Instrucion Manual for 48mm-size Program Cotroller Model REX-P24

IMREXP24-E1

<Preface>

Thank you very mutch to have bought our 48×48mm program controller model REX-P24.In this manual, the necessary items to handle REX-P24 are explained. Please read and understand the explanations of this manual very well before starting the actual operation.
This manual shall be kept carefully and prepared to be ready for reading at anytime in case of necessity.

=Request= Please arrange this manual to be surely in the hand of the direct person who will operate this product.

⚠ WARNING

* Wiring precautions
  - If a failure or an error of this instrument could result in a critical accident of the system. Please install an external protection circuit to prevent such an accident.
  - In order to prevent instrument damage or failure, protect the power line and the input/output lines from high currents by using fuses with appropriate ratings.
* Power supply
  - In order to prevent instrument damage or failure, supply power with the specified rating.
  - In order to prevent electric shock or instrument failure, do not turn on the power supply until all of the wiring are completed.
* Never use the instrument near inflammable gases.
  - In order to prevent fire, explosion or instrument damage, never use this instrument at a location where inflammable or explosive gases or vapour exists.
* Never touch the inside of the instrument.
  - In order to prevent electric shock or burns, never touch the inside of the instrument. Only RKC service engineers can touch the inside of the instrument to check the circuit or to replace parts.High voltage and high temperature sections inside of the instrument are extremely dangerous.
* Never modify the instrument
  - In order to prevent accident or instrument failure, never modify the instrument.
* Maintenance
  - In order to prevent electric shock, burns or instrument failure, only RKC service engineers may replace parts.
  - In order to use this instrument continuously and safely, conduct periodic maintenance.Some parts used in this instrument have a limited service life and may deteriorate over time.

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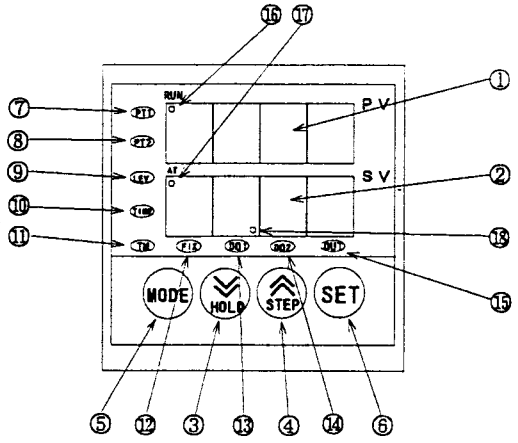
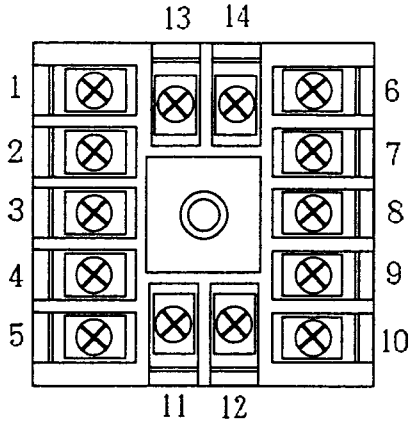
1 . Name of Front Part



Number	Name	Description
①	P V display	Displays the measured value (PV). Relevant characters are displayed to show the stantus of the instrument.
②	S V display	Displays the measured value (SV). Relevant characters are displayed to show the status of the instrument.
③	Setting value decrement key	Use this key to decrease the value at the changing of setting. During program operation or timer operation, if this key is kept on pushing more than 2 seconds, a hold function is activated. And during hold status, the pushing of more than 2 seconds cancels the hold status.
④	Setting value increment key	Use this key to increase the value at the changing of setting. During program operation or timer operation, if this key is kept on pushing more than 2 seconds, a step function is activated.
⑤	Mode key	Use this key to enter each mode and to switch modes. If this key is pushed several times, the operation start/stop display is regained.
⑥	Set key	Use this key to fix each setting. If this key is pushed for mare than 3 seconds, the switching to engineer's setting mode can be done.
⑦	Pattern 1 (PT1) lamp	This lamp lights when Pattern 1 is selected in program control mode.
⑧	Pattern 2 (PT2) lamp	This lamp lights when Pattern 2 is selected in program control mode. But when PT1 lamp is also lighs at the asme time, it means the No.9 to 16 segments of the linked program pattern .
⑨	Level (LEV.) lamp	When this lamp is on, the temperature set-value is displayed on SV display.
⑩	Time(TIME) lamp	When this lamp is on, the set time is displayed on SV display, and during operation the remaining time is displayed.
⑪	Timer(TM) lamp	When timer control mode is slected, this lamp is on.
⑫	Fixed set-point mode lamp	When fixed set-point control mode is selected, this lamp is on.
⑬	Digital output 1 (DO1) lamp	This lamp is on when contact output 1 is ON.
⑭	Digital output 2 (DO2) lamp	This lamp is on when contact output 2 is ON.
⑮	Control output lamp	This lamp is on when outupt is ON in cace of the control output type is M , V. In cace of the control output being R, the lamp goes out at 0%. Dark light at 1-99%, and bright light at 100%.
⑯	Operation lamp	Blinks during operation.
⑰	Auto-tuning(AT) lamp	Blinks during autotuning.
⑱	Time display lamp	This lamp is on when the set time is displayed. Blinks when display the remaining time during operation.

