. ALARM  BLOCK                            ← Multi-display
  3. PID  BLOCK
  4. WAIT  BLOCK
  5. CYCLE
  6. DEVICE  NO
  7. SENSOR  CORRECTION
  8. SAVE/LOAD
  9. PID  AUTO  TUNING
```

```
[1] [2] [3] [4] [5]  [CLR] [END] [—] [∧]
                           PTN  FAST  RUN      ← Setting keys
[6] [7] [8] [9] [0]  [ENT] [《] [》] [∨]
                           ADV  HOLD  STOP
```
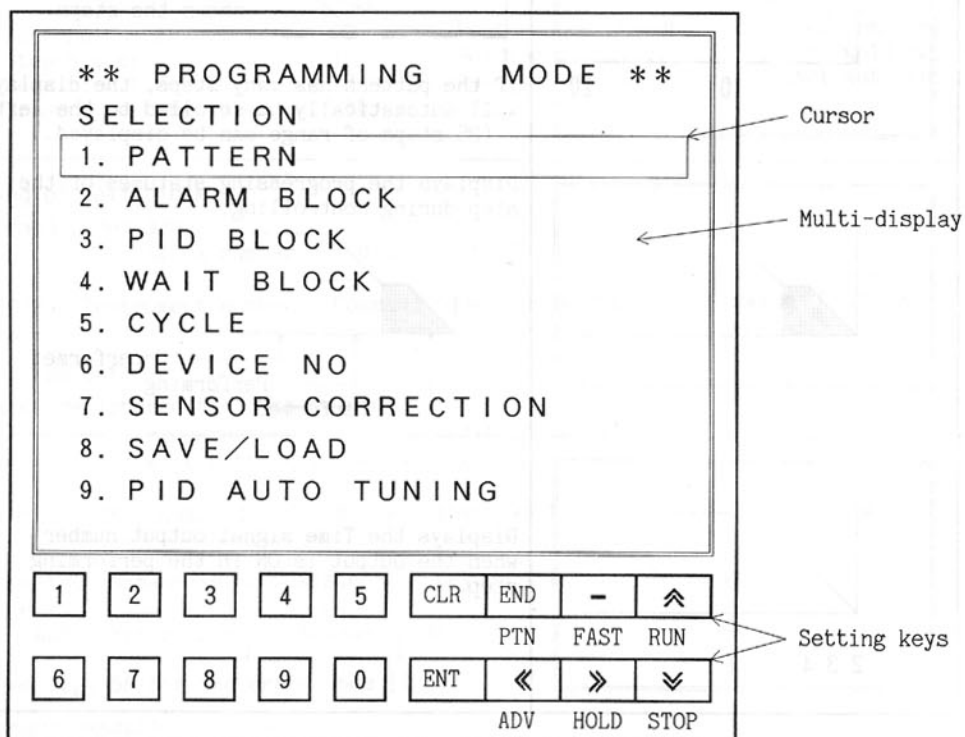
Note ───────────────────────────────

9. PID AUTO TUNING is displayed only when the program is performing (during control).

Multi-display	Description
• • PROGRAMMING MODE • • SELECTION ┌─────────────┐ │ 1.PATTERN │ └─────────────┘ 2.ALARM PID BLOCK	**Pattern setting mode** After Pattern No. is selected, the Temperature, Time, Block No. for PID, Alarm, Wait and Time signal can be set in this mode. [See Page 20 through 27]
1.PATTERN ┌─────────────┐ │ 2.ALARM BLOCK │ └─────────────┘ 3.PID BLOCK	**Alarm block setting mode** A mode to set the alarm values for High limit (A1), Low limit (A2), Process value 1 (A3) and Process value 2 (A4). [See Page 28 and 29]

Multi-display	Description
1.PATTERN 2.ALARM BLOCK 3.PID BLOCK	**PID block setting mode** Setting values of each item P, I, D and ARW are set to PID block No.1 through 9 in this mode. [See page 30 and 31]
2.ALARM BLOCK 3.PID BLOCK 4.WAIT BLOCK	**Wait block setting mode** Wait values are set to Wait block No.1 through 9 in this mode. [See page 32 and 33]
3.PID BLOCK 4.WAIT BLOCK 5.CYCLE	**Proportional cycle setting mode** Proportional cycle time is applied in this mode. [See page 34 and 35]
4.WAIT BLOCK 5.CYCLE 6.DEVICE NO	**Communication instrument number setting mode (Option)** [See page 36 and 37] A mode to set the instrument number to PC-700 individually when communicating.
5.CYCLE 6.DEVICE NO 7.SENSOR CORRECTION	**Sensor correction setting mode** A mode to set the sensor correction value. [See page 38 and 39]
6.DEVICE NO 7.SENSOR CORRECTION 8.SAVE/LOAD	**SAVE/LOAD selecting mode (Option)** The program data are saved or read between PC-700 and Memory-card. ┌─ Note ─────────────────── If the Memory-card is not set to the controller, it disables this function. [See page 40 to 44]
7.SENSOR CORRECTION 8.SAVE/LOAD 9.PID AUTO TUNING	**PID auto-tuning setting mode** A mode to designate the start or cancel of PID auto-tuning. ┌─ Note ─────────────────── This mode can be designated only when the program is performing (controlling) [See page 45 and 46]

4.2 Explanations of setting key function

Setting Key	Key name	Function
0 ···· 9	Ten-key	Sets the numeric value.
CLR	Clear key	Cancels the numeric value programmed.
ENT	Entry key	Enters (Registers) the setting contents. (In Change display, if this key is pressed for approx. 2 seconds, the display will turn to selection display.)
END / PTN	End key [Pattern key]	Terminates the setting mode in Program setting mode. [Selects the pattern number to be performed in Program performing mode.]
≪ / ADV	≪ cursor key [Advance key]	Moves the cursor to the left in program setting mode. [Advances the step to the next step in program performing mode.]
− / FAST	Minus key [Fast key]	In program setting mode, it functions as Minus (−) key. **When the scale range does not cover the minus side, it displays the minimum value.** [Moves the program time faster in program performing mode. (60 times)]
≫ / HOLD	≫ cursor key [Hold key]	Moves the cursor to the right in program setting mode. [Holds the progress of the program time in program performing mode.]
≫ / RUN	≫ cursor key [Run key]	Moves the cursor upward in program setting mode. [Starts the program performance. (This key cancels the HOLD, when the time is held.)]
≫ / STOP	≫ cursor key [Stop key]	Moves the cursor downward in program setting mode. [Stops the program performance in program performing mode.]
≫ ≫ ≪ ≫		When the cursor is moved to the next item, present item is automatically registered.

4.3 Explanations of Internal assembly function

① Function selecting switch (1)

Switches to change the baud rate for Communicating function [Option]

[1200bps]   [2400bps]   [4800bps]   [9600bps]

(Factory adjusted as above)

[PV start]   [Z (SV) start]

Switch to select starting system [PV start or Z (SV) start]

② Function selecting switch (2)

Switch to change the mode program setting or performing

SET — Program setting mode
CONT — Program performing mode

③ Display contrast adjusting potentiometer

Display contrast adjusting potentiometer

[Light]

ADJUSTED   ⊕

[Dark]

• Contrast is properly adjusted in factory. If the contrast is not clear owing to the visual angle or ambient temperature, adjust the potentiometer with small screwdriver.
(whichever ⊕ or ⊖)

④ Memory-card [Option]

Battery holder

Screws for battery holder

MEMORY CARD

◁

ML-16PC   ⊕

LITHIUM BATTERY:CR2016

◆ Exchange of battery for Memory-card [Option]

• Remove the screw on battery holder, and surely set the battery confirming the polarity of the battery.
• Exchange the battery with the same procedure as above.
(Exchange period of the battery is of standard 2 or 3 years.)
• It is recommended to fill in the date exchanged the battery on the rear of the card.

Notes:

• The battery is not provided to the Memory-card. It must be set before use.
• To avoid the plus side plate of the card from deformation, do not set the battery from the just above, but set it from the slantwise so as to push the plate from the side.
• **ALL CONTENTS OF THE MEMORY-CARD WILL BE GONE OUT IF THE BATTERY IS REMOVED.**
• Exchange the battery after registered the data (LOAD) to PC-700.
After exchanged the battery, register the data from PC-700 (SAVE) to Memory-card again.

5. Mounting to control panel

5.1 External dimension
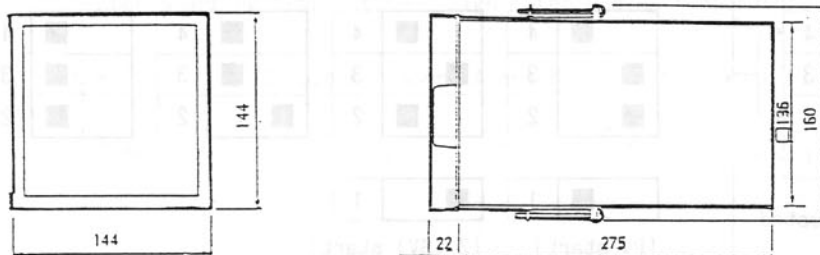
5.2 Panel cutout
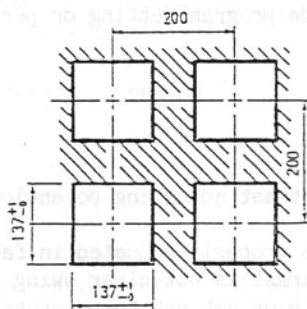
5.3 Mounting to control panel
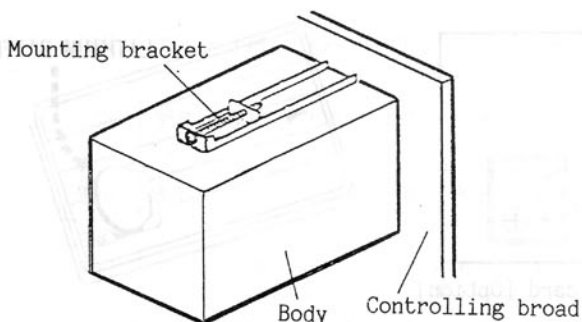
Mounting bracket

Mounting holes for the bracket
are provided at the top and bottom
of the body.

Body　　Controlling broad

● Site selection

Mount the PC-700 in a place with:

① A minimum of dust.

② An absence of corrosive gases.

③ No exposure to direct sunlight, ambient temperature within 0 to 50℃ (32 to 120℉) and it does not change suddenly.

④ Ambient humidity 85%RH or less and non-condensing.

⑤ No mechanical vibrations or shocks.

⑥ The PC-700 should be away from the electromagnetic switch of large capacity or cables through which large current flows.

⑦ No water or oil and their vapor directly splash.

5.4 Wiring connection

① Terminal arrangements
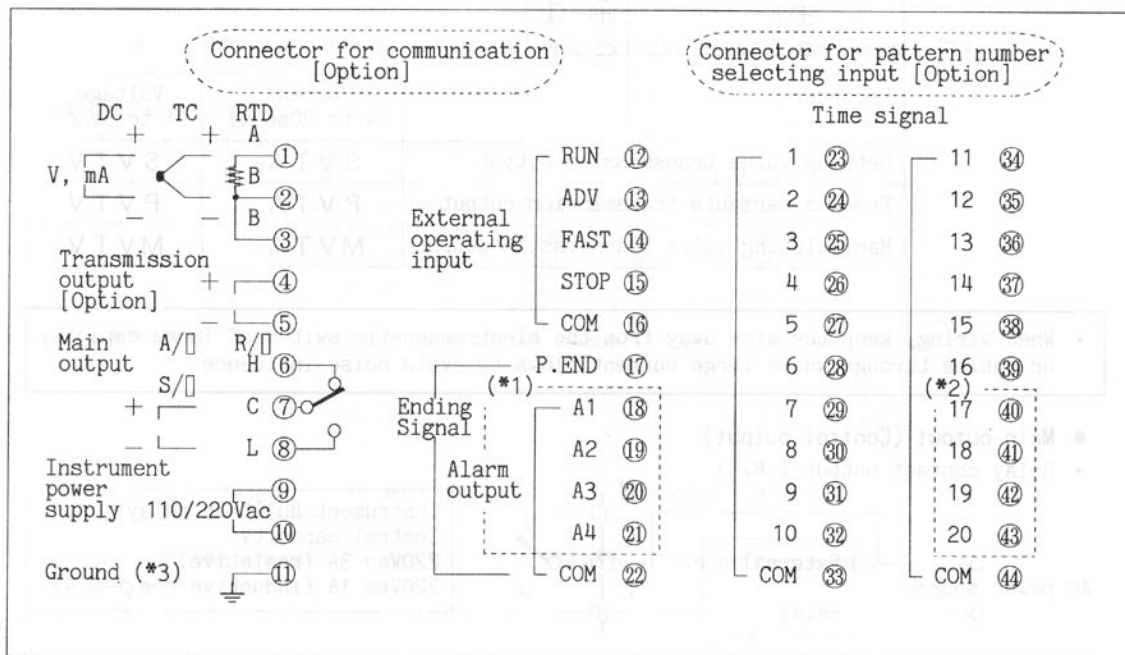
(*1) For the type PC-730-[]/[], alarm output terminals (A1 ⑱ to A4 ㉑) are not available.
(*2) For the type PC-735-[]/[], time signal output (17 ㊵ to 20 ㊸) are not available.
(*3) Ground ⑪ should be wired without failure. (Class the 3rd.)

② Wiring connection example
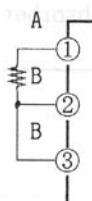
- Input
  - RTD   • Thermocouple   • DC voltage, current
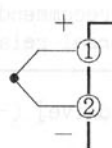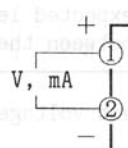
- Use 3-wire system of RTD applicable to the input specifications (Pt100) of this controller.
- Use compensating lead wire for thermocouple applicable to the type of the thermocouple.
- When wiring, keep the sensor location and compensating lead wire away from the electromagnetic switch of large capacity or cables through which large current flows to avoid noise influence.

● Transmission output [Option]

Receiving instrument   PC-700
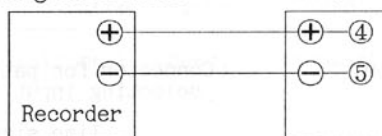
	Current (4 to 20mAdc)	Voltage (1 to 5Vdc)
Setting value transmission output	S V T A	S V T V
Process variable transmission output	P V T A	P V T V
Manipulating value transmission output	M V T A	M V T V

· When wiring, keep the wire away from the electromagnetic switch of large capacity or cables through which large current flows to avoid noise influence.

● Main output (Control output)
· Relay contact output (-R/[])
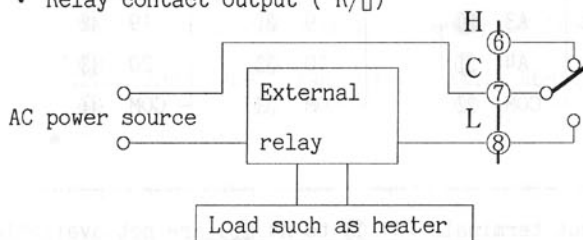
Instrument built-in relay: 1c
Control capacity:
220Vac 3A (resistive)
220Vac 1A (inductive cosϕ=0.4)

·Suitable relay to the load capacity should be used on the external of this controller. If built-in relay of this controller is directly connected to the load (even if the load capacity is less than the capacity of the built-in relay), life of the relay may be reduced according to the circumstances such as rush current.

·This controller has the noise proof on the standard level according to the severe quality control, however, to prevent from a bad influence to the instrument owing to the unexpected level noise, it is recommended that the surge absorber be provided between the coil of the external relay.

· Non-contact voltage output [for SSR drive] (-S/[])
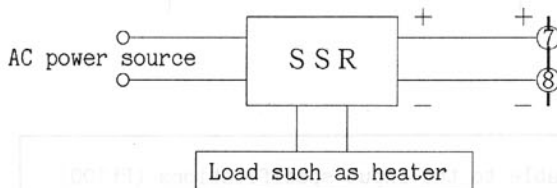
Output: 15Vdc (Load resistance
value 1kΩ or greater)
Isolated type

· DC current output (-A/[])
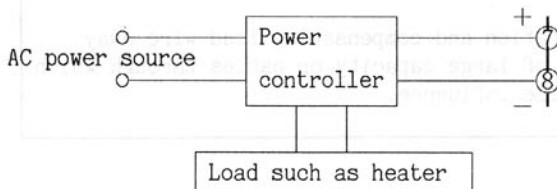
Output: 4 to 20mAdc
(Load resistance value
600Ω)

● Instrument power supply

AC source (specified) ○—○　○—○—○ ⑨

110 or 220Vac ○—○　○—○—○ ⑩

⑪

(Class the 3rd.)
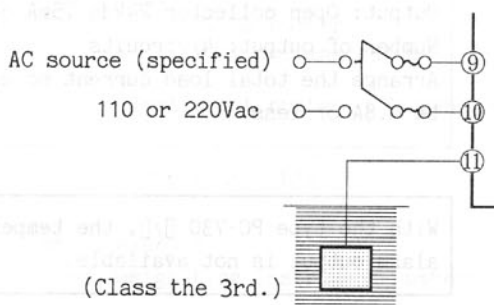
> Do not apply the voltage to the controller other than specified. This controller has no built-in power switch nor fuse. Therefore, power switch and fuse (220Vac 2A) should be provided in the line near the external controller.

> · Ground (Earth) must be provided.
> · Use the thick wire for the ground. (1.25 to 2.0mm²)
> · Use the 1.25-YAS3 or 2-YAS3 of solderless terminal to it.

● External operating input (External operating function)

· Open collector

—RUN ⑫

—ADV ⑬

—FAST ⑭

—STOP ⑮

—COM ⑯

· Relay contact

○—○—RUN ⑫

○—○—ADV ⑬

○—○—FAST ⑭

○—○—STOP ⑮

—COM ⑯
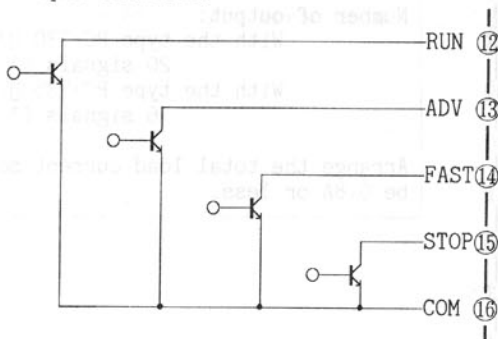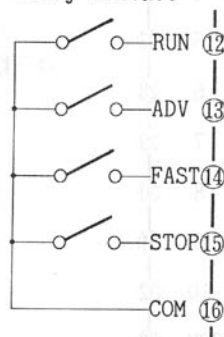
> The function is operative with Open collector (5Vdc 4mA per input) or closing the contact.

● Ending signal

—P.END ⑰

—COM ㉒
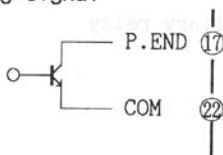
> Output　　　　　: Open collector
> 　　　　　　　　　24Vdc 75mA or less
> Number of output: 1 circuit
>
> Arrange the total load current so as to be 0.8A or less.

● Temperature alarm output

```
            ──────────────── A1  ⑱
        ○──K
            ──────────────── A2  ⑲
            ○──K
                ──────────── A3  ⑲
                ○──K
                    ──────── A4  ⑳
                    ○──K
            ────────────────── COM ㉒
```
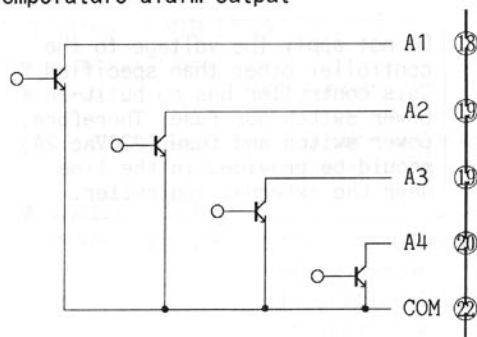
> Output: Open collector 24Vdc 75mA or less
> Number of output: 4 circuits
> Arrange the total load current so as to
> be 0.8A or less.

> With the type PC-730-[]/[], the temperature
> alarm output is not available.

● Time signal

```
        1  ㉓              11  ㉞
        2  ㉔              12  ㉟
        3  ㉕              13  ㊱
        4  ㉖              14  ㊲
    ○──K 5  ㉗         ○──K 15  ㊳
        6  ㉘              16  ㊴
        7  ㉙              17  ㊵
        8  ㉚              18  ㊶
        9  ㉛              19  ㊷
        10 ㉜              20  ㊸
        COM ㉝            COM  ㊹
```
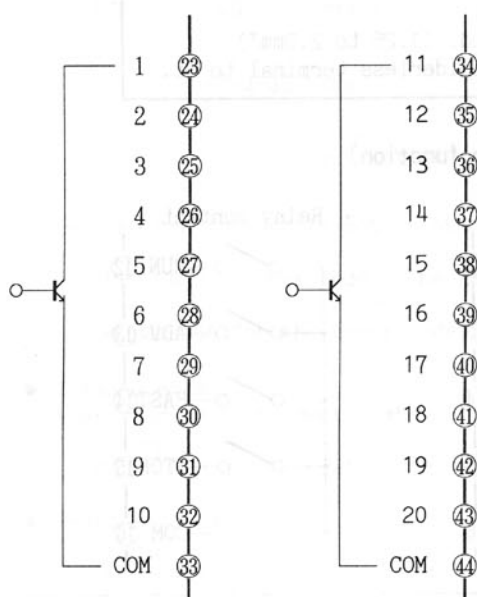
> Output: Open collector 24Vdc 75mA or less
>
> Number of output:
>   With the type PC-730-[]/[],
>   20 signals (1 to 20)
>   With the type PC-735-[]/[],
>   16 signals (1 to 16)
>
> Arrange the total load current so as to
> be 0.8A or less.

■ Wiring example for the open collector output

```
                                Output       24Vdc Auxiliary relay
                                side
        Internal instrument
                                 ○────────────〜〜〜
        ○──K
                                 ○────────────〜〜〜
            ○──K
                                 ○────────────〜〜〜
                ○──K
                                 ○
                        COM          ┤├
                                    24Vdc
```

6. Operation flow chart

● Controlling mode

Pattern to be controlled selection

Control performance (Running)

Instrument power ON —○ CONT
—○ SET

CONT/SET changing switch [Function selection switch (2)]

● Pattern setting (correction) mode

Pattern setting
or
Pattern correction

Program pattern number selection

— Pattern setting

— Step temperature setting

— Step time setting

— Time signal setting

— PID block number setting

— Alarm block number setting

— Wait block number setting

— Alarm block No.setting value setting

— PID block No.setting value setting

— Wait block No.setting value setting

— Proportional cycle setting

— Communication instrument No. setting

— Sensor correction setting

— Memory-card SAVE/LOAD selection

— PID Auto-tuning designation

◆ Set necessary items only.

◆ Controlling mode and Pattern setting (correction) mode are switched with function selecting switch (2).

◆ Even if during control (running), each item of the pattern can be corrected by changing the function selecting switch (2).

◆ During control (running), if the power is turned off and turned it on again, the control will be continued from the step at which the power is turned off.

7. Explanations of operation (Program setting method)

7.1 Before key operation

Before starting the setting, prepare the data. (Use the tables on page 89 to 91.)
Arrange the data to data table, and the pattern to be programmed to pattern table.

◆ Data preparing procedure (See 7.2 Program pattern preparing example)

● Data table preparing

① Enter each block setting value for Alarm, PID and Wait to the table.
② Enter the proportional cycle.
③ When the options are applied, enter them if necessary.

● Program pattern table preparing

① With the program pattern table, put the temperature [℃] on vertical line and the time [min.] on horizontal line.
② Plot from the data of the step starting temperature, step ending temperature and step time and connect the plots.
③ Enter each block number of Alarm, PID and Wait.
④ Enter the setting status (ON) for the item signal.

7.2 Program pattern entering examples (Data table)

● Alarm block setting value ([ ]: Objective equipment, etc.)

No.	A 1 D E V. H (High limit) [Liquid temperature 1]	A 2 D E V. L (Low limit) [Liquid temperature 2]	A 3 A B S (Process value) [Upper of the bath]	A 4 A B S (Process value) [Lower of the bath]
1	0 ℃	0 ℃	+ Maximum℃	+ Maximum℃
2	1 0 ℃	− 5 ℃	5 0 5 ℃	5 1 0 ℃
3	5 ℃	− 5 ℃	1 0 0 5 ℃	1 0 1 0 ℃

● PID block setting value

No.	P (Proportional band)	I (Integral time)	D (Derivative time)	ARW (Anti-reset windup)
1	0 . 0 %	0 sec.	0 sec.	5 0 %
2	2 . 5 %	2 0 0 sec.	5 0 sec.	5 0 %
3	4 . 0 %	3 8 0 sec.	9 5 sec.	5 0 %

● Wait block setting value

No.	Wait value
1	0 ℃
2	1 0 ℃
3	5 ℃

● Proportional cycle : 30sec.
● Options
　・ Communication function: 2400bps (baud rate)
　・ Instrument number : 2
　・ Transmission output : PVTV

Program pattern entering example (Program pattern table)

● Program pattern (Pattern number 99) ←───── [Enter the pattern No.]

Step number

×10 [℃]
  1   2   3   4   5   ←───── [Enter the step No.]

100 ─────

[Put the temperature on vertical line.]

Setting
temperature

[Make the program pattern graph.]

⇧ 50

0

⇨ Time (Minute)
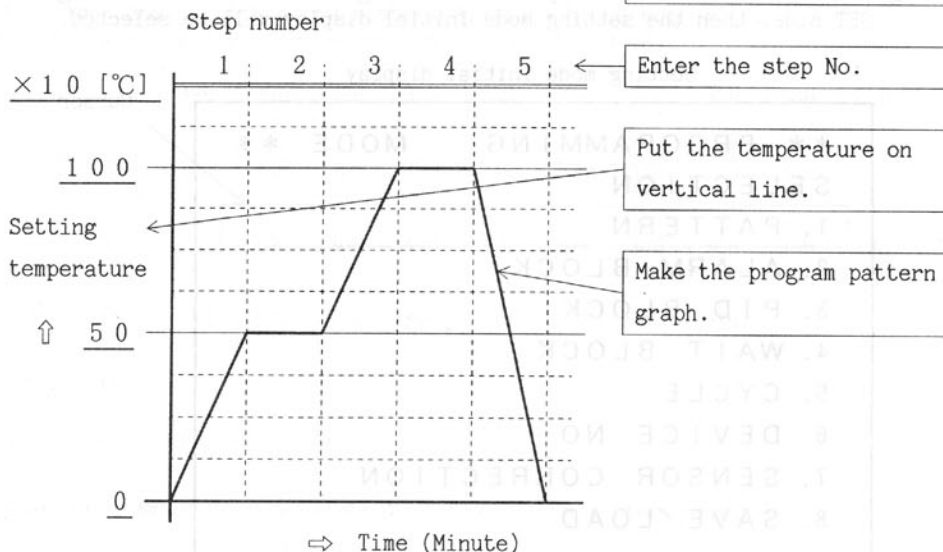
● Setting contents

Step number	1	2	3	4	5	
Starting temp. (℃)	0	500	500	1000	1000	Fill the starting temp. and ending temp. of the step.
Ending temp. (℃)	500	500	1000	1000	0	
Time (Min.)	30	70	45	60	120	Fill the time to be set to the step.
PID block number	3	2	3	2	1	
Alarm block number	1	2	1	3	1	Fill the block number for the Alarm, PID and Wait to be set to the step.
Wait block number	2	1	2	1	1	
T.S 1 [Damper 1]	ON					
T.S 2 [Damper 2]			ON			
T.S 3 [Damper 3]						Fill the time signal setting status (ON). Objective equipments, etc. are described in [ ].
T.S 4 [Dosing 1]	ON					
T.S 5 [Dosing 2]			ON			
⋮						
T.S14 [Flooding]		ON		ON		
T.S15 [Draining]					ON	
T.S16 [Steaming 1]	ON		ON			
T.S17 [Steaming 2]		ON		ON		In case of PC-735-[]/[], Time signal outputs T.S17 to T.S20 are not available.
T.S18 [Heating]	ON		ON			
T.S19 [Cooling]					ON	
T.S20 [Washing]						

7.3 Pattern programing

① Turn the power supplied to the PC-700 ON.

② Draw the internal assembly out, and change the function selecting switch (2) to the
SET side, then the setting mode initial display will be selected.

Setting mode initial display

```
** PROGRAMMING    MODE **
SELECTION
1. PATTERN                         ←Cursor
2. ALARM  BLOCK
3. PID  BLOCK
4. WAIT  BLOCK
5. CYCLE
6. DEVICE  NO
7. SENSOR  CORRECTION
8. SAVE/LOAD
```
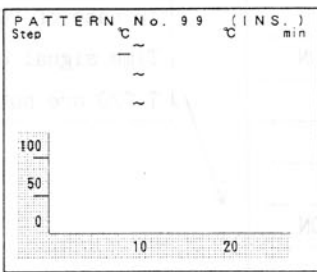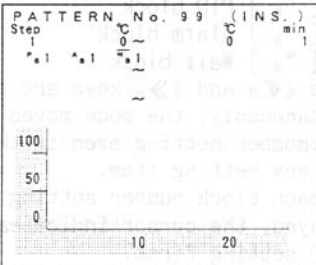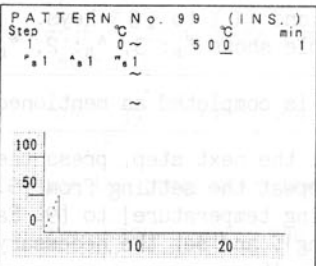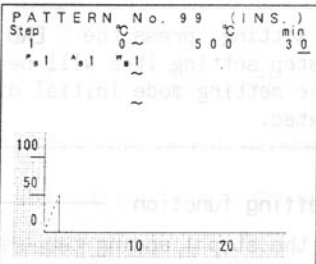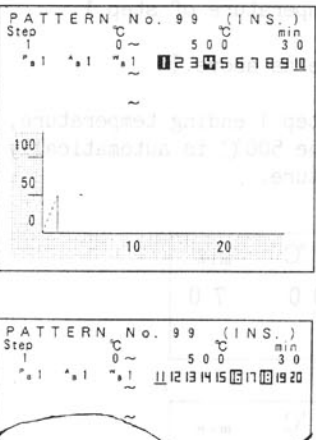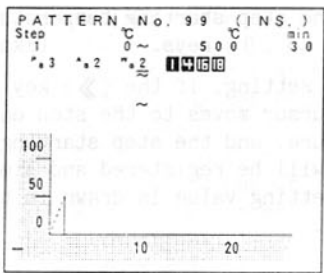
③ Set each item of the step by the procedure mentioned below referring the data table,
program pattern table prepared in advance.
(The setting methods are described here according to 7.2 Program pattern entering
example.)

No.	Display	Key operation
1	**1. PATTERN**	Move the cursor with the 《 ⋀ 》 and 《 ⋁ 》 keys, and select **1. PATTERN.** Then, press the 《 ENT 》 key.
2	PATTERN No. 1　　└Cursor	Program pattern number designation initial display will be selected. Cursor indicates the setting item blinking.
3	PATTERN No. 9 9	Set the pattern number with 《 0 》 to 《 9 》 keys (Ten-key), and register the number with the 《 ENT 》 key. (Example: Pattern number 99)
4	PATTERN No. 99 (INS.) Step ℃ ~ ℃ min ~ ~ 100 50 0　　10　　20	The display changes to the Step setting initial display. If the display indicates the change mode (CHANG), advance to ⑤ (page 26). If the program pattern has not set yet, press the 《 ⋁ 》 key once, since the display will indicate the insertion mode (INS.). Then, the step 1 setting item will be displayed, and the cursor blinks at the starting temperature. Step setting display indicates 3 steps.

No.	Display	Key operation
5	PATTERN No. 99 (INS.) Step 1 ℃ ℃ min 0 ~ 0 1 100 50 0 10 20	Set the step starting temperature with the 《0》 to 《9》 keys. (Example: 0℃) After setting, if the 《》》 key is pressed, the cursor moves to the step ending temperature, and the step starting temperature will be registered and simultaneously the setting value is drawn in the pattern graph.
6	PATTERN No. 99 (INS.) Step 1 ℃ ℃ min 0 ~ 5 0 0 1 100 50 0 10 20	Set the step ending temperature with the 《0》 to 《9》 keys. (Example: 500℃) After setting, if the 《》》 key is pressed, the cursor moves to the step time setting, and the step ending temperature will be registered and simultaneously the setting value is drawn in the pattern graph.
7	PATTERN No. 99 (INS.) Step 1 ℃ ℃ min 0 ~ 5 0 0 3 0 100 50 0 10 20	Set the step time with the 《0》 to 《9》 keys. (Example: 30 minutes) After setting, if the 《》》 key is pressed, the cursor moves to the time signal setting, and the step time will be registered. (Settable time: 1 to 999min. or 1 to 99.9min.)
8	PATTERN No. 99 (INS.) Step 1 ℃ ℃ min 0 ~ 5 0 0 3 0 **1** 2 3 **4** 5 6 7 8 9 10 100 50 0 10 20 PATTERN No. 99 (INS.) Step 1 ℃ ℃ min 0 ~ 5 0 0 3 0 11 12 13 14 15 **16** 17 **18** 19 20	Set the time signals. (Example: 1, 4, 16, 18) To set the time signal, set the cursor to the time signal number desired to output with the 《《》 and 《》》 keys, and press Ten-key excepting 《0》 key. ● **1**, **4**, **16**, **18** show that the time signals have been set. ● 2, 3, 5, 6 and so on show that the time signals have not been set. It is not necessary to set the number not used. If the 《》》 key is continuously pressed, the display will be scrolled to the left to call to 16 (PC-735) or 20 (PC-730) signals. If the 《《》 key is continuously pressed, it moves the opposite direction (right).

No.	Display	Key operation
9	PATTERN No. 99 (INS.) Step ℃ ℃ min 1 0~ 500 30 ᴾ·3 ᴬ·2 ᵂ·2 ▉▉▉▉ ~ 100 50 0 — 10 20	Each block number setting [ᴾ_B] PID block [ᴬ_B] Alarm block [ᵂ_B] Wait block If the 《≪》 and 《≫》 keys are pressed simultaneously, the mode moves to each block number setting even if the cursor is in any setting item. When each block number setting mode is displayed, the cursor indicates PID block number setting first. Set each block number with the 《≪》, 《≫》 and 《0》 to 《9》 keys. (Example shows ᴾ_B: 3, ᴬ_B: 2, ᵂ_B: 2)
	Data setting for 1 step is completed as mentioned.	
10		To set the next step, press the 《≫》 key and repeat the setting from [5. Step starting temperature] to [9. Each block setting], and set the necessary steps and setting items.
11		After setting, press the 《 END 》 key, and each step setting item will be registered and the setting mode initial display is indicated.

◆ Step temperature automatic setting function

In setting mode (INS.), after setting the step 1 ending temperature and if moves to the next step 2, this function automatically sets the step 2 starting temperature to the ending temperature of step 1.

[The steps after this are set the same as above.]

Example: When setting 500℃ to the step 1 ending temperature, and if moves to the next step 2, the 500℃ is automatically set to the step 2 starting temperature.

Step	℃	℃	min
1	0~	500	70
ᴾ_B 3 ᴬ_B 1 ᵂ_B 2			

Step	℃	℃	min
2	500~	0	1
ᴾ_B 1 ᴬ_B 1 ᵂ_B 1			

④ Point when setting

```
┌─────────── Point when setting the program pattern ───────────
│
│  ● If the key 《《》 , 《》》 , 《《》 or 《》》 is kept pressing, the cursor
│    moves continuously.
│
│  ● If the 《 END 》 key is pressed during setting of each item by mistake,
│    the mode returns to the setting mode initial display.
│       (The setting values are registered.)
│
│    To call setting pattern number again, set the cursor to 1. PATTERN of
│    the setting mode initial display and press the 《 ENT 》 key, and after
│    setting the pattern number to be set, press the 《 ENT 》 key again.
│
│    At this time, the setting mode display changes from Setting (INS.) to
│    Change (CHANG) and the step number is the status at which the 《 END 》
│    key was pressed by mistake.
│
│
│  ● It is easier to select the block number to apply to the pattern step
│    if each block setting value [2. ALARM BLOCK, 3. PID BLOCK and 4. WAIT
│    BLOCK] is set before setting each item of the step.
│
│    It is therefore recommended to set each block setting value in advance.
│
│
│  ● Each block number is adjusted as "1" in our factory, if some setting
│    value is applied to the block number 1, the value is also applied to
│    the step in which the block number is not set.
│
│    Use each block from block number 2, and it is useful if the block
│    number 1 is used for the purpose each action does not work.
│
│    As shown [7.2 Program pattern entering example] (page 20),
│    use the block number 1.
│
│    ┌───────────────────────────────────────────────────────────────┐
│    │ · Alarm block No.1: No alarm                                    │
│    │     (A1: 0℃, A2: 0℃, A3: maximum value, A4: maximum value)     │
│    │                                                                 │
│    │ · PID block   No.1: ON/OFF action                               │
│    │     (P: 0.0)                                                    │
│    │                                                                 │
│    │ · Wait block  No.1: No wait                                     │
│    │     (0℃)                                                        │
│    └───────────────────────────────────────────────────────────────┘
│
│  ● When the setting mode selection display (PROGRAMMING MODE) is selected,
│    the pattern setting (programming) can be performed even if the function
│    selecting switch (2) is changed to CONT (control performance) side.
│
└────────────────────────────────────────────────────────────────────────
```

⑤ Insertion, Change and Deletion of the step

First, call the pattern number to be inserted, changed or deleted.
To call the setting pattern number, set the cursor to 1. PATTERN of the setting mode initial display and press the 《 ENT 》 key, and after setting the pattern number to be set, press the 《 ENT 》 key again.
At this time, the setting mode display changes from Setting (INS.) to Change (CHANG).
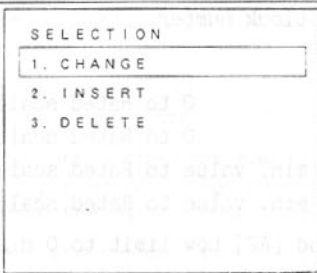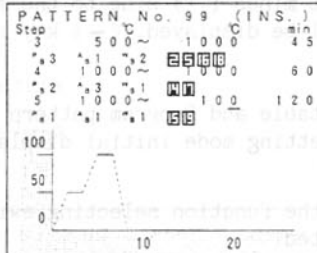
◆ To insert the step
[Example] In case it is desired to insert 1 step after the step 5 (page 21).

No.	Display	Key operations
1	PATTERN No. 99 (CHANG) Step	Set the cursor to the previous step [With the example, step 5] desired to insert by the change (CHANG) mode, and press the 《 ENT 》 key for 2 seconds or more.
2	SELECTION 1. CHANGE 2. INSERT 3. DELETE	The display changes to Selection. Set the cursor to 2. INSERT and press the 《 ENT 》 key.
3	(INS.) Step	The mode turns to Insertion (INS.). If the 《 ≫ 》 key is pressed once, the number of step will increase 1 step, and the setting item of step 6 is displayed. Set the step according to 7.3 Program pattern setting. The 《 END 》 key returns the mode to setting mode initial display.

◆ To change each setting value of the step
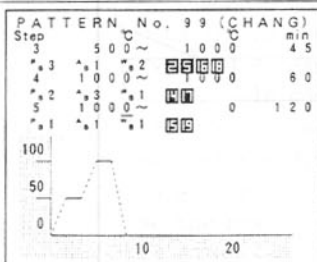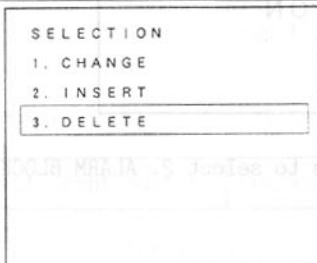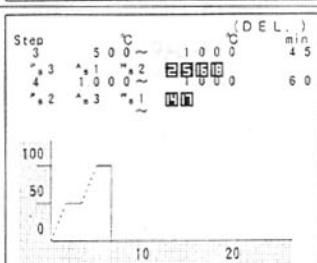
[Example] When changing the ending temperature of the step 5 (page 21) from 0℃ to 100℃.

No.	Display	Key operations
1	PATTERN No. 99 (INS.) Step	If the mode is change (CHANG), advance to procedure 3. If it is excepting the change (CHANG), press the 《 ENT 》 key for 2 seconds or more.

No.	Display	Key operations
2	S E L E C T I O N 1. CHANGE 2. INSERT 3. DELETE	The display changes to Selection. Set the cursor to 1. CHANGE and press the 《 ENT 》 key.
3	PATTERN No. 99 (INS.) (pattern graph display)	The mode turns to Change (CHANG). Change the setting value by setting the cursor to changing item. (Example shows the step 5 Ending temperature) The 《 END 》 key returns the mode to setting mode initial display.

◆ To delete unnecessary step

[Example] When desired to delete step 5 (page 21).

No.	Display	Key operations
1	PATTERN No. 99 (CHANG) (pattern graph display)	Set the cursor to the step desired to delete (e.g. Step 5, any setting item of the step 5), and press the 《 ENT 》 key for 2 or more seconds.
2	S E L E C T I O N 1. CHANGE 2. INSERT 3. DELETE	The display changes to Selection. Set the cursor to 3. DELETE and press the 《 ENT 》 key.
3	(DEL.) (pattern graph display)	The mode turns to Deletion (DEL.). If the 《 ∧ 》 key is pressed once, the step 5 will be deleted. (Each time the 《 ∧ 》 key is pressed, all setting items of 1 step will be deleted.) The 《 END 》 key returns the mode to setting mode initial display.

7.4 Alarm block setting value setting

◆ A mode to set the setting value in the Alarm block number.

◆ Setting range

- [A1] High limit alarm   0 to Rated scale max. value (℃)
- [A2] Low limit alarm   0 to Rated scale max. value (℃)
- [A3] Process value alarm 1   Rated scale min. value to Rated scale max. value (℃)
- [A4] Process value alarm 2   Rated scale min. value to Rated scale max. value (℃)

· Setting the alarm values [A1] High limit and [A2] Low limit to 0 disables the function.

· With [A2] Low limit alarm, it should be set minus (−) side to the main setting.
Using the 《0》 to 《9》 keys, (−) sign will be displayed, 《−》 key is not used.

◆ Setting procedure

Set the alarm value according to the Data table and Program pattern table.
When the multi-display is indicating the setting mode initial display, operate from
the item ②.

① Draw the internal assembly out and change the function selecting switch (2) to SET side.
② Setting mode initial display will be selected.

Setting mode initial display