2. Rear terminal drawing



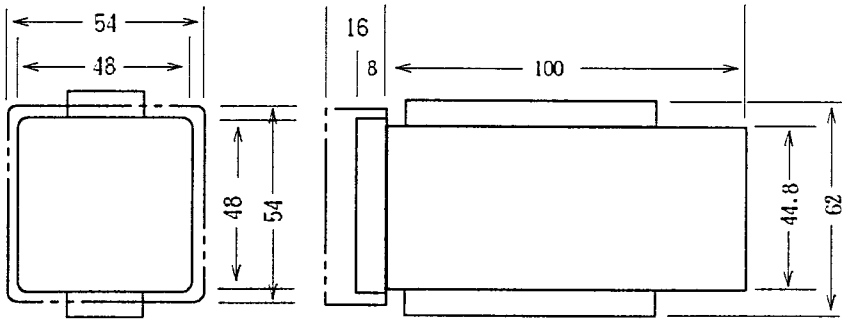
No.	Description	
1	NO DO1	External contact output
2		
3	NO DO2	
4	Relay: C / Voltage. Current: +	Control output
5	NO / −	

No.	Description	
6	AC100V~240V	Power supply
7		
8	T.C: + / RTD: A	Temperature input
9	B	
10	− / B	

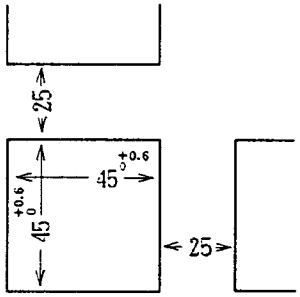
No.	Description	
11	COM(-)	External contact input A
12	NO	

No.	Description	
13	COM(-)	External contact input B
14	NO	

3. External dimensions (Unit:mm)



4. Panel cutout (Unit:mm)



5. Mounting method

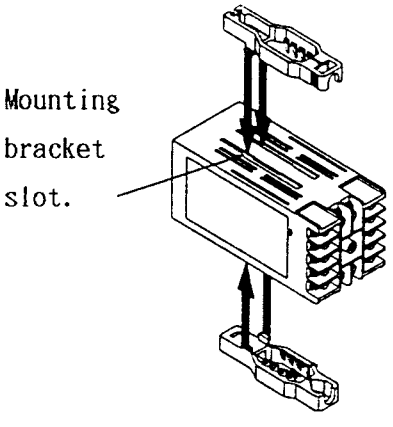
① Make rectangular holes corresponding to the number of controllers to be mounted on the panel by referring to the panel cutout dimensions.

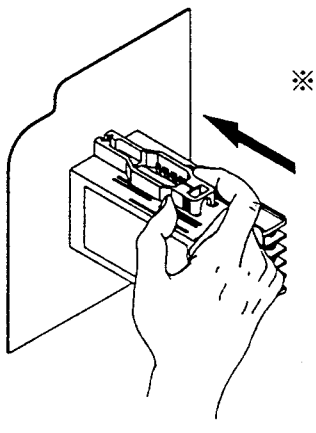
② Install the controller on the panel from the panel front.

③ Set the mounting bracket to the slots at the top ofthe controller.

④ Push the mounting bracket as the arrow shows below.