```
** PROGRAMMING    MODE **
SELECTION                           ── Cursor
1 · PATTERN
2 · ALARM  BLOCK
3 · PID  BLOCK
4 · WAIT  BLOCK
5 · CYCLE
6 · DEVICE  NO
7 · SENSOR  CORRECTION
8 · SAVE／LOAD
```

Move the cursor with the 《∧》 and 《∨》 keys to select 2. ALARM BLOCK, and press the
《 ENT 》 key.

③ Alarm block setting display will be selected.

No.	Display	Key operations
1	No.　A1　　　　　A2 　　(DEV. H)　　(DEV. L) 1　　0℃　－　　0℃ 2　　0℃　－　　0℃ 3　　0℃　－　　0℃ 4　　0℃　－　　0℃ 5　　0℃　－　　0℃ 6　　0℃　－　　0℃ 7　　0℃　－　　0℃ 8　　0℃　－　　0℃ 9　　0℃　－　　0℃	Alarm block setting display Cursor indicates the setting item blinking at the Alarm block number 1 A1 (DEV. H).
2	No.　A1　　　　　A2 　　(DEV. H)　　(DEV. L) 1　　0℃　－　　0℃ 2　10 0℃　－　　5℃ 3　　5℃　－　　5℃ 4　　0℃　－　　0℃ 5　　0℃　－　　0℃ 6　　0℃　－　　0℃ 7　　0℃　－　　0℃ 8　　0℃　－　　0℃ 9　　0℃　－　　0℃	Move the cursor to the block number and the kind of alarm to be set with the keys 《∧》, 《∨》, 《≪》 and 《≫》, and set the setting value with the 《0》 to 《9》 keys. The 《≪》 and 《≫》 keys change the setting display between [A1, A2] and [A3, A4].
3	No.　A3　　　　　A4 　　(ABS)　　　(ABS) 1　1200℃　　1200℃ 2　505℃　　510℃ 3　1005℃　　1010℃ 4　　0℃　　　0℃ 5　　0℃　　　0℃ 6　　0℃　　　0℃ 7　　0℃　　　0℃ 8　　0℃　　　0℃ 9　　0℃　　　0℃	Press the 《 END 》 key to register the values, and the mode returns to the setting mode initial display.

7.5 PID block setting

◆ A mode to set the setting value in the PID block number.

◆ Setting range

- Proportional band [P   (%)]   0.1 to 200.0 (%)
- Integral time   [I   (s)]   1   to 3600 (s)
- Derivative time   [D   (s)]   1   to 1800 (s)
- Anti-reset windup [ARW (%)]   0   to 100   (%)

◆ Setting procedure

Set the PID value according to the Data table and Program pattern table.
When the multi-display is indicating the setting mode initial display, operate from
the item ②.
① Draw the internal assembly out and change the function selecting switch (2) to SET side.
② Setting mode initial display will be selected.

Setting mode initial display

```
** PROGRAMMING    MODE  **
SELECTION
1 · PATTERN
2 · ALARM  BLOCK
3 · PID  BLOCK                    ⟵ Cursor
4 · WAIT  BLOCK
5 · CYCLE
6 · DEVICE  NO
7 · SENSOR  CORRECTION
8 · SAVE / LOAD
```

Move the cursor with the 《∧》 and 《∨》 keys to select 3. PID BLOCK, and press the
《 ENT 》 key.

③ Alarm block setting display will be selected.

No.	Display	Key operations
1	No P (%) I (s) D (s) ARW% 1 0. 0 0 0 5 0 2 0. 0 0 0 5 0 3 0. 0 0 0 5 0 4 0. 0 0 0 5 0 5 0. 0 0 0 5 0 6 0. 0 0 0 5 0 7 0. 0 0 0 5 0 8 0. 0 0 0 5 0 9 0. 0 0 0 5 0	PID block setting display Cursor indicates the setting item blinking at P (%) of the PID block number 1.
2	No P (%) I (s) D (s) ARW% 1 0. 0 0 0 5 0 2 2. 5 2 0 0 5 0 5 0 3 4. 0 3 8 0 9 5 5 0 4 0. 0 0 0 5 0 5 0. 0 0 0 5 0 6 0. 0 0 0 5 0 7 0. 0 0 0 5 0 8 0. 0 0 0 5 0 9 0. 0 0 0 5 0	Move the cursor to the block number and the P, I, D and ARW to be set with the keys 《⋀》 , 《⋁》 , 《⋘》 and 《⋙》 , and set the setting value with the 《 0 》 to 《 9 》 keys. When applying the setting value with decimal point as shown P (%) of block number 2 [page 20], press the keys 《 2 》 and 《 5 》 . Set the proportional band to 0.0 (%) when the ON/OFF action is desired.
3	**PROGRAMMING MODE** SELECTION 1. PATTERN 2. ALARM BLOCK 3. PID BLOCK 4. WAIT BLOCK 5. CYCLE 6. DEVICE NO 7. SENSOR CORRECTION 8. SAVE/LOAD	Press the 《 END 》 key to register the values, and the mode returns to the setting mode initial display.

7.6 Wait block setting

◆ A mode to set the setting value in the wait block number.

◆ What is the wait?

A function which waits the progress to the next step until the process variable becomes within the beginning temperature of the next step ± wait temperature at the end of the step. Step time progress is halted during waiting.

◆ Setting range
Wait value　　±10.0% of full scale
[Example] Range: 0 to 1200℃ (K)
　　　　　When setting the wait value to 1.0%,
　　　　　The wait temperature is ±12℃

◆ Setting procedure
Set the wait value according to the Data table and Program pattern table.
When the multi-display is indicating the setting mode initial display, operate from the item ②.
① Draw the internal assembly out and change the function selecting switch (2) to SET side.
② Setting mode initial display will be selected.

Setting mode initial display

```
**  PROGRAMMING   MODE  **
SELECTION
1 · PATTERN
2 · ALARM  BLOCK
3 · PID  BLOCK
4 · WAIT  BLOCK
5 · CYCLE
6 · DEVICE  NO
7 · SENSOR  CORRECTION
8 · SAVE／LOAD
```
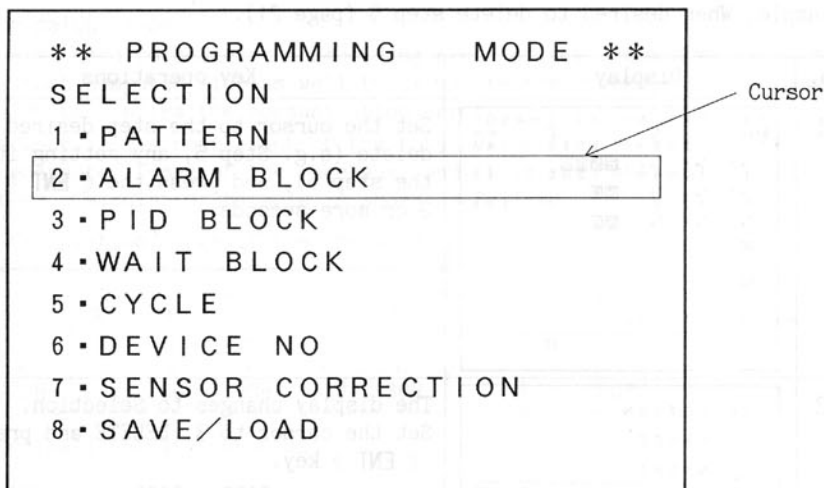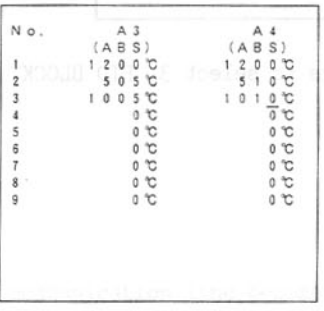
Cursor

Move the cursor with the 《✩》 and 《✧》 keys to select 4. WAIT BLOCK, and press the 《 ENT 》 key.

③ Wait block setting display will be selected.

No.	Display	Key operations
1	 No WAIT 1 0. 0 % 2 0. 0 % 3 0. 0 % 4 0. 0 % 5 0. 0 % 6 0. 0 % 7 0. 0 % 8 0. 0 % 9 0. 0 %	Wait block setting display Cursor indicates the setting item blinking at wait value of the wait block number 1.
2	 No WAIT 1 0. 0 % 2 10. 0 % 3 5. 0 % 4 0. 0 % 5 0. 0 % 6 0. 0 % 7 0. 0 % 8 0. 0 % 9 0. 0 %	Move the cursor to the block number to be set with the 《∧》 and 《∨》 keys, and set the setting value with the 《0》 to 《9》 keys. When applying the setting value with decimal point as shown 10.0% of block number 2 [page 20], press the keys 《1》, 《0》 and 《0》.
3	 **PROGRAMMING MODE** SELECTION 1. PATTERN 2. ALARM BLOCK 3. PID BLOCK 4. WAIT BLOCK 5. CYCLE 6. DEVICE NO 7. SENSOR CORRECTION 8. SAVE/LOAD	Press the 《 END 》 key to register the values, and the mode returns to the setting mode initial display.

7.7 Proportional cycle setting

◆ A mode to set the proportional cycle.

◆ Setting range

Proportional cycle [ON/OFF cycle]   0 to 120 seconds

- Factory adjusted as 15sec. (-R/□) or 3sec. (-S/□).
- Proportional cycle set by this mode is set to all steps of the program pattern commonly.
- This setting mode is not provided to the type DC current output (-A/□).

◆ Setting procedure

Set the proportional cycle according to the Data table and Program pattern table. When the multi-display is indicating the setting mode initial display, operate from the item ②.

① Draw the internal assembly out and change the function selecting switch (2) to SET side.

② Setting mode initial display will be selected.

Setting mode initial display

```
** PROGRAMMING   MODE **
SELECTION
1 · PATTERN
2 · ALARM  BLOCK
3 · PID  BLOCK
4 · WAIT  BLOCK
5 · CYCLE                         ← Cursor
6 · DEVICE  NO
7 · SENSOR  CORRECTION
8 · SAVE／LOAD
```

Move the cursor with the 《∧》 and 《∨》 keys to select 5. CYCLE, and press the 《 ENT 》 key.

③ Proportional cycle setting display will be selected.

No.	Display	Key operations
1	ON-OFF CYCLE SELECTION(1~120sec) ? 15 Input. number and ENT	Proportional cycle setting display Cursor indicates the setting item blinking.
2	ON-OFF CYCLE SELECTION(1~120sec) ? 30 Input. number and ENT	Set the proportional cycle time with the 《 0 》 to 《 9 》 keys. [Example] Proportional cycle time 30sec.
3	**PROGRAMMING MODE** SELECTION 1. PATTERN 2. ALARM BLOCK 3. PID BLOCK 4. WAIT BLOCK 5. CYCLE 6. DEVICE NO 7. SENSOR CORRECTION 8. SAVE/LOAD	Press the 《 ENT 》 or 《 END 》 key to register the values, and the mode returns to the setting mode initial display.

7.8 Instrument number setting

◆ A mode to set the instrument number

When controlling by communication (Option code: C, C4, C5), the individual instrument number is applied to the PC-700.

The instrument number is to be applied when the PC-700 is observed from the host computer. When communicating with plural controllers such as C4 (RS-422A) or C5 (RS-485), take care not to set the same number to the plural controllers since if it is repeated, normal action cannot be gotten.

◆ Setting range
Instrument number [DEVICE NO]   0 to 95
Settable instrument number is 0 to 95, however, according to the communication method, connectable number of controllers are as follows.

● RS-232C [Option code: C] (Connectable number: 1) Unnecessary to set the number.

```
┌─────────────┐                 ┌──────────┐        ┌─────────┐
│             │                 │ RS-232C  │        │ PC-700  │
│   ┌─────┐   │                 └──────────┘        │         │
│   │     │   │                                     │         │
│   └─────┘   │                                     │         │
│ Host computer│                                    │         │
└─────────────┘                                     └─────────┘
```
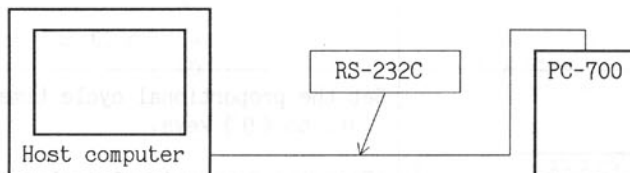
● RS-422A [Option code: C4] (Connectable number: 10) Multi-drop connection

```
┌─────────────┐          ┌──────────┐      ┌────────┐ ┌────────┐      ┌────────┐
│             │          │ RS-422A  │      │ PC-700 │ │ PC-700 │ ---- │ PC-700 │
│   ┌─────┐   │          └──────────┘      │        │ │        │      │        │
│   │     │   │                            │        │ │        │      │        │
│   └─────┘   │                            │ No.  0 │ │ No.  1 │      │ No.  9 │
│ Host computer│                           └────────┘ └────────┘      └────────┘
└─────────────┘
```
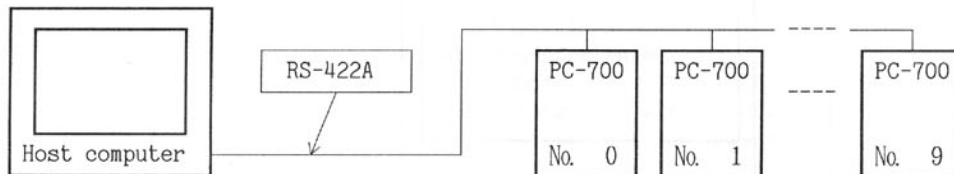
● RS-485 [Option code: C5] (Connectable number: 31) Multi-drop connection

```
┌─────────────┐    ┌──────────────┐   ┌────────┐ ┌────────┐      ┌────────┐
│             │    │ IF-100-C5    │   │ PC-700 │ │ PC-700 │ ---- │ PC-700 │
│   ┌─────┐   │    │ Communication│   │        │ │        │      │        │
│   │     │   │    │ converter    │   │        │ │        │      │        │
│   └─────┘   │    └──────────────┘   │ No.  0 │ │ No.  1 │      │ No.3 0 │
│ Host computer│                      └────────┘ └────────┘      └────────┘
└─────────────┘
```

┌──────────────────────────┐   ┌────────────┐   ┌───────────────────────────────┐
│ RS-232C or RS-422A   │   │ RS-485   │   │ Connect the terminal resistor │
└──────────────────────────┘   └────────────┘   │ (100 Ω) between Y_A and Y_B.│
                                                          └───────────────────────────────┘
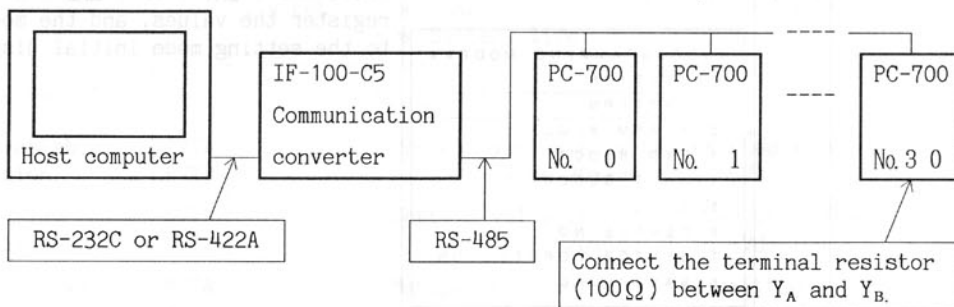
● Communication converter [IF-100-C5] is provided with extra charge.

◆ Setting procedure

Set the instrument number according to the Data table and Program pattern table.
When the multi-display is indicating the setting mode initial display, operate from the item ②.

① Draw the internal assembly out and change the function selecting switch (2) to SET side.
② Setting mode initial display will be selected.

Setting mode initial display

```
** PROGRAMMING    MODE **
SELECTION
1 · PATTERN
2. ALARM BLOCK
3. PID BLOCK
4. WAIT BLOCK
5. CYCLE
6. DEVICE NO                    ← Cursor
7. SENSOR CORRECTION
8. SAVE/LOAD
```
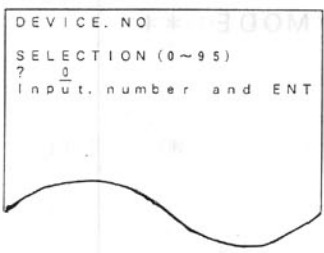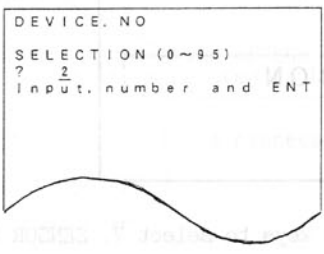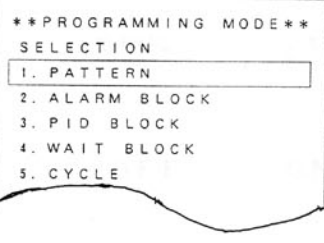
Move the cursor with the 《 ⩓ 》 and 《 ⩔ 》 keys to select 6. DEVICE NO, and press the 《 ENT 》 key.

③ Instrument number setting display will be selected.

No.	Display	Key operations
1	DEVICE. NO SELECTION (0~95) ? 0 Input. number and ENT	Instrument number setting display Cursor indicates the setting item blinking.
2	DEVICE. NO SELECTION (0~95) ? 2 Input. number and ENT	Set the instrument number with the 《 0 》 to 《 9 》 keys. [Example] Instrument number 2
3	**PROGRAMMING MODE** SELECTION 1. PATTERN 2. ALARM BLOCK 3. PID BLOCK 4. WAIT BLOCK 5. CYCLE	Press the 《 ENT 》 or 《 END 》 key to register the values, and the mode returns to the setting mode initial display.

7.9 Sensor correction setting

◆ A mode to set the sensor correcting value

◆ What is the sensor correction?
It corrects the input value from the sensor. When a sensor cannot be set at a location where control is desired, the sensor measuring value may deviate from the value in the controlled location. When controlling with plural PC-100s, the accuracy of sensors have influence on the control. Therefore, sometimes measuring value does not accord with the same setting value. In such a case, the control can be accorded with desired value by shifting the input value of sensors.

◆ Setting range

Sensor correcting value -50.0 to $50.0℃$

◆ Setting procedure
When the multi-display is indicating the setting mode initial display, operate from the item ②.
① Draw the internal assembly out and change the function selecting switch (2) to SET side.
② Setting mode initial display will be selected.

Setting mode initial display

```
** PROGRAMMING   MODE **
 SELECTION
 1·PATTERN
 2. ALARM  BLOCK
 3. PID  BLOCK
 4. WAIT  BLOCK
 5. CYCLE
 6. DEVICE  NO
 7. SENSOR   CORRECTION
 8. SAVE/LOAD
```
                                                        —— Cursor
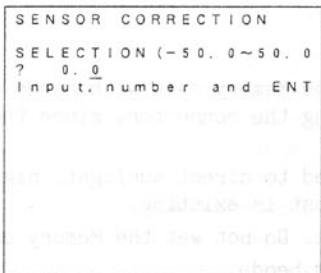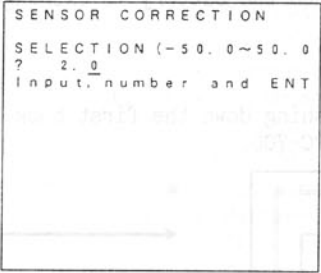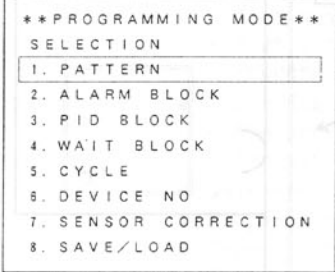
Move the cursor with the 《⩘》 and 《⩗》 keys to select 7. SENSOR CORRECTION, and press the 《 ENT 》 key.

③ Sensor correction setting display will be selected.

No.	Display	Key operations
1	SENSOR CORRECTION SELECTION (-50. 0~50. 0 ? 0. 0 Input number and ENT	Sensor correction setting display Cursor indicates the setting item blinking.
2	SENSOR CORRECTION SELECTION (-50. 0~50. 0 ? 2. 0 Input number and ENT	Set the sensor correcting value with the 《 0 》 to 《 9 》 and 《 − 》 keys. [Example] Sensor correcting value 2.0℃
3	**PROGRAMMING MODE** SELECTION 1. PATTERN 2. ALARM BLOCK 3. PID BLOCK 4. WAIT BLOCK 5. CYCLE 6. DEVICE NO 7. SENSOR CORRECTION 8. SAVE/LOAD	Press the 《 ENT 》 or 《 END 》 key to register the values, and the mode returns to the setting mode initial display.

7.10 SAVE/LOAD selection

◆ What is the external memory function?
   A function to SAVE, LOAD or copy the data by using the Memory-card.

◆ Notice when handling the Memory-card
   - Do not touch the connector (terminal) of the Memory-card with hands or metal.
     Take care not to damage the card by touching the connector, since the static electricity
     may be charged in dry season.
   - Do not put the Memory-card the place exposed to direct sunlight, high temperature such as
     near the heater or high humidity or much dust is existing.
   - Do not throw the Memory-card away into fire. Do not wet the Memory-card by water.
   - Do not give a shock such as drop, strike or bend.
   - Put the Memory-card into the protective case when it is not used.
   - Do not open the battery holder excepting when the battery is exchanged.

◆ Memory-card insertion
   Pull the internal assembly out about 14cm pushing down the first hook. (See page 4)
   Set the Memory-card to the card slot of the PC-700.


```
 ─────── Point ───────
The position at which the letter "C" is
a little hidden is the proper setting
position for the card.
```

5	CLR	END	–	≪
		PTN	FAST	RUN
0	ENT	≪	≫	≪
		ADV	HOLD	STOP
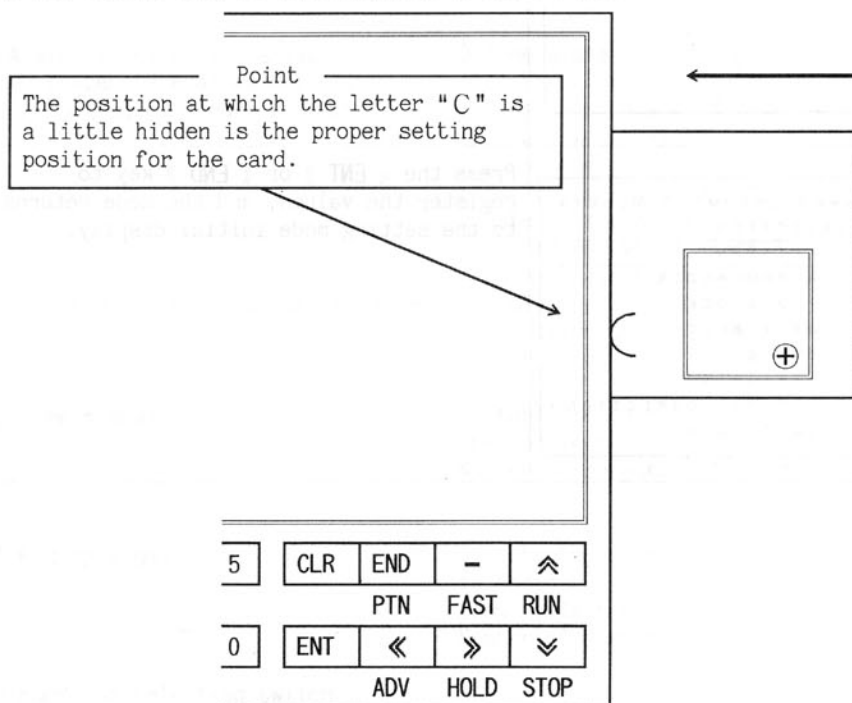
> - Do not insert the Memory-card by force. Set it certainly.
> - Do not give a shock to the Memory-card when setting.

◆ Setting procedure

When the multi-display is indicating the setting mode initial display, operate from the item ②.

① Draw the internal assembly out and change the function selecting switch (2) to SET side.

② Setting mode initial display will be selected.

Setting mode initial display

```
** PROGRAMMING    MODE **
SELECTION
1. PATTERN
2. ALARM  BLOCK
3. PID  BLOCK
4. WAIT  BLOCK
5. CYCLE
6. DEVICE  NO                          ─── Cursor
7 · SENSOR  CORRECTION
8 · SAVE／LOAD
```
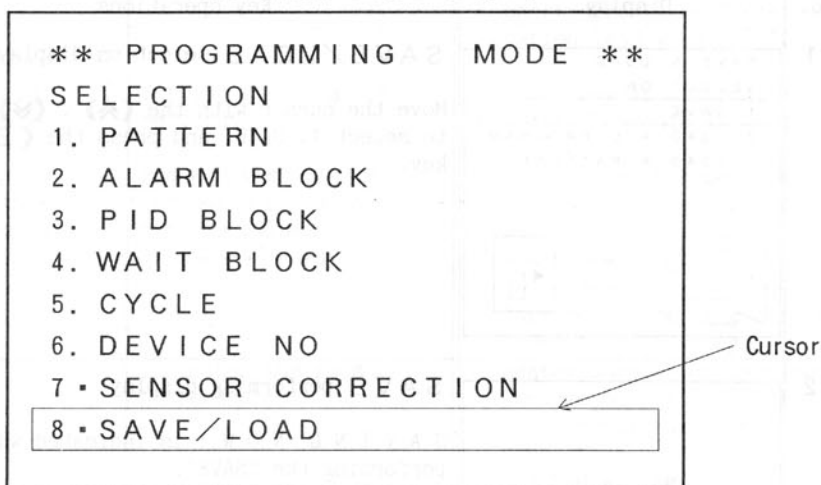
Move the cursor with 《 ⋀ 》 and 《 ⋁ 》 keys to select 8. SAVE/LOAD, and press the 《 ENT 》 key.

③ SAVE/LOAD selecting display will be selected. Selectable items are as follows.

```
1. SAVE
```

It writes the data from the PC-700 to the Memory-card.

```
2. LOAD  ALL  PROGRAM
```

It reads all data from the Memory-card to the PC-700.

```
3. LOAD  A  PATTERN
```

It reads the data from any pattern number of Memory-card to any pattern number of PC-700.

───── **Suggestion** ─────

Save the data from programmed PC-700 to the Memory-card, and if excuted the "LOAD ALL PROGRAM" from the card to the other PC-700, data copy between PC-700 ⟷ PC-700 is easily possible.
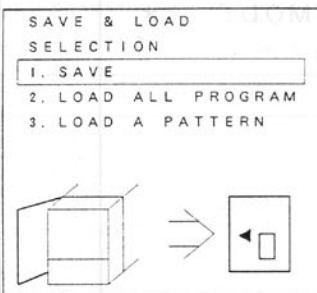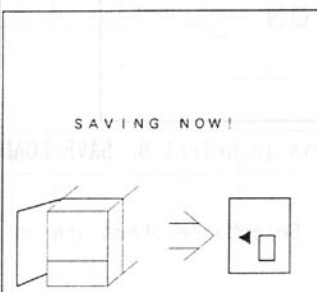
```
If the Memory-card is not inserted, this display will not be indicated.
```

1. When selecting the S A V E.
   (It writes the data from the PC-700 to the Memory-card.)

┌─────────────────── **Notice** ───────────────────┐

When "SAVE" is made, the former data in the Memory-card will be gone off.
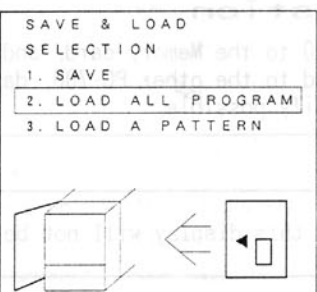
└──┘

No.	Display	Key operations
1	SAVE & LOAD SELECTION 1. SAVE 2. LOAD ALL PROGRAM 3. LOAD A PATTERN 	SAVE/LOAD selection display Move the cursor with the 《 ∧ 》 , 《 ∨ 》 keys to select 1. SAVE, and press the 《 ENT 》 key.
2	SAVING NOW! 	SAVE performing display SAVING NOW! is indicated when performing the "SAVE". The indication returns to the Setting mode initial display when the "SAVE" is ended.
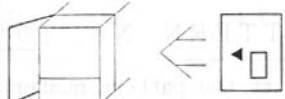
2. When selecting the L O A D   A L L   P R O G R A M.
   (It reads all data from the Memory-card to the PC-700.)

┌─────────────────── **Notice** ───────────────────┐

When "LOAD ALL PROGRAM" is made, the former data in the PC-700 will be gone off.

└──┘

No.	Display	Key operations
1	SAVE & LOAD SELECTION 1. SAVE 2. LOAD ALL PROGRAM 3. LOAD A PATTERN 	SAVE/LOAD selection display Move the cursor with the 《 ∧ 》 , 《 ∨ 》 keys to select 2. LOAD ALL PROGRAM, and press the 《 ENT 》 key.

2	LOADING NOW!	LOAD ALL PROGRAM performing display L O A D I N G N O W ! is indicated when performing the "LOAD ALL PROGRAM". The indication returns to the Setting mode initial display when the "LOAD ALL PROGRAM" is ended.

3. When selecting the L O A D A P A T T E R N.
   (It writes from any pattern number of data in Memory-card to any pattern number of the PC-700.)
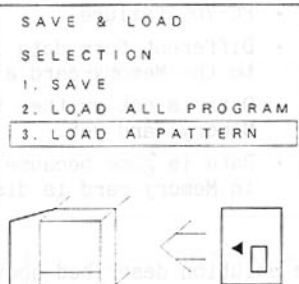
─────── Notice ───────

"LOAD A PATTERN" does not read each block value [Alarm, PID and Wait], proportional cycle, instrument number and sensor correcting value.
The former data of selected pattern in PC-700 will be gone off.
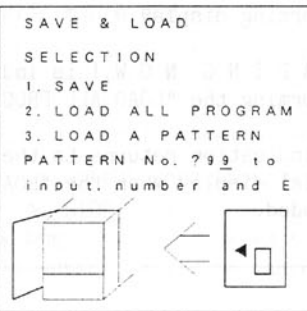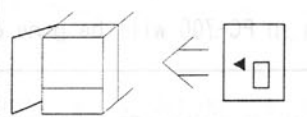
[Example] When reading the data from pattern number 99 in the Memory-card to pattern number 2 of the PC-700.

No.	Key operations
1	First, set the pattern number to be read in PC-700, referring to the "7.3 Program pattern setting (page 22), ③ operating procedure 1, 2 and 3" [in this example: 2], and press the 《 END 》 key to register the number. When the 《 ENT 》 key is pressed by mistake, the display will turn to the Step setting initial display. However, press the 《 END 》 key to register the number in this case as well.
2	The display returns to the Setting mode initial display. Move the cursor with the 《≪》 , 《≫》 keys to select 8. SAVE/LOAD, and press the 《 ENT 》 key.

	Display	Key operations
3	SAVE & LOAD SELECTION 1. SAVE 2. LOAD ALL PROGRAM 3. LOAD A PATTERN	SAVE／LOAD selection display Move the cursor with the 《≪》 , 《≫》 keys to select 3. LOAD A PATTERN, and press the 《 ENT 》 key. To be continued on the next page.

(Continued from page 43)

4	SAVE & LOAD SELECTION 1. SAVE 2. LOAD ALL PROGRAM 3. LOAD A PATTERN PATTERN No. ?9<u>9</u> to input. number and E	Pattern number in Memory-card setting display Set the pattern number to read from the Memory-card to the PC-700. [in this example: 99] PATTERN No. ?<u>99</u> to 2 Confirm the pattern number to be read to the PC-700. Press the 《 ENT 》 key if it is right.
5	LOADING NOW!	LOAD A PATTERN performing display L O A D I N G N O W ! is indicated when performing the "LOAD A PATTERN". The indication returns to the Setting mode initial display when the "LOAD A PATTERN" is ended.

◆ Error message

The error message displayed when performing SAVE/LOAD by the Memory-card and the cause is as follows.

Error message	Causes
! ! S A V E E R R O R ! !	• Memory-card insertion is imperfect. • Memory-card failure
! ! L O A D E R R O R ! !	• PC-700 failure
! ! D A T A T Y P E M I S M A T C H ! !	• Memory-card insertion is imperfect. • Memory-card failure • PC-700 failure • Different form data is written to the Memory-card already. • Data is not written to the Memory-card yet. • Data is gone because the battery in Memory-card is discharged.

When the error is not fixed even if the solution described above is carried out, inquire us.

8. PID auto-tuning designation

◆ A mode to designate or cancel the PID auto-tuning performance.

◆ What is the PID auto-tuning?
A function to set each value of P, I, D and ARW automatically by giving the fluctuation to the control object by force.

◆ Notice when designating the PID auto-tuning.

- PID auto-tuning designation or cancellation can be done only when performing the control.
  To avoid the wrong result, it is recommended to perform the PID auto-tuning during the test running.

- The setting values gotten by PID auto-tuning are set to the PID block number in which the PID auto-tuning has been performed.
  Initial value of PID block number for all step is "1", therefore if the PID auto-tuning is performed by PID block number "1", the setting values gotten by PID auto-tuning are also set to the step of which the step temperature and so on is mot set.
  As explained on "Point when setting the program pattern", use each block from block number 2, and it is useful if the block number 1 is used for the purpose each action does not work.

◆ Designating procedure

① Draw the internal assembly out and change the function selecting switch (2) to the SET side.

② Setting mode initial display will be selected.

```
** PROGRAMMING   MODE **
SELECTION
1. PATTERN
2. ALARM  BLOCK
3. PID  BLOCK
4. WAIT  BLOCK
5. CYCLE
6. DEVICE  NO
7. SENSOR  CORRECTION
8. SAVE/LOAD                    ← Cursor
9. PID  AUTO  TUNING
```
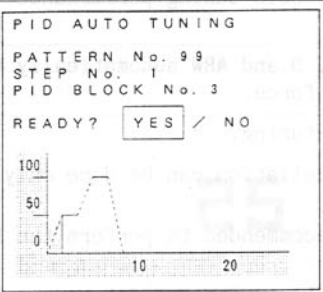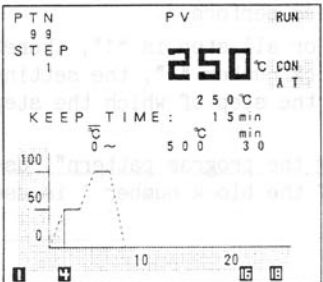
When the setting mode initial display is selected, return the function selection switch (2) to CONT (control) side.

Move the cursor with the 《 ⌃ 》 and 《 ⌄ 》 keys to select 9. PID AUTO TUNING and press the 《 ENT 》 key.

③ PID auto-tuning designation selecting display will be selected.

No.	Display	Key operations
1	PID AUTO TUNING PATTERN No. 99 STEP No. 1 PID BLOCK No. 3 READY? YES / NO 100 50 0 　　10　　20	PID auto-tuning designation selecting display Set the cursor to "YES" or "NO" with the 《 ≪ 》 and 《 ≫ 》 keys, and press the 《 ENT 》 key. • "YES": It performs the PID auto-tuning. • "NO" : It cancels the PID auto-tuning.
2	PTN　　　　　PV　　　RUN 99 STEP 1　　**250**℃ CON 　　　　　　　　 AT 　　　　　250℃ KEEP TIME: 15min 　　　℃　　　min 0~　500　30 100 50 0 　　10　　20	PID auto-tuning performing display AT blinks during the PID auto-tuning and it goes off when the tuning is ended. AT also will be gone off when the tuning is cancelled.

◆ Notices when designating the PID auto-tuning
• When designating the PID auto-tuning for the step which has short setting time, if the designation "YES" or "NO" is not applied while the designation selecting display is indicating, the step will advance to the next. Therefore, designate the auto-tuning selection "YES" or "NO" within the step time.
• The PID auto-tuning is performed with the temperature setting value at which the tuning is designated.
• Time progress of the step is interrupted during the PID auto-tuning, and the remaining step time is progressed after the PID auto-tuning is finished. (See below figure.)

PID auto-tuning   Delayed time
performing   by auto-tuning

―――― Step setting value

――― Delayed step setting value
by auto-tuning
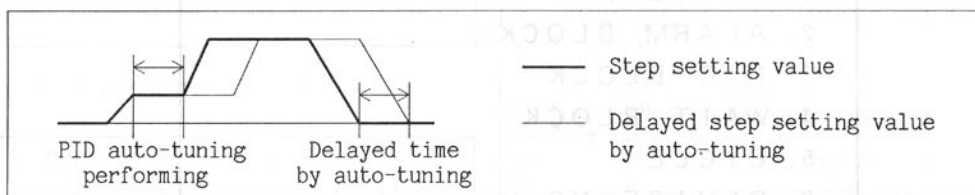
• According to the process, the controlling status may be different from the temperature high, middle or low, therefore, it is recommended to set the PID block No. arranging the temperature range High, Middle and Low temperature range to get the proper control.
(See below figure.)

High

Middle

Low temperature range
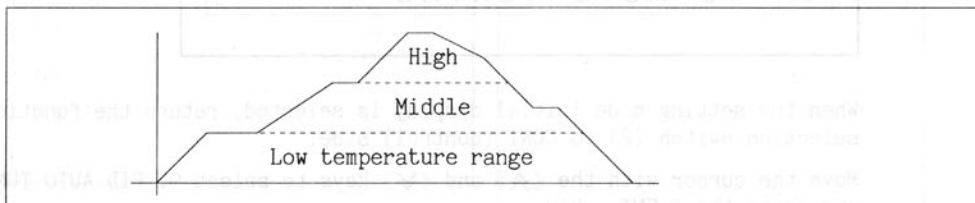
Note: When the PID auto-tuning is performed, this system gives the fluctuation by force. However, in case of heating control, the fluctuation does not fall to the room temperature or less. Therefore, do not perform the PID auto-tuning when it is near the room temperature.

9. Running (Program performance)

```
┌──────────┐   ┌──────────────┐   ┌──────────────────┐   ┌──────────────────────┐
│ Power    │──▶│ Running mode │──▶│ Program control  │──▶│ Running              │
│ supply ON│   │ Control stop │   │ Pattern selection│   │ (Control performance)│
└──────────┘   └──────────────┘   └──────────────────┘   └──────────────────────┘
  ┊              ┊   ▲                                            ▲
  ┊              ┊   │  《 END 》 key                             ┊
  ┊              ┊ ┌─────────────────┐                           ┊
  ┊─ (*1) ---->  │ Setting mode    │                            ┊
  ┊              │ initial display │                            ┊
  ┊              └─────────────────┘                            ┊
  ┊                                                              ┊
  ┊───── (*2) --------------------------------------------------┊
```
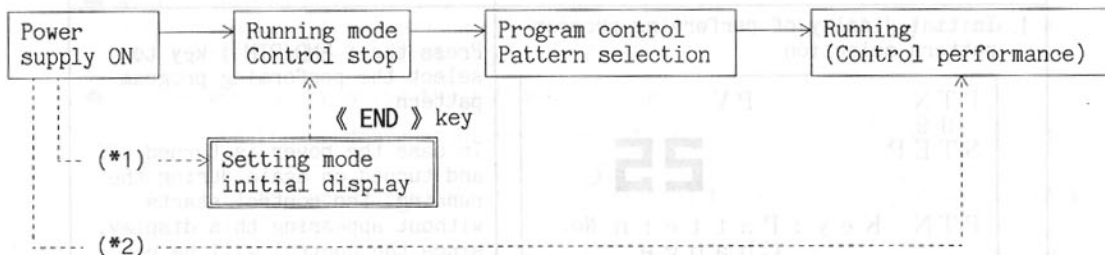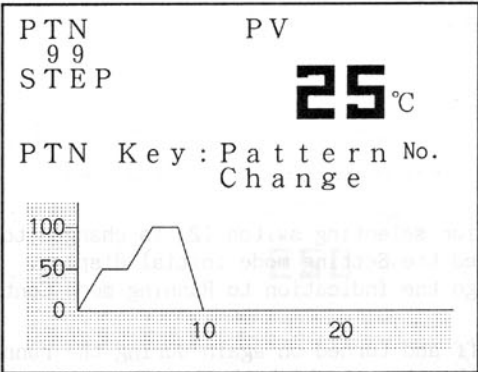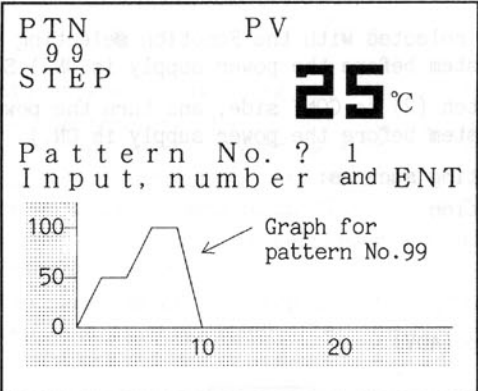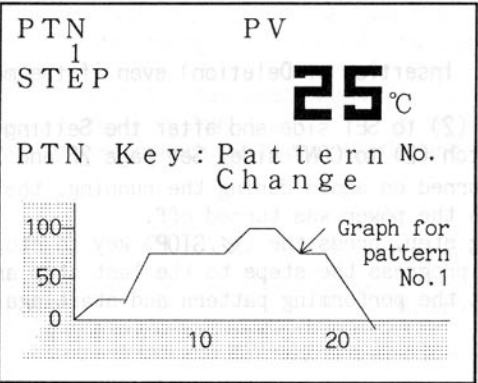
(*1) In setting mode, if the function selecting switch (2) is changed to CONT side,
the indication will be selected the Setting mode initial display.
Press the 《 END 》 key to change the indication to Running mode Control stop
display.

(*2) In case the power is turned off and turned on again during the running, the
control will be started from the step at which the power was turned off.

9.1 Before running

◆ Starting system [PV or Z (SV)] can be selected with the Function selecting switch (1).
(Set the system before the power supply is ON.) See page 13.

◆ Change the the Function selecting switch (2) to CONT side, and turn the power on.
(Set the system before the power supply is ON.)

◆ In running mode following pattern setting such as:
- Program controlling pattern selection
- Pattern performance (RUN)
- Pattern stopping (STOP)
- Step time progress holding (HOLD)
- Advances the step to the next step (ADV)
- Turn back to the previous step
- Time fast change (FAST)
- Pattern ending signal cancellation
- PID auto-tuning

can be made with the key operations.

◆ Setting values are changeable (Change, Insertion or Deletion) even if the mode is during
the control.
(Change the Function selecting switch (2) to SET side and after the Setting mode initial
display is indicated, return the switch (2) to CONT side. See page 26 and 27.)

◆ In case the power is turned off and turned on again during the running, the control
will be started from the step at which the power was turned off.
If desired to start from the beginning step, press the 《≫/STOP》 key to stop the
program, or press the 《≪/ADV》 key to progress the steps to the last step and
terminate the pattern, and then select the performing pattern and start again.

9.2 Performing program pattern selection, Control performance

Display	Key operation

1. Initial display of performing program pattern selection
 	
PTN   PV
99
STEP   **25**℃
 	
PTN Key:Pattern No.
       Change
 	
100
50
0
     10   20
	Press the 《 END/PTN 》 key to select the performing program pattern.
	
	In case the power is turned off and turned on again during the running, the control starts without appearing this display, since the control will be continuously started from the step at which the power is turned off.

2. Performing pattern selection PTN PV 99 STEP **25**℃ Pattern No. ? 1 Input, number and ENT 100 50 Graph for 0 pattern No.99 10 20	Select the performing pattern number with the 《0》 to 《9》 keys, and press the 《 ENT 》 key to set the number. Display shows when changing the number from 99 to 1. If the pattern number under the PTN is desired one, or when controlling continuously the same pattern terminated, press the 《⋀/RUN 》 key to start the control. The display turns to 4. Control performance.

3. Control performance is ready
 	
PTN   PV
1
STEP   **25**℃
 	
PTN Key:Pattern No.
       Change
 	
100   Graph for
50   pattern
0   No.1
     10   20
	If the 《 ENT 》 key is pressed performing pattern number is set and the indication returns to performing pattern selection initial display (Stopping).
	
	It displays the graph for the program pattern which has been set.

4. Control performance (Running)