⑤ Install a mounting bracket also to the bottom of the case in the same way as ③ and ④ above.

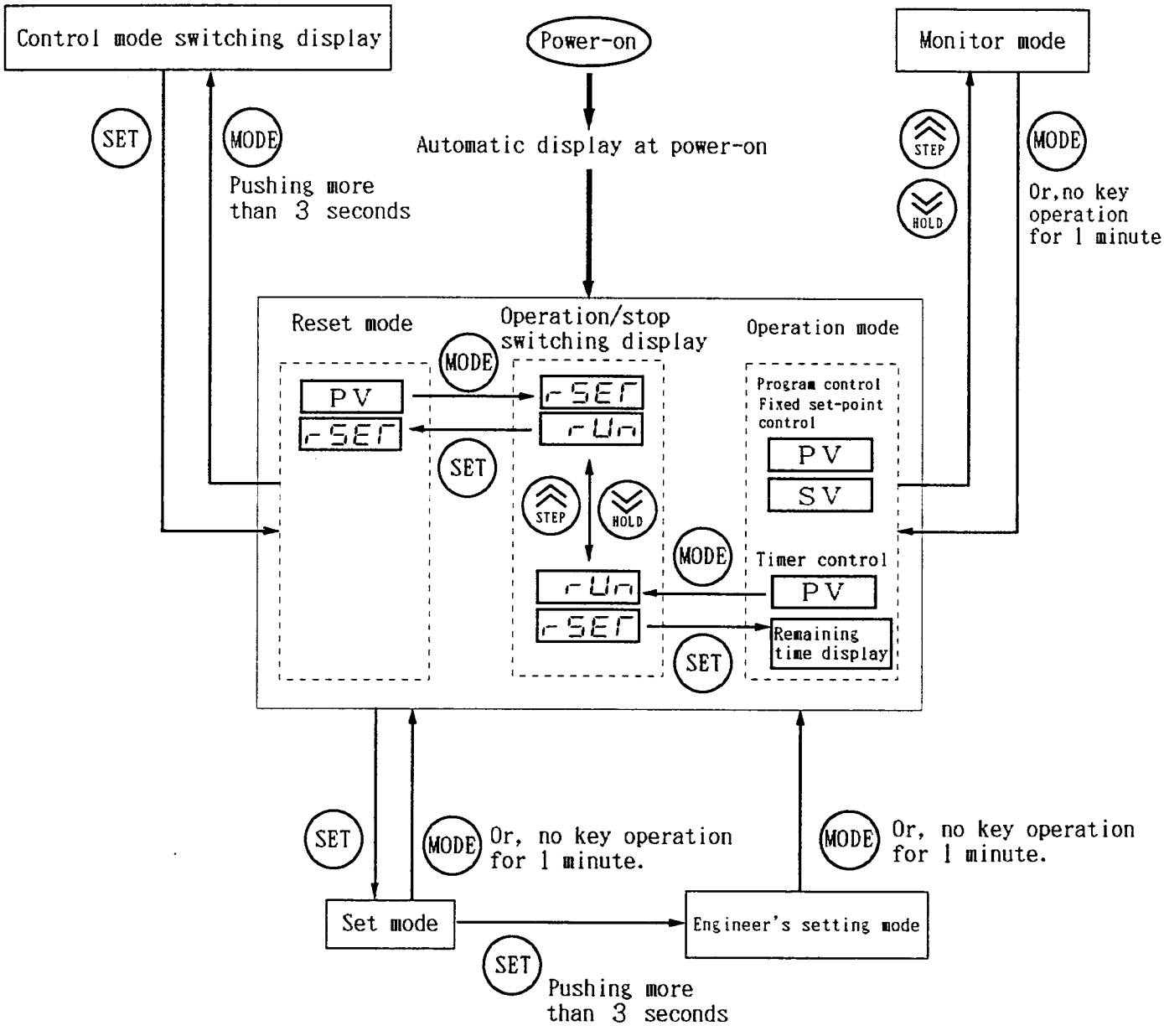




※ Confirm if the controller is firmly fixed to the panel.