```
P T N          P V          RUN
  1
S T E P        25℃
  1                          AL1
       S V :         0 ℃
K E E P  T I M E :    1 5 min  AL3
       ℃          ℃      min
     0 ~      2 5 0     1 5

100
 50
  0
          10        20
```
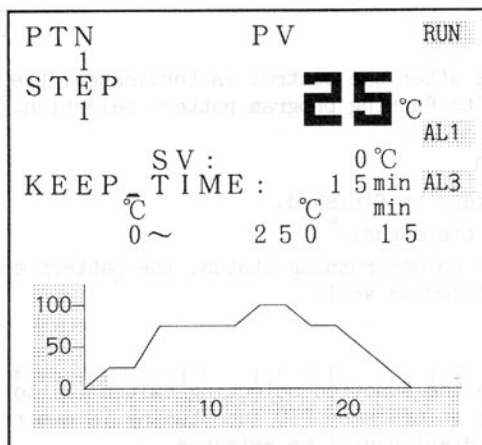
Selected pattern to control will be started if the 《⋏/RUN》 key is pressed.
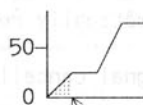
```
50

 0
```
└ It displays the step performing.

Explanation of control performing display

```
P T N          P V          RUN
  1                          HLD
S T E P        875          FST
  6                    ℃CON
                             AL1
       S V :        8 7 5 ℃
K E E P  T I M E :    1 0 min
       ℃          ℃      min AL4
   7 5 0 ~    1 0 0 0     2 0

100
 50
  0
          10        20

 1 2 3    6
```
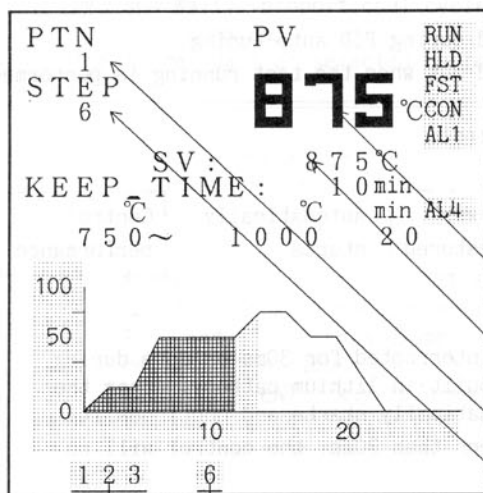
RUN : Appears during the control.

HLD : Blinks during the hold.

FST : Blinks when the step time is changing faster.

CON : Appears while the main output is ON.

AL1 to AL4 : Appears when each temperature alarm output is ON.

Input temperature of the sensor.

Setting temperature (If the step has temperature slant, it will change with the progress of time.)

Pattern number controlling

Step number controlling

Appears when time signal is ON.

```
K E E P — T I M E :    1 0 min
```
── Remaining time of the step
── Blinks during the control

```
7 5 0 ~ 1 0 0 0 ℃     2 0 min
```
── Setting time of the step
── Finishing temperature of the step
── Starting temperature of the step

◆ Performing pattern display will automatically be indicated to the last step by horizontal scroll.

◆ If input temperature exceeds the temperature scale range, "━ ━ ━ ━ ━" will flash on PV display.

Pattern performance end

If the controller is left as it is after the control is terminated, the display will automatically return to Running program pattern selection.

Pattern ending signal cancellation

The signal is output when the pattern is finished.

Press the 《∨/STOP》 key to cancel the signal.

If the 《∧/RUN》 key is pressed to select running status, the pattern ending signal will automatically be cancelled as well.

PID auto-tuning setting

To set the PID auto-tuning, change the Function selecting switch (2) to SET side during the control when it is at the step PID auto-tuning is desired. Then, the Program setting initial display will be selected.

As to the setting method, see page 45 and 46.

Notes:
· Step time progress is interrupted during PID auto-tuning.
· PID auto-tuning should be carried out when the test running is performed.

Power failure backup during the control

Power failure	→	Running interrupted	→	Power restored	→	Automatically starts	→	Control performance
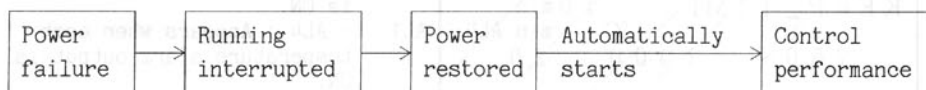
With the PC-700, when the power is interrupted for 30ms or more during running data backup will work with built-in lithium battery. After the power is restored, the control automatically starts and continues it.

In case the power failure time is less than 30ms, the control will be continued as it is.

Reverse advance function

Each time the 《《/ADV》 key is pressed while the 《 ENT 》 key is being pressed causes the step progress to the reverse.

10. When troubled

Problem	Instrument status	Faulty part presumption
Display does not appear	Multi-display does not appear (Does not start-up)	• Power is not applied to the instrument. Check power supply line. • Adjust the contrast (brightness) with the potentiometer. (See page 13) • Short-circuit on Thermocouple, compensation lead wire or RTD.
Setting is impossible	Setting items cannot be input	• Input key is abnormal. • Control circuit is abnormal.
Temperature rises too much	Process variable is indicated far above the setting value. (- - - -)	• Burnout or improper connection of Thermocouple, compensation lead wire or RTD. Check the wiring.
Temperature does not rise	Indicates the room temperature	• Improper electromagnetic valve, or the connection is wrong. • Heater burnout or improper connection. • Trouble on built-in relay circuit, or external auxiliary relay, or improper connection. Check the wiring.
	Process variable is indicated near the zero or (- - - -)	• Short-circuit or breakage on thermocouple or RTD. • Improper mounting (insertion) of thermocouple or RTD. Check the place. • Reverse polarity of thermocouple or compensating lead wire. Check the wiring. • Improper specification of RTD. Check the resistance value.
Unstable	Display and control are fluctuated	• Influence of inductive fault or noise. • AC leaks into RTD circuit. • Improper connection at terminal. Check the wiring.
Program control does not perform	Normal display	• Control circuit abnormal
Abnormal display	Normal control action	• Display control circuit abnormal
Each function does not work	Normal display	• Each function control circuit abnormal

◆ If it cannot be restored even above checking is performed or if unclear problem other than above mentioned is occurred, make inquiries at our agent about the matter.

◆ With this instrument, do not disassemble the instrument since it is composed with precise parts.

11. Standard specification

11.1 Model name: PC-700

Thermocouple input			RTD input			Alarm output
Relay output	Non-contact voltage output	Current output	Relay output	Non-contact voltage output	Current output	
PC-730-R/E	PC-730-S/E	PC-730-A/E	PC-730-R/R	PC-730-S/R	PC-730-A/R	None
PC-735-R/E	PC-735-S/E	PC-735-A/E	PC-735-R/R	PC-735-S/R	PC-735-A/R	4-output

DC current input			DC voltage input			Alarm output
Relay output	Non-contact voltage output	Current output	Relay output	Non-contact voltage output	Current output	
PC-730-R/A	PC-730-S/A	PC-730-A/A	PC-730-R/V	PC-730-S/V	PC-730-A/V	None
PC-735-R/A	PC-735-S/A	PC-735-A/A	PC-735-R/V	PC-735-S/V	PC-735-A/V	4-output

11.2 Rating

Rated scale

Input	Scale range		Resolution
K, J	0 to 400℃	0 to 800℉	1℃ (℉)
K	0 to 1200℃	0 to 2400℉	1℃ (℉)
R, S	0 to 1600℃	0 to 3200℉	1℃ (℉)
B	0 to 1800℃	0 to 3200℉	1℃ (℉)
Pt100 JPt100	0 to 150℃	0 to 300℉	1℃ (℉)
Pt100 JPt100	0 to 250℃	0 to 480℉	1℃ (℉)
Pt100	-100.0 to 400.0℃	-100.0 to 750.0℉	0.1℃ (℉)
0 to 1Vdc	0 to 100.0		0.1
4 to 20mAdc	0 to 100.0		0.1

Input   Thermocouple K, J, R, S and B (100Ω or less)
                 RTD   Pt100 (JIS'89), JPt100 (JIS'81)
                               3-wire system (resistance per wire 4Ω or less)
                 DC voltage   0 to 1Vdc
                 DC current   4 to 20mAdc

Supply voltage   110Vac, 115Vac, 220Vac or 230Vac (specified) 50/60Hz

11.3 General structure

External dimension   144×144×297mm (H×W×D)
Mounting method   Flush
Terminal arrangements See page 15

11.4 Indicating mechanism

- Display   : Full dot graphics LCD (Liquid crystal display) [160×128dots]
                       Back light with EL (Electroluminescent)
- Indicating contents : ● When running mode
  - Performing pattern number   • Performing step number
  - Temperature setting value (performing step start ⇨ end,
                                        present setting value)
  - Process variable (PV, sensor measuring temperature)
  - Step time (setting time and remaining time)
  - Time signal output of performing step   • Pattern graph
  - Status (Running, Holding, Fast progress, Control output
                and Alarm 1 to 4)
  ● When setting mode
  - Pattern number   • Step number   • Step time
  - Temperature setting value (step start ⇨ end)
  - PID block number   • Temperature alarm block number
  - Wait block number   • PID block setting value
  - Temperature alarm block setting value
  - Wait block setting value   • Proportional cycle
  - Sensor correction value
  (Options) • Instrument number   • SAVE/LOAD selection

11.5 Setting   : Ten-keys and Function keys using sheet key system

- Setting contents   : ● Program pattern setting
  - Pattern number   • Step number   • Step temperature
  - Step time   • PID block number   • Wait block number
  - Temperature alarm block number
  - Time signal
  ● Temperature alarm block setting (1 to 9 blocks)
      (not available for PC-730-[]/[])
  - High limit alarm   • Low limit alarm
  - Process value alarm 1   • Process value alarm 2
  ● PID block setting (1 to 9 blocks)
  - Proportional band   • Integral time
  - Derivative time   • Anti-reset windup (ARW)
  ● Wait block setting (1 to 9 blocks)
  ● Proportional cycle (common setting to all patterns)
  ● Sensor correction value
  (Options)
  ● Instrument number setting
  ● SAVE/LOAD selection
- Key-board   : See page 12

11.6 Indicating ability

- Temperature indicating accuracy: Within ±0.3% of full scale ±1 digit
                                    However, with the B type of input,
                                    unwarrantable for 0 to 300℃ (0 to 600℉)
- Time indicating accuracy   : Within ±0.1% of the indication

11.7 Program ability

- Program capacity   : 1200 steps max.
- Pattern number   : Maximum 99 (No.1 to 99)
- Step number   : Maximum 99 (No.1 to 99)/pattern
- Setting temperature : The same as the rated scale
                        (resolution: 1℃ or 0.1℃ [1℉ or 0.1℉])
- Setting time   : 0 to 999 minutes (resolution: 1 minute)
- Time signal output : 16 (PC-735-[]/[]) or 20 (PC-730-[]/[])

11.8 Control ability

- Temperature control accuracy : Within ±0.3% of full scale ±1 digit
- Temperature control action : PID action (with auto-tuning function)
  PID constant (Settable to each step in 9 blocks)
  Proportional band (P) 0.1 to 200.0%
    (on/off action when set to 0.0)
  Proportional cycle   1 to 120sec. (n/a for -A/□)
      (factory adjusted as 15sec. -R/□, 3sec. -S/□)
  Integral time   (I) 1 to 3600sec. (off when set to 0)
  Derivative time   (D) 1 to 1800sec. (off when set to 0)
  Anti-reset windup (ARW) 0 to 100%
  Wait value   ±(0.1 to 10.0%) of full scale
  Changeable   (off when set to 0)

- Temperature control output : ● (-R/□) Relay contact output 1c
      Contact capacity 220Vac 3A (resistive load)
                  1A (inductive load cos φ =0.4)
    ● (-S/□) Non-contact voltage (for SSR drive)
          15Vdc   (load resistance 1kΩ)
    ● (-A/□) DC current (isolated)
              4 to 20mAdc (load resistance 600Ω)

11.9 Alarm (In case of the type PC-730 [20 Time signals], this alarm is not available.)

- Temperature alarm setting : (A1) High limit alarm [deviation setting]
  (Settable to each pattern)   0 to rated scale maximum value (off when set to 0)
                  (A2) Low limit alarm [deviation setting]
                     0 to rated scale maximum value (off when set to 0)
                  (A3) Process value alarm 1
                     Rated scale minimum value to rated scale maximum value
                  (A4) Process value alarm 2
                     Rated scale minimum value to rated scale maximum value
- Temperature alarm output (Effective only to PC-735-□/□)
                  Open collector   24Vdc 75mA or less
                  Number of output   4 (A1, A2, A3 and A4)

11.10 Time signal

: Settable to each step
  Open collector   24Vdc 75mA or less
  Number of output   16 (PC-735-□/□)
              or 20 (PC-730-□/□)

11.11 Ending signal

: It outputs the signal when the pattern performance
  is ended.
  Open collector   24Vdc 75mA or less
  Number of output   1

11.12 Function selecting switch

- Function selecting switch (1) : PV start and Z(SV) start selection
- Function selecting switch (2) : Control mode and Setting mode selection

11.13 External operating function

Following functions can be operated by closing the contact or open collector.
- RUN/HOLD   OFF ⇨ ON   Starts the control.   ON ⇨ OFF   Holds the time progress.
- ADV   OFF ⇨ ON   Advances the control to the next step.
- FAST   During ON   Makes the time progress fast (60 times).
- STOP   OFF ⇨ ON   Stops the control.

① As for the timing of the external operating input
- RUN/HOLD input ..... It is processed by the level.
    ON : RUN processing
    OFF: HOLD processing

Within 1sec.   Within 1sec.   Within 1sec.

| Action | S T A N D B Y | Control start | HOLD processing | HOLD cancellation |

RUN/HOLD status   O F F   O N   O F F   O N

- ADV input .... It is processed at the edge ON rising.

Within 1sec.   Within 1sec.   Within 1sec.

| Action | R U N | Moves to the next step and controls. | Moves to the next step and controls. | Moves to the next step and controls. |

ADV input   O F F   ON   O F F   ON   O F F   ON   O F F
More than 1sec.
* More than 5sec.
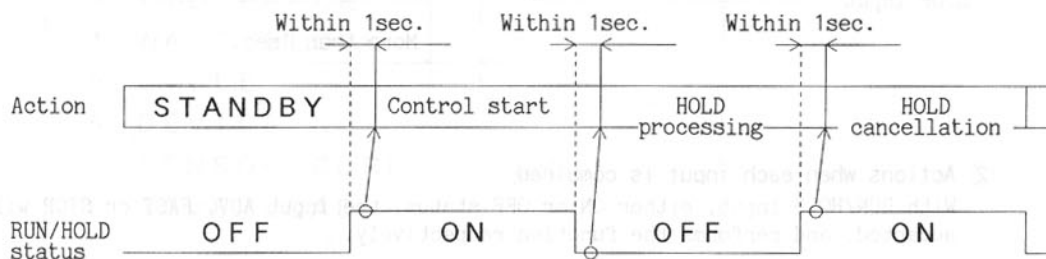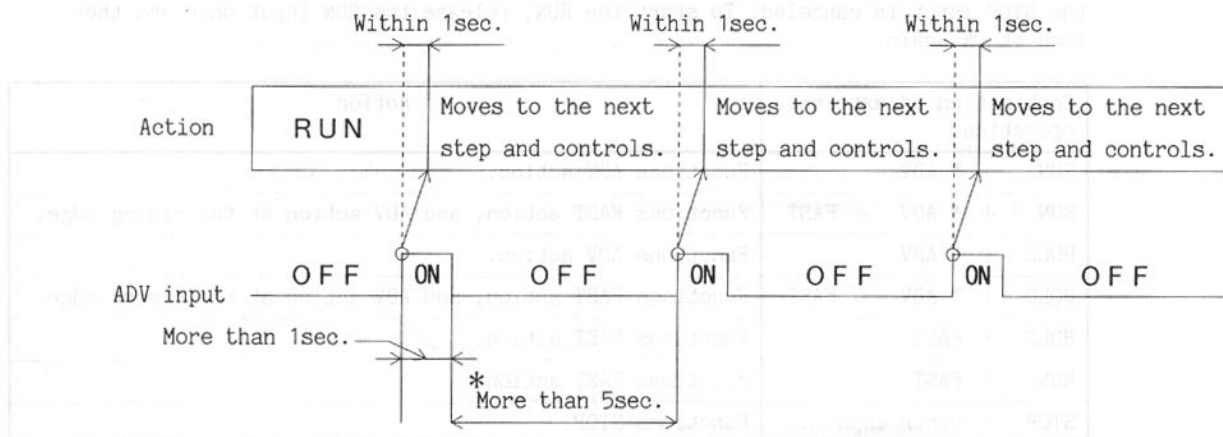
* Pulse separation of the ADV is required for 5 seconds as the minimum time since it is related to the drawing speed of the display.

- FAST input .... It is processed by the level.

ON : 60 times speed

OFF: Normal time progress   Within 1sec. Within 1sec. Within 1sec. Within 1sec.

| Action | NORMAL | 60 times of speed | NORMAL | 60 times of speed | NORMAL |

FAST input   O F F   O N   O F F   O N   O F F

• STOP input .... It is processed at the edge ON rising.

Within 1sec.

Action

R U N	S T A N D B Y

STOP input ——— O F F ——— | ON | ——— O F F ———

More than 1sec.
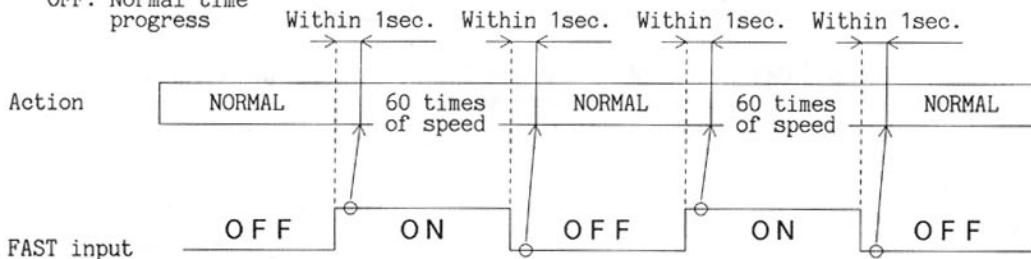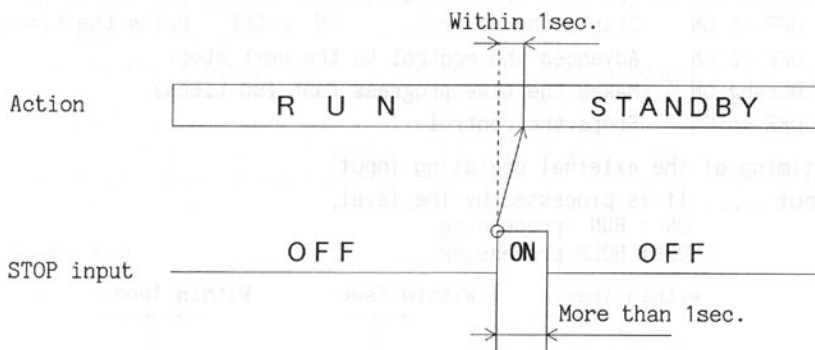
② Actions when each input is combined.

With RUN/HOLD input, either ON or OFF status, the input ADV, FAST or STOP will be accepted, and performs the function respectively.

The STOP input takes priority over all others.

In the RUN input status, if the STOP input is applied, RUN will not function even if the STOP input is canceled. To start the RUN, release the RUN input once and then turn it ON again.

Combination of external operation	Action
RUN + * ADV	Functions ADV action.
RUN + * ADV + FAST	Functions FAST action, and ADV action at the rising edge.
HOLD + * ADV	Functions ADV action.
HOLD + * ADV + FAST	Functions FAST action, and ADV action at the rising edge.
HOLD + FAST	Functions FAST action.
RUN + FAST	Functions FAST action.
STOP + Other input	Functions STOP.

* ADV input acts at the ON status edge.

Note: In the STANDBY status, ADV input, FAST input and STOP input are ineffective.

11.14 Sensor correction function (It corrects the sensor measuring value)
When the input is thermocouple or RTD, $\pm50.0°C$
When the input is DC voltage or current, ±50.0

11.15 Wait function
During the wait function, the performing step number blinks.

11.16 Insulation and Dielectric strength
- Insulation resistance : 10MΩ or greater at 500Vdc
- Dielectric strength :
Between input terminal and power terminal, ground terminal,   500Vac for 1 mim.
Between power terminal and ground terminal,   1.5kVac for 1 min.
Between output terminal and power terminal, ground terminal, 1.5kVac for 1 min. (R/[])
Between output terminal and power terminal, ground terminal, 500Vac for 1 min. (S/[]
and A/[])

11.17 Attached function
- Power failure compensation
In case the power failure time exceeds 30ms, the data are kept with lithium battery, and after the failure restored, the controller starts automatically.
[Life of lithium battery: Approx. 10 years at 20°C (68℉).]
- Self-diagnostic function
It watches the CPU by watchdog timer, and when occurred any abnormal status on the CPU, it makes the system to reset status making the all output off, and makes the indication to the program performance pattern selection initial display.
- Automatic cold junction temperature compensation (-[]/E)
It detects the temperature at the connecting terminal between thermocouple and instrument, and always makes it the same status at which the reference junction is located at 0°C[32℉].
- Reverse advance function
A function to make the step progress to the reverse. (Each time the 《 ADV 》 key is pressed while the 《 ENT 》 key is being pressed.)

11.18 Others
- Power consumption   : Approx. 15VA
- Voltage fluctuation : Within $\pm10\%$ of rated value
- Ambient temperature : 0 to 50°C (32 to 122℉)
- Ambient humidity   : 35 to 85%RH (Non-condensing)
- LCD back light life : Approx. 10000 hours
- Weight   : Approx. 4kg
- Accessories   : Mounting bracket   1 set
                         Instruction manual 1 copy

12. Optional specifications

Option	Code	Accessory	Description
Pattern number external selecting function	PTN	Exclusive cable 1 set	Converting the number to 2 digits of BCD code, it selects the operating number from inner memorized program pattern(1 to 99). [See p.60]

Communication function	C C4 C5	———	• Following operations can be performed from external computer.
			① Program pattern creation and change.
			② Reading of program pattern.
			③ Operations such as RUN, STOP, HOLD and ADV.
			④ Reading of control status.
			• Instrument number 0 to 95
			• Communication line:
			  EIA RS-232C (option: C)
			  EIA RS-422A (option: C4)
			  EIA RS-485 (option: C5)
			• Communication system: Half-duplex synchronous start-stop system
			• Data format:
			  Start bit : 1
			  Data bit : 7
			  Parity bit: Even parity
			  Stop bit : 1
			• Data transfer rate:
			  2400bps (300, 1200, 4800 and 9600bps)
			  [Changeable with Function selecting switch (1). See page 60.]

External memory function	DM	Memory-card 1 sheet	Using the memory-card, the program is stored in the outside of the controller, or copied to plural units of PC-700s. See page 40 to 44 for operating method. ∗ Battery life: 2 or 3 years at 25℃
Transmitting output function • Process variable transmission	PVTA PVTV		Process variable is transmitted in analog. 4 to 20mAdc, 1 to 5Vdc
• Setting value transmission	SVTA SVTV	———	Setting value is transmitted in analog. 4 to 20mAdc, 1 to 5Vdc

• Manipulating value transmission	MVTA MVTV		Manipulating value is transmitted in analog.
			4 to 20mAdc, 1 to 5Vdc
			∗ Current transmission
			    load resistance maximum 600Ω
			∗ Voltage transmission
			    load resistance minimum 1kΩ
			See page 16 for the connecting method.

Time unit	MS	———	0 to 99.9 min. (Resolution: 0.1 min.)

12.1 Pattern number external selection function (Option code: PTN)

Select the performing number (1 to 99) from the patterns stored in the instrument with 2 digits of BCD code using such as a BCD thumb wheel switch.

① Take the exclusive cable (attached) out

The D sub-connector pin of the exclusive cable is connected as follows.

[D sub-connector pin connection table]

Pin No.	Name	Lead Color	Abbr.	Pin No.	Name	Lead Color	Abbr.
1	BCD 10^0 -1	Brown	Br	9	STROB	White	Wh
2	BCD 10^0 -2	Red	Re	10	NC	——	
3	BCD 10^0 -4	Orange	Or	11	NC	——	
4	BCD 10^0 -8	Yellow	Ye	12	COM	Black	Bk
5	BCD 10^1 -1	Green	Gn	13	COM	Light gree	Lg
6	BCD 10^1 -2	Blue	Bu	14	COM	Pink	Pi
7	BCD 10^1 -4	Purple	Pu	15	NC	——	
8	BCD 10^1 -8	Gray	Gy				

② Connect the pared side of the exclusive cable.

Connect the BCD thumb wheel switch and push switch for strobed signal referring the figure mentioned below.

After connected, connect the connector of the exclusive cable to the pattern number selection input connector on the terminal board at the rear face of the case.

Pattern number selection input connector (15P D Sub-connector)

10^1 Digits
BCD Thumb wheel switch, etc.
[Real code type]

10^0 Digit

Push switch for
strobe signal
[Momentary type]
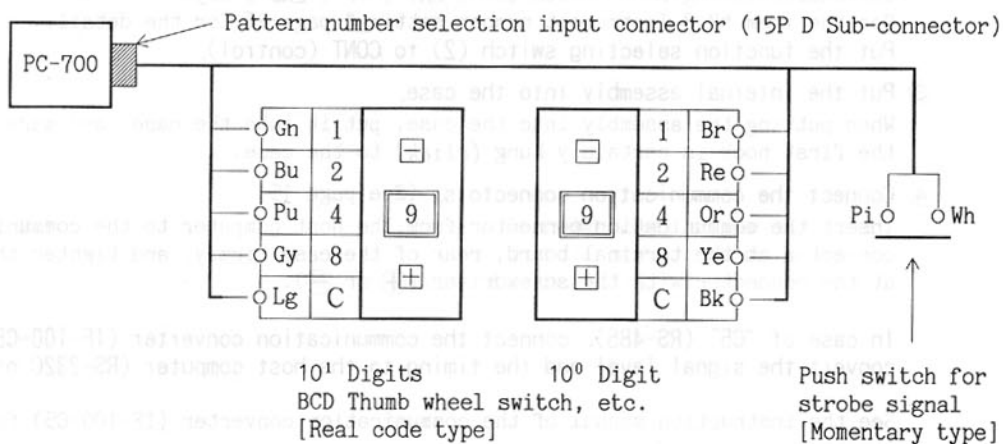
③ Select the pattern number and confirm it.

After the numeric value has been set with BCD thumb wheel switch and so on, pattern number will be selected at the falling edge of strobe signal (when released the push switch for strobe signal).

Pattern number must be selected when Initial display of program performing pattern selection is displayed (Standby status).

12.2 Communication function [Option code: C, C4 and C5]
1. Before using the Communication function
① Select the transfer rate (baud rate).

When the transfer rate of the host computer is 2400bps, it is not necessary to change the rate, advance to ②.
Select the transfer rate the same as the host computer. It can be selected by changing the function selecting switch (1) [2, 3 and 4] to any rate 1200, 2400, 4800 or 9600bps.
(Refer to "4.3 Explanations of Internal assembly function" page 13)
Factory adjusted as 2400bps. When using the communication function excepting 2400bps, select the rate by the procedure ①-1 and 2.

①-1 Draw the internal assembly out.

Swing open the front door to the left, and pull out the internal assembly by pushing down the first hook. Then it can be pulled out to the second hook.
Do not pull out internal assembly releasing the second hook.
See the item "2.3 Confirmation of specification" page 4 for the detail.

①-2 Set the function selecting switch (1) to meet desired transfer rate.

Set the switch referring the figures on "4.3 Explanations of Internal assembly function" page 13.

② Set the instrument number.

In case of "C" (RS-232C), it is not necessary to set the number, advance to ③ or ④.
Put the function selecting switch (2) to SET, and when the setting mode initial display is indicated, move the cursor to select [6. DEVICE NO] with the keys 《∧》 and 《∨》 .
Press the 《 ENT 》 key to select the instrument number setting display. Then set the number with the 《0》 to 《9》 keys. The setting range is 0 to 95.
The number is registered with the 《 ENT 》 or 《 END 》 key.
See the item "7.8 Instrument number setting" page 36 for the detail.
Put the function selecting switch (2) to CONT (control).

③ Put the internal assembly into the case.
When putting the assembly into the case, put it into the case, and make sure that the first hook is certainly hung *(click)* to the case.

④ Connect the communication connectors. (See page 15)
Insert the communication connector from the host computer to the communication connector at the terminal board, rear of the case firmly, and tighten the screws at the connector with the screwdriver (⊕ or ⊖).

In case of "C5" (RS-485), connect the communication converter (IF-100-C5) to convert the signal level and the timing to the host computer (RS-232C or RS-422A).

See the instruction manual of the communication converter (IF-100-C5) for the wiring.

2. General specification

(1) Communication system   Half-duplex
(2) Synchronous system   Start-stop
(3) Data transfer rate   2400bps (1200, 4800 and 9600bps switchable with dip switch)
(4) Code form   ASCII, JIS 7 bits code
(5) Error detection   Parity check, Checksum
(6) Error correction   Command request repeat system
(7) Data format

Start	b1	b2	b3	b4	b5	b6	b7	Parity	Stop
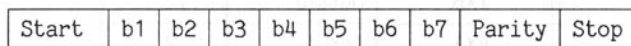
Start bit : 1
Data bit : 7
Parity bit: Even parity
Stop bit : 1

3. Interface specification

(1) RS-232C (Option code: C)

◆ Characteristic, Based on EIA RS-232C
◆ Connection

Signal	Abbreviation	Direction	Pin No.
Frame ground	FG	——	1
Transmit data	TXD	Output	2
Receive data	RXD	Input	3
Signal ground or Common return	SG	——	7

◆ Cable length, maximum 10m
◆ Adaptable connector and cable (below table or the equivalent)

Parts	Maker	Model
D sub-connector	Japan Aviation Electronics	DB-25PFT-N
Connector cover	Ind. Ltd.	DB-C2-J9
Cable	Onamba Co., Ltd.	OTSC-2PVB-7/0.32TA

◆ Connectable unit 1
◆ Connection method