6. Block Diagram of Operation Mode

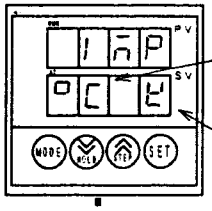
REX-P24 has only 4 setting keys. So, there are on operation(RUN)/stop(RESET) keys. The operation/stop displays can be gained by pushing MODE key the specified times. On the switching display for operatino/stop, the switching of operation and stop can be done by the pushing of set key after the display of 「r-Un」 (operation) or 「r-SEr」 (stop) on PV display (upside 7-segment LED) by the ∧∨ key.



7. Display at the power-on

Power-on

After the completion of wiring, when the power is supplied. the prescribed displays are shown at first, then the initial display appears. Please reconfirm at power-on if there will be on mistake in wiring.



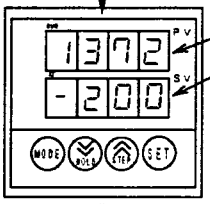
Displays unit
°C=℃, °F=°F

Displays input type

7-segment LED table

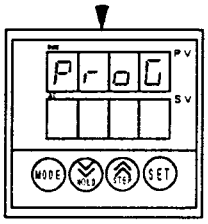
1	2	3	4	5	6	7	8	9	0	A	B	C	D	E	F	G	H
I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

K=K, J=J, r=R, S=S, b=B, E=E, T=T, P=PLII,
W=W5Re/W26Re, U=U, L=L, JP=JPt100, PT=PT100

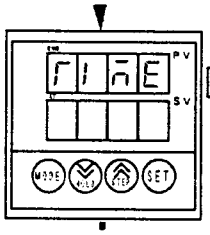


Displays the maximum value of a range
Displays the minimum value of a range

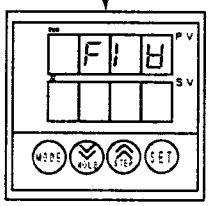
(Note : At the shipment, this instrument is set at cold start status in program control mode.



Mode display
program control
LED of PT1 or and PT2 lights
(Refer to the part pointed by ➘)



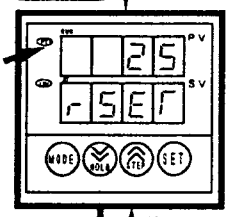
Mode display
Timer control
LED of TM lights
(Refer to the part pointed by ➘)



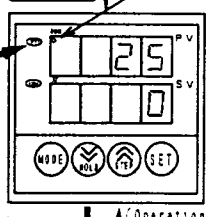
Mode display
Fixed set-point control
LED of FIX lights
(Refer to the part pointed by ➘)

Initial status

Cold start

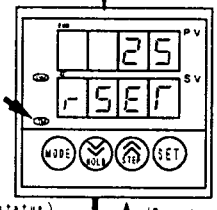


Hot start

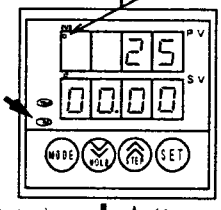


RUN lamp blinks

Cold start

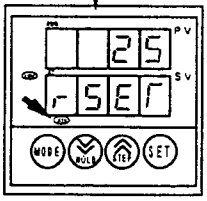


Hot start

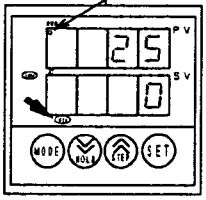


RUN lamp blinks

Cold start



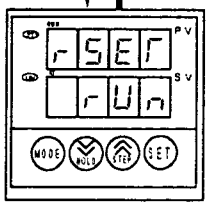
Hot start

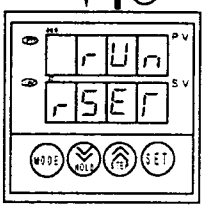


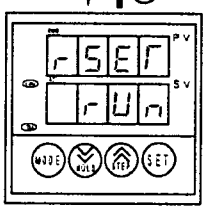
RUN lamp blinks

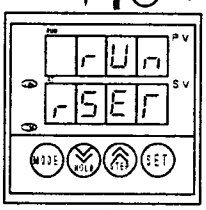
(Reset status)
(Operation status)
(Reset status)
(Operation status)
(Reset status)
(Operation status)