```
(Host computer)                                    (PC-700)
         3                                    2
  RXD  o───┐                            ┌────o  TXD
         2 │                            │ 3
  TXD  o───┼─────         ─────────────┼────o  RXD
         7 │                            │ 7
  SG   o───┼─────         ─────────────┼────o  SG
         1 │                            │ 1
  FG   o   │      (Shielding wire)      │   o  FG
         4 │                            │
  RTS  o───┤                           ┷
         5 │
  CTS  o───┘
         6
  DSR  o───┐
        20 │
  DTR  o───┘
```
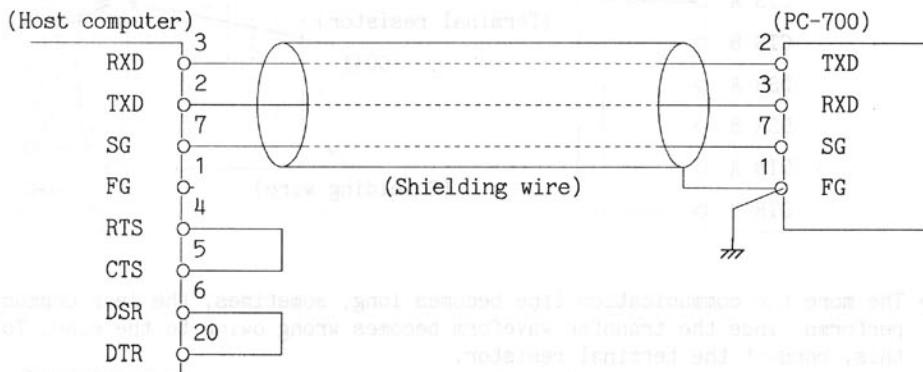
Note: Connect the shielding wire only one side to FG or ground terminal so as not
      to flow the current into the shielding wire. If both sides of the wire are
      connected to the FG or ground terminal, the circuit is made between the wire
      and ground, and the noise may easily occur by the current. The FG or ground
      terminal must be grounded.

(2) RS-422A (Option code: C4)

◆ Characteristic, Based on EIA RS-422A
◆ Connection

Signal	Abbreviation	Direction	Pin No.
Transmit data A	TXA	Output	11
Transmit data B	TXB	Output	12
Receive data A	RXA	Input	2
Receive data B	RXB	Input	3
Signal ground or Common return	SG	———	7

◆ Cable length, maximum 1km
◆ Adaptable connector and cable (below table or the equivalent)

Parts	Maker	Model
D sub-connector	Japan Aviation Electronics	DB-25PFT-N
Connector cover	Ind. Ltd.	DB-C2-J9
Cable	Onamba Co., Ltd.	OTSC-3PVB-7/0.32TA

◆ Connectable units 10
◆ Connection method
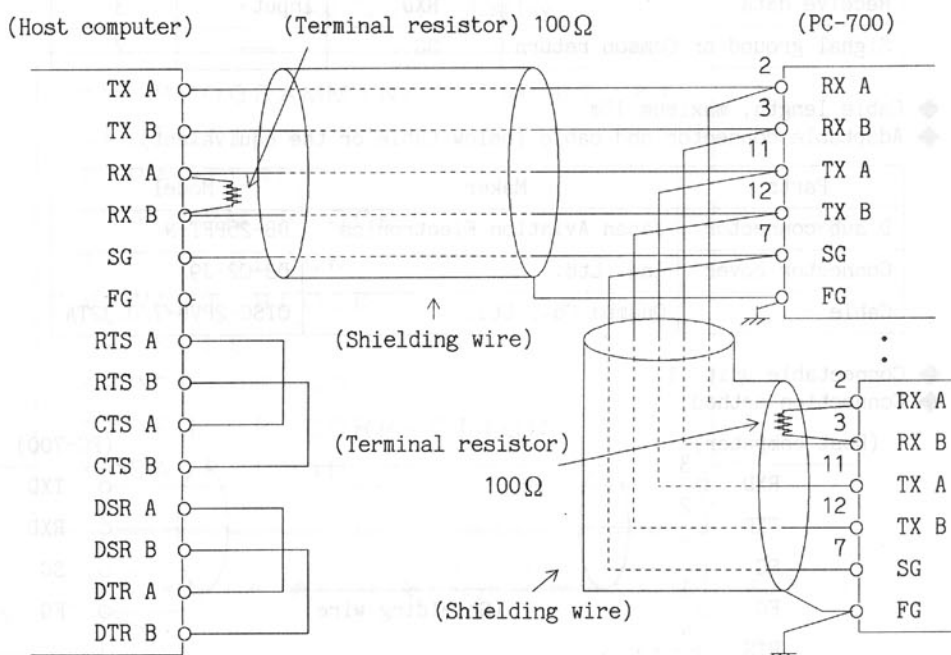
◆ The more the communication line becomes long, sometimes, the less communication performs since the transfer waveform becomes wrong owing to the echo. To prevent this, connect the terminal resistor.
The resistance value should be the same as the impedance of the communication cable (impedance matching). The place to connect should be the physical terminal of the communication cable.

(3) RS-485 (Option code: C5)

◆ Characteristic, Based on EIA RS-485
◆ Connection

Signal	Abbreviation	Direction	Pin No.
Inverted output	Y_A	Input, Output	2
Ainverted output	Y_B	Input, Output	3
Signal ground or Common return	SG	——	7

◆ Cable length, maximum 1km
◆ Adaptable connector and cable (below table or the equivalent)

Parts	Maker	Model
D sub-connector	Japan Aviation Electronics	DB-25PFT-N
Connector cover	Ind. Ltd.	DB-C2-J9
Cable	Onamba Co., Ltd.	OTSC-2PVB-7/0.32TA

◆ Connectable units 31
◆ Connection method
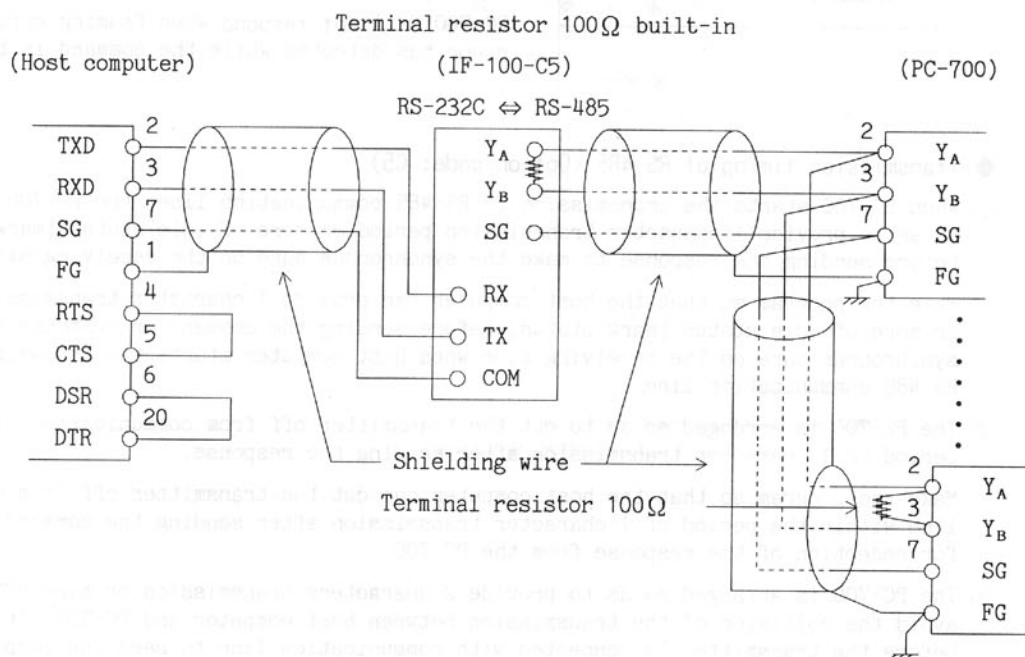
Terminal resistor 100Ω built-in

(Host computer)   (IF-100-C5)   (PC-700)

RS-232C ⇔ RS-485

◆ The more the communication line becomes long, sometimes, the less communication performs since the transfer waveform becomes wrong owing to the echo. To prevent this, connect the terminal resistor.

The resistance value should be the same as the impedance of the communication cable (impedance matching). The place to connect should be the physical terminal of the communication cable.

◆ Communication converter [IF-100-C5] is provided. Sold seperately. Require us.

4. Communication procedure

◆ [RS-232C (Option code: C), RS-422A (Option code: C4), RS-485 (Option code: C5)]
Communications between a host computer and the PC-700 are started by sending the command from the host computer, and terminated by receiving the response from the PC-700.

Host computer   PC-700

Command	→

Data ←

Command	→

Acknowledgement ←

Command	→

Negative acknowledgement ←

Command	→

× ←

- Response with data
  When host computer sends the reading command, PC-700 returns the corresponding **setting value or current status** as the response.

- Acknowledgement
  If the host computer sends the setting command, PC-700 will return **acknowledgement (ACK)** as the response after the processings are terminated.

- Negative acknowledgement
  When the host computer sends the command not existent or the value beyond settable range, PC-700 returns **negative acknowledgement (NAK)** for the response.

- No response
  PC-700 will **not respond** when framing error or checksum error has detected while the command is being received.

◆ Transmission timing of RS-485 (Option code: C5)

① When PC-700 starts the transmission to RS-485 communication line, the PC-700 is arranged so as to provide 1 character transmission period or more of idle status [mark status] before sending the response to make the synchronous sure on the receiving side.

Make the program so that the host computer can provide 1 character transmission period or more of idle status [mark status] before sending the command or response to make the synchronous sure on the receiving side when host computer starts the transmission to RS-485 communication line.

② The PC-700 is arranged so as to cut the transmitter off from communication line within the period of 1 character transmission after sending the response.

Make the program so that the host computer can cut the transmitter off from communication line within the period of 1 character transmission after sending the command in preparation for reception of the response from the PC-700.

③ The PC-700 is arranged so as to provide 2 characters transmission or more of period to avoid the collision of the transmission between host computer and PC-700. It is arranged before the transmitter is connected with communication line to send the response after the PC-700 received the command.

Make the program so that the host computer can provide 2 characters transmission or more of period to avoid the collision of the transmission between host computer and PC-700. It should be arranged before the transmitter is connected with communication line to send the next command after the host computer received the response.

- In case the host computer communicates with the PC-700 **through the line converter (IF-100)**, **it is not requested to manage the transmission timings** ①, ② and ③ since the IF-100 takes the timing interpreting the protocol automatically. (See RS-485 connection page 63)

◆ Transmission timing of RS-422A (Option code: C4)

① If this option is applied, PC-700 can be connected with the type multidrop using the communication line based on RS-422A standard. (See RS-422A connection, page 66)

② Host computer receiving line is in high impedance status excepting the period when it is receiving the response from PC-700.

③ When the PC-700 sends the response to the command from the host computer, the idle status [mark status] (period of 1 character transmission or more) is arranged before sending the response to make the synchronous sure on the host computer.

④ PC-700 will cut the transmitter off from communication line within the period of 1 character transmission after sending the response.

5. Command structure

6.1 Basic structure

① Command   (   ): Hexadecimal

Header	Instrument number	Command code	Data	Checksum	Delimiter

Header   : STX (02H)
                      Start of text.
                      Control code to represent the beginning of the command (text).

Instrument number: 0 to 95 (00 to 5FH)
                    Instrument number of the PC-700 observed from the host computer.
                    The number 0 to 95 (00 to 5FH) is used giving 20H of bias since
                    00 to 1FH is used as the control code.

                    [Example] In case the instrument number is 1, 21H (01H + 20H)
                              In case the instrument number is 95, 7FH (5FH + 20H)

Command code   : The code to discriminate the command (setting, reading and operation).
Data   : The contents differ from the command (setting, reading and operation).
Checksum   : 2-digit of data to detect the error.
                      See the next page for the calculation.
Delimiter   : ETX (03H)
                      End of text.
                      Control code to represent the ending of the command (text).

② Response

◆ Acknowledgement   (   ): Hexadecimal

Header	Instrument number	Checksum	Delimiter

Header   : ACK (06H)
Instrument number: (40H) fixed
Checksum   : 2-digit
Delimiter   : ETX (03H)

◆ Negative acknowledgement   ( ): Hexadecimal

Header	Instrument number	Error code	Checksum	Delimiter

Header   : NAK (15H)
Instrument number: (40H) fixed
Error code   : 1-digit
                     1 (31H) When it is the command not existent.
                     2 (32H) When designated wrong pattern, step or block.
                     3 (33H) When the setting beyond the settable range.
                     4 (34H) When the status is not settable [auto-tuning].
                     5 (35H) During the setting mode by key operation.
Checksum   : 2-digit
Delimiter   : ETX (03H)

◆ Response with data   ( ): Hexadecimal

Header	Instrument number	Command code	Data	Checksum	Delimiter

Header   : ACK (06H)
Instrument number: (40H) fixed
Command code   : Discriminating code of the command.
Data   : The contents differ from the command.
Checksum   : 2-digit
Delimiter   : ETX (03H)

◆ Checksum calculation
   Checksum is used to detect the receiving error of the command or data. Make the program
   for the host computer side as well to calculate the checksum of the response data from
   the PC-700 to confirm the communication error.

   The Checksum is 2's complement of the total value (low byte) from the instrument number
   to the character front of the checksum, and it is indicated with 2 digits of Hex-ASCII
   characters. Calculation example is shown as follows.

```
        Calculation range of the checksum
       |←──────────────────────────────────────────→|

  STX   "    $    0    0    3    0              ETX     ASCII character expression
   ↓    ↓    ↓    ↓    ↓    ↓    ↓               ↓
  02H  22H  24H  30H  30H  33H  30H             03H     ASCII code expression
```

   [Hexadecimal] [Binary notation]

```
      22H        0010  0010                  Checksum
      24H        0010  0100
      30H        0011  0000
      30H        0011  0000
      33H        0011  0011
   +  30H        0011  0000
   ───────────────────────────
      109H   1   0000  1001     ──────→   1111  0110   (1's complements)
                                        +            1
                                        ───────────────
                                          1111  0111   (2's complements)
                                           ↓     ↓
                                           F     7      (Hexadecimal)
                                           ↓     ↓
                                          46H   37H     (ASCII code)
```

· 1's complements:
    Make each bit of binary reverse.
· 2's complements:
    Add 1 to the 1's complements.

[Code to be transmitted]

02H	22H	24H	30H	30H	33H	30H	46H	37H	03H

◆ Notice when input the command

- All commands are composed with ASCII (JIS, 7-bit) codes.
- As to the sign, when Minus: Make the sign digit as " − ".
  when Plus : Make the sign digit as " " (space [20H]) or " + ".
- Numerical value is accepted either "0" or " " (space [20H]).
  [Example] In case of 50 (4-digit), it can be either "0050" or " 50".
- With the data applied the decimal point, input the data ignoring the decimal point.
  [Example] In case of 20.0 (4-digit), it is "0200".
- If power failure has occurred during communication, the data cannot be guaranteed.

(2) Setting command

◆ Registration and correction of the program pattern

① Registration of PID block setting
  - Command code: 20H
  - Data　　　　: Block number　　　　　　　　　　　　1-digit (1 to 9)
    　　　　　　 Proportional band (P)　setting value　4-digit
    　　　　　　 Integral time　　(I)　setting value　4-digit
    　　　　　　 Derivative time　(D)　setting value　4-digit
    　　　　　　 Anti-reset windup (ARW) setting value　4-digit

STX(02H)	Instrument number	Command code	Block number	Proportional band

Integral time	Derivative time	ARW setting value

Checksum	ETX(03H)

- Command example

  * When setting Instrument number: 2, Block number: 2, Proportional band: 2.5%,
    Integral time: 200sec., Derivative time: 50sec., ARW setting value: 50%.

STX(02H)	22H	20H	32H	30H	30H	32H	35H	30H	32H	30H	30H
	30H	30H	35H	30H	30H	30H	35H	30H	37H	39H	ETX(03H)

- Response data

ACK(06H)	40H	43H	30H	ETX(03H)

　43H　30H: C 0 : Checksum

In case the command is not existent or beyond the settable range.

NAK(15H)	40H	Error code	Checksum	ETX(03H)

See page 66 for the error code [1 to 5].

② Registration of alarm block setting

- Command code: 21H
- Data   : Block number   1-digit (1 to 9)
               A1 setting value   Sign 1-digit + 4-digit
               A2 setting value   Sign 1-digit + 4-digit
               A3 setting value   Sign 1-digit + 4-digit
               A4 setting value   Sign 1-digit + 4-digit

STX(02H)	Instrument number	Command code	Block number	Sign	A1 setting value

Sign	A2 setting value	Sign	A3 setting value	Sign

A4 setting value	Checksum	ETX(03H)

- Command example

  * When setting Instrument number: 2, Block number: 2, A1 setting value: 10℃,
    A2 setting value: −5℃, A3 setting value: 505℃, A4 setting value: 510℃

02H	22H	21H	32H	20H	30H	30H	31H	30H	2DH	30H	30H	30H	35H

20H	30H	35H	30H	35H	20H	30H	35H	31H	30H	45H	38H	03H

- Response data

06H	40H	43H	30H	03H

In case the command is not existent or beyond the settable range.

15H	40H	Error code	Checksum	03H

See page 66 for the error code [1 to 5].

③ Designation of program length

- Command code: 22H

- Data   : Pattern number   2-digit (1 to 99)
                   Number of steps   2-digit (0 to 99)

             If the number of steps is designated as 0 or space, the program
             of the pattern can be erased.

STX(02H)	Instrument number	Command code	Pattern number	Number of steps

	Checksum	ETX(03H)

- Command example

    * When designating Instrument number: 2, Block number: 2, Pattern number: 99,
      Number of steps: 5.

02H	22H	22H	39H	39H	30H	35H	45H	35H	03H

    * When erasing the program on the pattern number 99.

02H	22H	22H	39H	39H	30H	30H	45H	41H	03H

- Response data

06H	40H	43H	30H	03H

In case the command is not existent or beyond the settable range.

15H	40H	Error code	Checksum	03H

See page 66 for the error code [1 to 5].

④ Registration of step setting value
   This command cannot be performed if ③ Program length is not designated.

- Command code: 23H
- Data　　　　:

Pattern number	2-digit	(1 to 99)
Step number	2-digit	(1 to 99)
Step starting temperature	sign 1-digit + 4-digit	
Step ending temperature	sign 1-digit + 4-digit	
Step time	4-digit	
PID block number	1-digit	
Alarm block number	1-digit	
Wait block number	1-digit	
Time signal 1	1-digit, ON: "1", OFF: "0"	
Time signal 2	1-digit, ON: "1", OFF: "0"	
Time signal 3	1-digit, ON: "1", OFF: "0"	
Time signal 4	1-digit, ON: "1", OFF: "0"	
Time signal 5	1-digit, ON: "1", OFF: "0"	
Time signal 6	1-digit, ON: "1", OFF: "0"	
Time signal 7	1-digit, ON: "1", OFF: "0"	
Time signal 8	1-digit, ON: "1", OFF: "0"	
Time signal 9	1-digit, ON: "1", OFF: "0"	
Time signal 10	1-digit, ON: "1", OFF: "0"	
Time signal 11	1-digit, ON: "1", OFF: "0"	
Time signal 12	1-digit, ON: "1", OFF: "0"	
Time signal 13	1-digit, ON: "1", OFF: "0"	
Time signal 14	1-digit, ON: "1", OFF: "0"	
Time signal 15	1-digit, ON: "1", OFF: "0"	
Time signal 16	1-digit, ON: "1", OFF: "0"	
Time signal 17 *	1-digit, ON: "1", OFF: "0"	
Time signal 18 *	1-digit, ON: "1", OFF: "0"	
Time signal 19 *	1-digit, ON: "1", OFF: "0"	
Time signal 20 *	1-digit, ON: "1", OFF: "0"	

* With the type PC-735, "0" is fixed for the Time signal 17 to 20.

STX	Instrument number	Command code	Pattern number	Step number	Sign

Step starting temperature	Sign	Step ending temperature	Step

time	PID block number	Alarm block number	Wait block number

Time signal 1	Time signal 2	T. S. 3	T. S. 4	T. S. 5	T. S. 6

T. S. 7	T. S. 8	T. S. 9	T. S. 10	T. S. 11	T. S. 12	T. S. 13

T. S. 14	T. S. 15	T. S. 16	T. S. 17	T. S. 18	T. S. 19	T. S. 20

Checksum	ETX

● Command example

* When designating Instrument number: 2, Pattern number: 99, Step number: 1,
  Step starting temperature: 0℃, Step ending temperature: 500℃,
  Step time: 30min., PID block number: 3, Alarm block number: 1,
  Wait block number: 2, Time signal ON (1, 4, 16 and 18).

02H	22H	23H	39H	39H	30H	31H	20H	30H	30H	30H	30H	20H

	30H	35H	30H	30H	30H	30H	33H	30H	33H	31H	32H	31H

	30H	30H	31H	30H	30H	30H	30H	30H	30H	30H	30H	30H

	30H	30H	31H	30H	31H	30H	30H	30H	36H	03H

● Response data

06H	40H	43H	30H	03H

In case the command is not existent or beyond the settable range.

15H	40H	Error code	Checksum	03H

See page 66 for the error code [1 to 5].

⑤ Registration of proportional cycle

● Command code: 24H
● Data   : Proportional cycle setting value   4-digit

STX	Instrument number	Command code	Proportional cycle	Checksum	ETX

● Command example

* When setting Instrument number: 2, Proportional cycle 30sec.

02H	22H	24H	30H	30H	33H	30H	46H	37H	03H

● Response data

06H	40H	43H	30H	03H

In case the command is not existent or beyond the settable range.

15H	40H	Error code	Checksum	03H

See page 66 for the error code [1 to 5].
With the type DC current output (-A/□), it returns the error code [3].

⑥ Pattern designation (Performing pattern)

- Command code: 25H
- Data　　　　: Pattern number　　2-digit

STX	Instrument number	Command code	Pattern number	Checksum	ETX

- Command example
  * When designating Instrument number: 2, Pattern number: 99.

02H	22H	25H	39H	39H	34H	37H	03H

- Response data

06H	40H	43H	30H	03H

In case the command is not existent or beyond the settable range.

15H	40H	Error code	Checksum	03H

See page 66 for the error code [1 to 5].

⑦ Control performance (Running)

- Command code: 26H
- Data　　　　: None

STX	Instrument number	Command code	Checksum	ETX

- Command example
  * When designating Instrument number: 2, and performed with the program designated by ⑥ Pattern designation.

02H	22H	26H	42H	38H	03H

- Response data

06H	40H	43H	30H	03H

In case the command is not existent.

15H	40H	Error code	Checksum	03H

See page 66 for the error code [1 to 5].

⑧ Stop performance
- Command code: 27H
- Data　　　: None

STX	Instrument number	Command code	Checksum	ETX

- Command example
  * When designating Instrument number: 2, and stopping the program running.

02H	22H	27H	42H	37H	03H

- Response data

06H	40H	43H	30H	03H

In case the command is not existent.

15H	40H	Error code	Checksum	03H

See page 66 for the error code [1 to 5].

⑨ Advance performance
- Command code: 28H
- Data　　　: None

STX	Instrument number	Command code	Checksum	ETX

- Command example
  * When designating Instrument number: 2, and advancing the program running.

02H	22H	28H	42H	36H	03H

- Response data

06H	40H	43H	30H	03H

In case the command is not existent.

15H	40H	Error code	Checksum	03H

See page 66 for the error code [1 to 5].

⑩ Hold performance
- Command code: 29H
- Data : None

STX	Instrument number	Command code	Checksum	ETX

- Command example
  * When designating Instrument number: 2, and holding the program running.

02H	22H	29H	42H	35H	03H

- Response data

06H	40H	43H	30H	03H

In case the command is not existent.

15H	40H	Error code	Checksum	03H

See page 66 for the error code [1 to 5].

⑪ Auto-tuning designation
- Command code: 2AH
- Data : None

STX	Instrument number	Command code	Checksum	ETX

- Command example
  * When designating Instrument number: 2, and performing the auto-tuning by the program running.

02H	22H	2AH	42H	34H	03H

- Response data

06H	40H	43H	30H	03H

In case the command is not existent.

15H	40H	Error code	Checksum	03H

See page 66 for the error code [1 to 5].

⑫ Registration of wait block setting
- ● Command code: 32H
- ● Data   : Block number   1-digit (1 to 9)
                    Wait setting value   3-digit

STX	Instrument number	Command code	Block number	Wait setting value

Checksum	ETX

- ● Command example
    * When designating Instrument number: 2, Block number: 2, Wait setting value: 10.0%.

02H	22H	32H	32H	31H	30H	30H	45H	39H	03H

- ● Response data

06H	40H	43H	30H	03H

In case the command is not existent or beyond the settable range.

15H	40H	Error code	Checksum	03H

See page 66 for the error code [1 to 5].

(3) Reading command

① Reading of PID block

- Command code: 2BH
- Data   : Block number   1-digit (1 to 9)

STX	Instrument number	Command code	Block number	Checksum	ETX

- Response data
  * When deciphered the command code.

Block number	1-digit (1 to 9)
Proportional band (P) setting value	4-digit
Integral time (I) setting value	4-digit
Derivative time (D) setting value	4-digit
Anti-reset windup (ARW) setting value	4-digit

ACK(06H)	40H	Command code	Block number	Proportional band

Integral time	Derivative time	ARW setting value

Checksum	ETX(03H)

In case the command is not existent or beyond the settable range.

15H	40H	Error code	Checksum	03H

See page 66 for the error code [1 to 5].

- Command example
  When reading instrument number 2, PID block number 2.

02H	22H	2BH	32H	38H	31H	03H

- Response data

06H	40H	2BH	32H	20H	20H	32H	35H	20H	32H	30H

30H	20H	20H	35H	30H	20H	20H	35H	30H	43H

30H	03H

Block number	2
Proportional band (P) setting value	2.5
Integral time (I) setting value	200
Derivative time (D) setting value	50
Anti-reset windup (ARW) setting value	50

② Reading of alarm block
- Command code: 2CH
- Data   : Block number   1-digit (1 to 9)

STX	Instrument number	Command code	Block number	Checksum	ETX

- Response data
  * When deciphered the command code.

Block number	1-digit (1 to 9)
A1 setting value	Sign 1-digit + 4-digit
A2 setting value	Sign 1-digit + 4-digit
A3 setting value	Sign 1-digit + 4-digit
A4 setting value	Sign 1-digit + 4-digit

ACK(06H)	40H	Command code	Block number	Sign	AI setting value

	Sign	A2 setting value	Sign	A3 setting value

	Sign	A4 setting value	Checksum	ETX(03H)

In case the command is not existent or beyond the settable range.

15H	40H	Error code	Checksum	03H

See page 66 for the error code [1 to 5].

- Command example
When reading instrument number 2, Alarm block number 2.

02H	22H	2CH	32H	38H	30H	03H

- Response data

06H	40H	2CH	32H	20H	20H	20H	31H	30H	2DH	20H

20H	20H	35H	20H	20H	35H	30H	35H	20H	20H

35H	31H	30H	32H	46H	03H

Block number 2
A1 setting value ... 10
A2 setting value ... 5
A3 setting value ... 505
A4 setting value ... 510

③ Reading of program length
- Command code: 2DH
- Data   : Pattern number   2-digit (1 to 99)

STX(02H)	Instrument number	Command code	Pattern number	Checksum	ETX(03H)

- Response data
  * When deciphered the command code

    Pattern number   2-digit (1 to 99)
    Number of steps   2-digit (0 to 99)

ACK(06H)	40H	Command code	Pattern number	Number of steps	Checksum	ETX(03H)

In case the command is not existent or beyond the settable range.

15H	40H	Error code	Checksum	03H

  See page 66 for the error code [1 to 5].

- Command example
  * When reading the program length of Instrument number: 2, Pattern number: 99

02H	22H	2DH	39H	39H	33H	46H	03H

- Response data

06H	40H	2DH	39H	39H	20H	35H	43H	43H	03H

  Pattern number: 99
  Step number   : 5

④ Reading of step setting value
- Command code: 2EH
- Data   : Pattern number   2-digit (1 to 99)
                  Step number   2-digit (1 to 99)

STX(02H)	Instrument number	Command code	Pattern number	Step number

Checksum	ETX(03H)

- Response data
  * When deciphered the command code

Pattern number	2-digit (1 to 99)
Step number	2-digit (1 to 99)
Step starting temperature	sign 1-digit + 4-digit
Step ending temperature	sign 1-digit + 4-digit
Step time	4-digit
PID block number	1-digit
Alarm block number	1-digit
Wait block number	1-digit
Time signal 1	1-digit, ON: "1", OFF: "0"
Time signal 2	1-digit, ON: "1", OFF: "0"
Time signal 3	1-digit, ON: "1", OFF: "0"
Time signal 4	1-digit, ON: "1", OFF: "0"
Time signal 5	1-digit, ON: "1", OFF: "0"
Time signal 6	1-digit, ON: "1", OFF: "0"
Time signal 7	1-digit, ON: "1", OFF: "0"
Time signal 8	1-digit, ON: "1", OFF: "0"
Time signal 9	1-digit, ON: "1", OFF: "0"
Time signal 10	1-digit, ON: "1", OFF: "0"
Time signal 11	1-digit, ON: "1", OFF: "0"
Time signal 12	1-digit, ON: "1", OFF: "0"
Time signal 13	1-digit, ON: "1", OFF: "0"
Time signal 14	1-digit, ON: "1", OFF: "0"
Time signal 15	1-digit, ON: "1", OFF: "0"
Time signal 16	1-digit, ON: "1", OFF: "0"
Time signal 17 *	1-digit, ON: "1", OFF: "0"
Time signal 18 *	1-digit, ON: "1", OFF: "0"
Time signal 19 *	1-digit, ON: "1", OFF: "0"
Time signal 20 *	1-digit, ON: "1", OFF: "0"

* With the type PC-735, "0" is fixed for the Time signal 17 to 20.

ACK (06H)	40H	Command code	Pattern number	Step number	Sign

Step starting temperature		Sign	Step ending temperature		Step

time		PID block number	Alarm block number	Wait block number

Time signal 1	Time signal 2	T. S. 3	T. S. 4	T. S. 5	T. S. 6

T. S. 7	T. S. 8	T. S. 9	T. S. 10	T. S. 11	T. S. 12	T. S. 13

T. S. 14	T. S. 15	T. S. 16	T. S. 17	T. S. 18	T. S. 19	T. S. 20

Checksum	ETX (03H)

In case the command is not existent or beyond the settable range.

15H	40H	Error code	Checksum	03H

See page 66 for the error code [1 to 5].

● Command example
   * When reading Instrument number: 2, Pattern number: 99, Step number: 1

02H	22H	2EH	39H	39H	30H	31H	44H	44H	03H

● Response data

06H	40H	2EH	39H	39H	30H	31H	20H	20H	20H	20H	30H	20H

	20H	35H	30H	30H	20H	20H	33H	30H	33H	31H	32H	31H

	30H	30H	31H	30H	30H	30H	30H	30H	30H	30H	30H	30H

	30H	30H	31H	30H	31H	30H	30H	33H	44H	03H

Pattern number	99	Time signal 3	0 (OFF)	Time signal 13	0 (OFF)
Step number	1	Time signal 4	1 (ON)	Time signal 14	0 (OFF)
Step starting temperature	0	Time signal 5	0 (OFF)	Time signal 15	0 (OFF)
Step ending temperature	500	Time signal 6	0 (OFF)	Time signal 16	1 (ON)
Step time	30	Time signal 7	0 (OFF)	Time signal 17	0 (OFF)
PID block number	3	Time signal 8	0 (OFF)	Time signal 18	1 (ON)
Alarm block number	1	Time signal 9	0 (OFF)	Time signal 19	0 (OFF)
Wait block number	2	Time signal 10	0 (OFF)	Time signal 20	0 (OFF)
Time signal 1	1 (ON)	Time signal 11	0 (OFF)		
Time signal 2	0 (OFF)	Time signal 12	0 (OFF)		

⑤ Reading of proportional cycle

- Command code: 2FH
- Data : None

STX(02H)	Instrument number	Command code	Checksum	ETX(03H)

- Response data
  * When deciphered the command code

               Proportional cycle setting value   4-digit

ACK(06H)	40H	Command code	Proportional cycle setting value	Checksum	ETX(03H)

In case the command is not existent or beyond the settable range.

15H	40H	Error code	Checksum	03H

     See page 66 for the error code [1 to 5].

- Command example

02H	22H	2DH	39H	39H	33H	46H	03H

- Response data

06H	40H	2DH	39H	39H	20H	35H	43H	43H	03H

       Proportional cycle setting value ... 30

⑥ Reading of the status 1

- Command code: 30H
- Data : None

STX(02H)	Instrument number	Command code	Checksum	ETX(03H)

- Response data
  * When deciphered the command code

Process temperature	sign 1-digit + 4-digit
Temperature control output status	4-digit (0 to 100%)
A1 output status	1-digit, ON: "1", OFF: "0"
A2 output status	1-digit, ON: "1", OFF: "0"
A3 output status	1-digit, ON: "1", OFF: "0"
A4 output status	1-digit, ON: "1", OFF: "0"
Time signal 1	1-digit, ON: "1", OFF: "0"
Time signal 2	1-digit, ON: "1", OFF: "0"
Time signal 3	1-digit, ON: "1", OFF: "0"
Time signal 4	1-digit, ON: "1", OFF: "0"
Time signal 5	1-digit, ON: "1", OFF: "0"
Time signal 6	1-digit, ON: "1", OFF: "0"
Time signal 7	1-digit, ON: "1", OFF: "0"
Time signal 8	1-digit, ON: "1", OFF: "0"
Time signal 9	1-digit, ON: "1", OFF: "0"
Time signal 10	1-digit, ON: "1", OFF: "0"
Time signal 11	1-digit, ON: "1", OFF: "0"
Time signal 12	1-digit, ON: "1", OFF: "0"
Time signal 13	1-digit, ON: "1", OFF: "0"
Time signal 14	1-digit, ON: "1", OFF: "0"
Time signal 15	1-digit, ON: "1", OFF: "0"
Time signal 16	1-digit, ON: "1", OFF: "0"
Time signal 17 *	1-digit, ON: "1", OFF: "0"
Time signal 18 *	1-digit, ON: "1", OFF: "0"
Time signal 19 *	1-digit, ON: "1", OFF: "0"
Time signal 20 *	1-digit, ON: "1", OFF: "0"

* With the type PC-735, "0" is fixed for the Time signal 17 to 20.

ACK (06H)	40H	Command code	Sign	Process temperature	Temperature control output

status	A1 output status	A2 output status	A3 output status	A4 output status

Time signal 1	Time signal 2	T. S. 3	T. S. 4	T. S. 5	T. S. 6	T. S. 7

T. S. 8	T. S. 9	T. S. 10	T. S. 11	T. S. 12	T. S. 13	T. S. 14	T. S. 15

T. S. 16	T. S. 17	T. S. 18	T. S. 19	T. S. 20	Checksum	ETX (03H)

In case the command is not existent.

15H	40H	Error code	Checksum	03H

See page 66 for the error code [1 to 5].

● Command example

02H	22H	30H	41H	45H	03H

● Response data

06H	40H	30H	20H	20H	20H	33H	32H	20H	31H	30H	30H	30H	30H	31H

31H	31H	30H	30H	31H	30H	30H	30H	30H	30H	30H	30H	30H	30H

30H	30H	31H	30H	31H	30H	30H	39H	35H	03H

Process temperature ... 32	Time signal 3 .... 0 (OFF)	Time signal 12 ... 0 (OFF)
Temperature control	Time signal 4 .... 1 (ON)	Time signal 13 ... 0 (OFF)
output status 100	Time signal 5 .... 0 (OFF)	Time signal 14 ... 0 (OFF)
A1 output status 0	Time signal 6 .... 0 (OFF)	Time signal 15 ... 0 (OFF)
A2 output status 0	Time signal 7 .... 0 (OFF)	Time signal 16 ... 1 (ON)
A3 output status 1	Time signal 8 .... 0 (OFF)	Time signal 17 ... 0 (OFF)
A4 output status 1	Time signal 9 .... 0 (OFF)	Time signal 18 ... 1 (ON)
Time signal 1 .... 1 (ON)	Time signal 10 ... 0 (OFF)	Time signal 19 ... 0 (OFF)
Time signal 2 .... 0 (OFF)	Time signal 11 ... 0 (OFF)	Time signal 20 ... 0 (OFF)

⑦ **Reading of the status 2**
  ● Command code: 31H
  ● Data   : None

STX(02H)	Instrument number	Command code	Checksum	ETX(03H)

● Response data
  * When deciphered the command code

Pattern number	2-digit
Step number	2-digit
Remaining time	4-digit
Present setting value	Sign 1-digit + 4-digit
Performance/Standby	1-digit 0: Standby
	1: Performance
Holding	1-digit 0: Not holding
	1: Holding
Auto-tuning	1-digit 0: Not auto-tuning
	1: Auto-tuning

ACK (06H)	40H	Command code	Pattern number	Step number	Remaining time

Sign	Present setting value	Performance/Standby	Holding	Auto-tuning	Checksum

ETX (03H)

In case the command is not existent.

15H	40H	Error code	Checksum	03H

See page 66 for the error code [1 to 5].

● Command example

02H	22H	31H	41H	44H	03H

● Response data

06H	40H	31H	39H	39H	20H	31H	20H	20H	31H	33H	20H	20H	32H	38H

36H	31H	30H	30H	42H	37H	03H

Pattern number 99   Performance/Standby ... 1 (Performance)
Step number 1   Holding .... 0 (Not holding)
Remaining time 13   Auto-tuning .... 0 (Not auto-tuning)
Present setting value ... 286

⑧ **Reading of wait block**
  ● Command code: 33H
  ● Data   : Block number 1-digit (1 to 9)

STX(02H)	Instrument number	Command code	Block number	Checksum	ETX(03H)

● Response data
  * When deciphered the command code
            Block number   1-digit (1 to 9)
            Wait setting value   3-digit

ACK(06H)	40H	Command code	Block number	Wait setting value	Checksum	ETX(03H)

In case the command is not existent or beyond the settable range.

15H	40H	Error code	Checksum	03H

    See page 66 for the error code [1 to 5].

● Command example
  When reading the setting value of instrument number 2, block number 2.

02H	22H	33H	32H	37H	39H	03H

● Response data

06H	40H	33H	32H	31H	30H	30H	43H	41H	03H

              Block number 2
              Wait setting value ... 100

12.3 Communication sample program

After the wiring connection is completed,

1. Input the program

Start the GW-BASIC and input the Communication sample program described to the next page. When the program input is finished, preserve the program as "SAMPLE 1A. BAS".

2. Run the Sample program

Input as RUN.
Line [-------------] will be indicated. Then the preparation to exchange the data is completed. Transmitting data is displayed over the line, and receiving data under.

Example 1. When executing the PID block setting command.

When setting the values: Instrument number 2, Block number 2, Proportional band 2.5%, Integral time 200sec., Derivative time 50sec. and ARW value 50%.
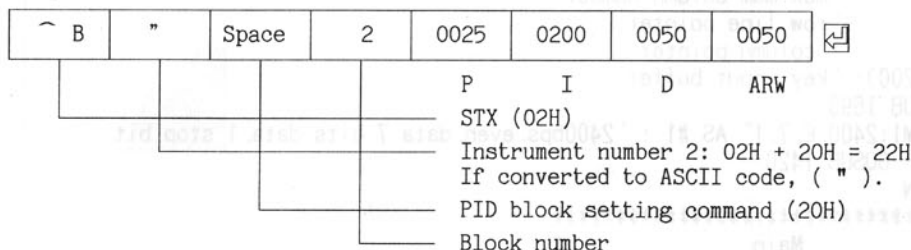
⌒ B	"	Space	2	0025	0200	0050	0050	⏎

P   I   D   ARW
— STX (02H)
— Instrument number 2: 02H + 20H = 22H
    If converted to ASCII code, (").
— PID block setting command (20H)
— Block number

It sends the command adding the checksum and ETX (03H) automatically.
If the communication is normally finished, it responds as follows.

⌒ F	@	C 0	⌒ C

— ACK (Acknowledgement) (06H)
— Instrument number 32: 20H + 20H = 40H,
    If converted to ASCII code, (@). Host computer
— Checksum
— ETX (03H)
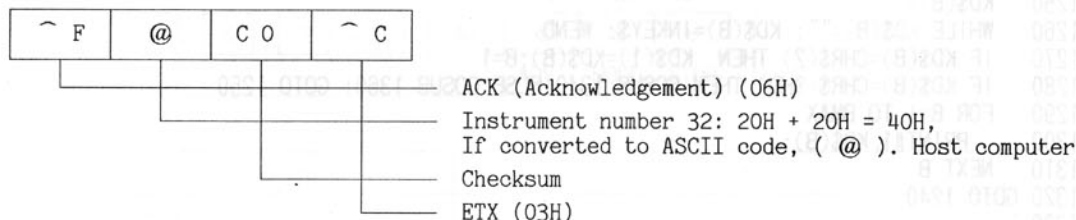
Example 2. When executing the Proportional cycle reading command.
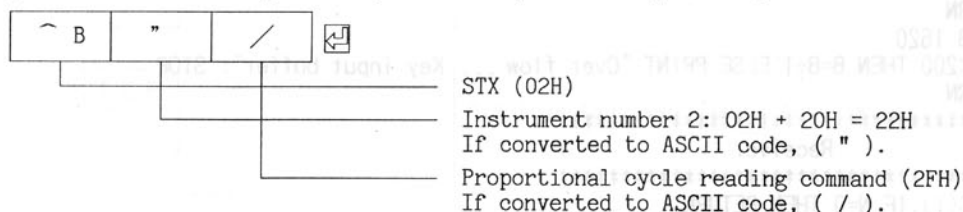
⌒ B	"	/	⏎

— STX (02H)
— Instrument number 2: 02H + 20H = 22H
    If converted to ASCII code, (").
— Proportional cycle reading command (2FH)
    If converted to ASCII code, (/).

It sends the command adding the checksum and ETX (03H) automatically.
If the communication is normally finished, it responds as follows.
(In case the proportional cycle value is 30sec.)

⌒ F	@	/	Space Space 30	E E	⌒ C

— ACK (Acknowledgement) (06H)
— Instrument number 32:
    20H + 20H = 40H,
    If converted to ASCII code,
    (@). Host computer
— Proportional cycle reading
    command (2FH)
— 30sec.
— Checksum
— ETX (03H)
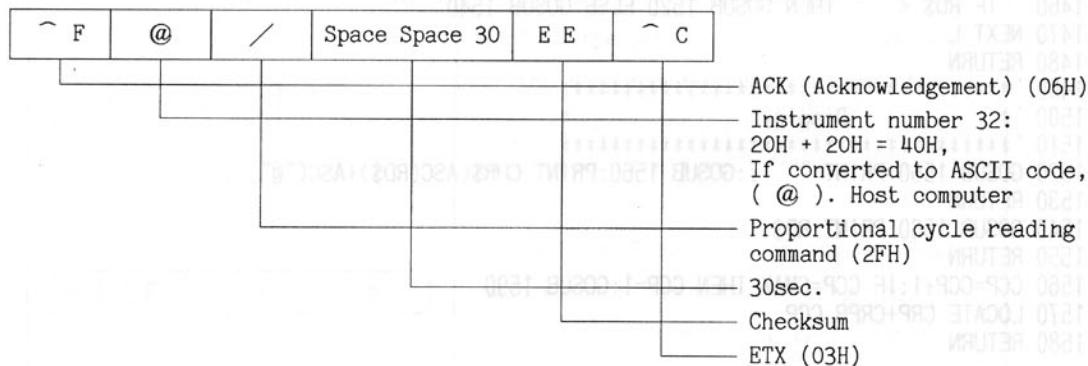
```
1000 ' ----------------------------------------------------------------------
1010 ' <SAMPLE1A. BAS>
1020 ' * This Program is communication example for MCD-100, MCR-100, HCD-100,
1030 '    MPC-200, PC-600, PC-700 and PC-800.
1040 ' * It runs on the IBM PC and compatible PC with GW-BASIC.
1050 '
1060 '                              Dec. 24, 1993    SHINKO TECHNOS CO., LTD.
1070 ' ----------------------------------------------------------------------
1080 '
1090 ' *******************************************
1100 ' *                Initial                  *
1110 ' *******************************************
1120 CRPMAX=25:       'maximum row line number (vertical)
1130 CMAX=80:         'maximum column number
1140 CRP=1:           'row line pointer
1150 CCP=1:           'column pointer
1160 DIM KD$(200):    'key input buffer
1170 CLS: GOSUB 1690
1180 OPEN "COM1:2400, E, 7, 1" AS #1 : '2400bps, even, data 7 bits data, 1 stop bit
1190 ON COM(1) GOSUB 1420
1200 COM(1) ON
1210 ' *********************************
1220 ' *           Main                *
1230 ' *********************************
1240 B=1
1250   KD$(B)=""
1260   WHILE KD$(B)="": KD$(B)=INKEY$: WEND
1270   IF KD$(B)=CHR$(2) THEN  KD$(1)=KD$(B):B=1
1280   IF KD$(B)=CHR$(&HD) THEN GOSUB 1340 ELSE GOSUB 1360: GOTO 1250
1290   FOR B=1 TO BMAX
1300     PRINT#1, KD$(B);
1310   NEXT B
1320 GOTO 1240
1330 '
1340 GOSUB 1750: KD$(B)=CHR$(3): BMAX=B:GOSUB 1620
1350 RETURN
1360 GOSUB 1620
1370 IF B<200 THEN B=B+1 ELSE PRINT "Over flow ... Key input buffer": STOP
1380 RETURN
1390 ' *********************************
1400 ' *           Receiver            *
1410 ' *********************************
1420 N=LOC(1):IF N=0 THEN RETURN
1430 D$=INPUT$(N, #1):CRPB=2
1440 FOR L=1 TO N
1450   RD$=MID$(D$, L, 1)
1460   IF RD$ < " " THEN GOSUB 1520 ELSE GOSUB 1540
1470 NEXT L
1480 RETURN
1490 ' *********************************
1500 ' *           Display             *
1510 ' *********************************
1520 GOSUB 1560:PRINT " ^";:GOSUB 1560:PRINT CHR$(ASC(RD$)+ASC("@"));
1530 RETURN
1540 GOSUB 1560:PRINT RD$;
1550 RETURN
1560 CCP=CCP+1:IF CCP=CMAX THEN CCP=1:GOSUB 1590
1570 LOCATE CRP+CRPB, CCP
1580 RETURN
```

```
1590 CRP=CRP+4:IF CRP=CRPMAX THEN CRP=1:CLS
1600 GOSUB 1690
1610 RETURN
1620 CRPB=0
1630 IF KD$(B) < " " THEN GOSUB 1650 ELSE GOSUB 1670
1640 RETURN
1650 GOSUB 1560:PRINT " ^";:GOSUB 1560:PRINT CHR$(ASC(KD$(B))+ASC("@"));
1660 RETURN
1670 GOSUB 1560:PRINT KD$(B);
1680 RETURN
1690 LOCATE CRP+1,CCP:PRINT STRING$(CMAX,"-");
1700 LOCATE CRP+CRPB,CCP
1710 RETURN
1720 '*********************************
1730 '*            Make SUM           *
1740 '*********************************
1750 SUM=0
1760 FOR LS=2 TO B-1
1770    SUM=SUM+ASC(KD$(LS))
1780 NEXT LS
1790 SUMC$=RIGHT$("0"+HEX$(((NOT SUM)+1) AND &HFF),2)
1800 KD$(B)=LEFT$(SUMC$,1):GOSUB 1620:B=B+1
1810 KD$(B)=RIGHT$(SUMC$,1):GOSUB 1620:B=B+1
1820 RETURN
1830 END
```

12.4 ASCII code table

				b7	0	0	0	0	1	1	1	1
				b6	0	0	1	1	0	0	1	1
				b5	0	1	0	1	0	1	0	1
b4	b3	b2	b1		0	1	2	3	4	5	6	7
0	0	0	0	0	NUL	TC7 (DLE)	SP	0	@	P	`	p
0	0	0	1	1	TC1 (SOH)	DC1	!	1	A	Q	a	q
0	0	1	0	2	TC2 (STX)	DC2	"	2	B	R	b	r
0	0	1	1	3	TC3 (ETX)	DC3	#	3	C	S	c	s
0	1	0	0	4	TC4 (EOT)	DC4	$	4	D	T	d	t
0	1	0	1	5	TC5 (ENQ)	TC8 (NAK)	%	5	E	U	e	u
0	1	1	0	6	TC6 (ACK)	TC9 (SYN)	&	6	F	V	f	v
0	1	1	1	7	BEL	TC10 (ETB)	'	7	G	W	g	w
1	0	0	0	8	FE0 (BS)	CAN	(	8	H	X	h	x
1	0	0	1	9	FE1 (HT)	EM	)	9	I	Y	i	y
1	0	1	0	A	FE2 (LE)	SUB	*	:	J	Z	j	z
1	0	1	1	B	FE3 (VT)	ESC	+	;	K	[	k	{
1	1	0	0	C	FE4 (FF)	IS4 (FS)	,	<	L	¥	l	|
1	1	0	1	D	FE5 (CR)	IS3 (GS)	−	=	M	]	m	}
1	1	1	0	E	SO	IS2 (RS)	.	>	N	^	n	‾
1	1	1	1	F	SI	IS1 (US)	/	?	O	_	o	DEL

13. Appendix
13.1 Data table
● Alarm block setting value ([   ]: Objective equipment)

No.	A1 (DEV. H) [ ]	A2 (DEV. L) [ ]	A3 (ABS) [7	A4 (ABS) [ ]
1	℃	℃	℃	℃
2	℃	℃	℃	℃
3	℃	℃	℃	℃
4	℃	℃	℃	℃
5	℃	℃	℃	℃
6	℃	℃	℃	℃
7	℃	℃	℃	℃
8	℃	℃	℃	℃
9	℃	℃	℃	℃

● PID block setting value

No.	P (Proportional band)	I (Integral time)	D (Derivative time)	ARW (Anti-reset windup)
1	%	s	s	%
2	%	s	s	%
3	%	s	s	%
4	%	s	s	%
5	%	s	s	%
6	%	s	s	%
7	%	s	s	%
8	%	s	s	%
9	%	s	s	%

● Wait block setting value

No.	Wait value
1	%
2	%
3	%
4	%
5	%
6	%
7	%
8	%
9	%

● Proportional cycle _____ seconds
● Option
· Data transfer rate _____ bps
· Instrument number _____
· Transmitting output _____

13.2 Program pattern table　(Copy and use.)

● Program pattern (pattern number)


```
          Step No.
      ×  ──────── (℃)
           [    ]


  Setting temperature
         ↑
           [    ]



           [    ]
                          ──────→  Time (minute)
```

● Setting contents

Step number						
Starting temp. (℃)						
Ending temp.　(℃)						
Time　　(min.)						
PID block number						
Alarm block number						
Wait block number						
T.S.　1 [　　　]						
T.S.　2 [　　　]						
T.S.　3 [　　　]						
T.S.　4 [　　　]						
T.S.　5 [　　　]						
T.S.　6 [　　　]						
T.S.　7 [　　　]						
T.S.　8 [　　　]						
T.S.　9 [　　　]						
T.S. 10 [　　　]						
T.S. 11 [　　　]						
T.S. 12 [　　　]						
T.S. 13 [　　　]						
T.S. 14 [　　　]						
T.S. 15 [　　　]						
T.S. 16 [　　　]						
T.S. 17 [　　　]						
T.S. 18 [　　　]						
T.S. 19 [　　　]						
T.S. 20 [　　　]						

Shinko

═══
INDUSTRIAL MEASURING INSTRUMENTS
═══

· · · Inquiry · · ·

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

```
                                    [Example]
· Model      ....................... PC-735-R/R
· Rated scale ...................... 0 to 400℃
· Type of input ................... K
· Instrument number ............. □□□□□□
· Supply voltage ................. 200Vac
```

In addition to the above, let us know the details of malfunction, if any, and the operating conditions specifically on job site.

```
┌─────────────────────────────────────────────┐
│   The specifications subject to change without notice.   │
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