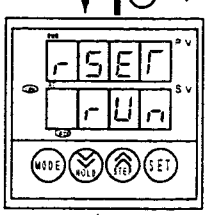
Push MODE key
Push SET key

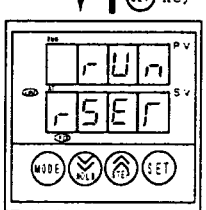










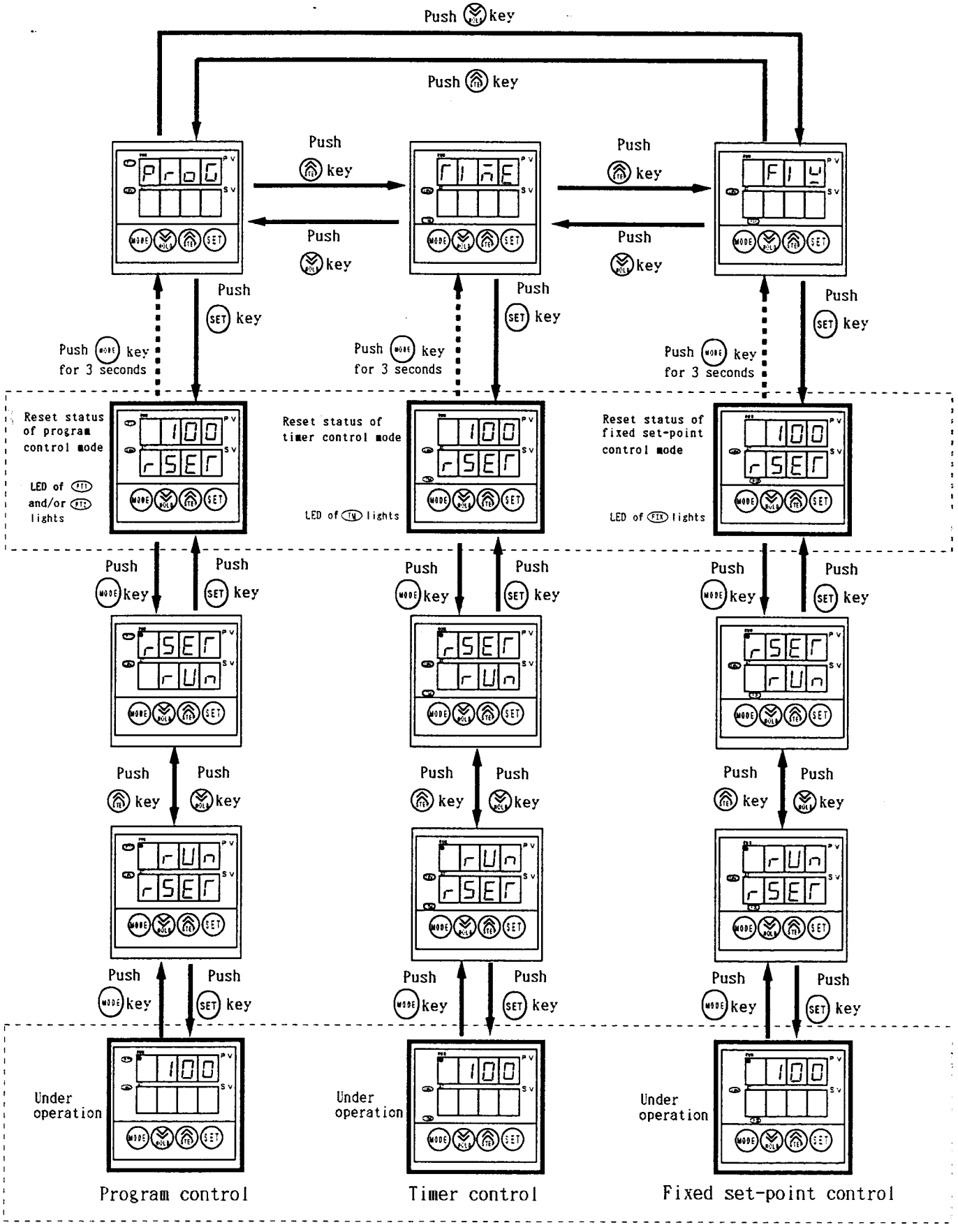


Push ROLL or STEP key

8. How to switch the operation mode

Caution : The switching of the operation mode must be done after making the reset status.

The operation mode can be selected from the program control, timer control or fixed set-point control. After the stop(reset) of the operation, keep pushing the MODE key for more than 3 seconds. Then the display switched to mode switching status.

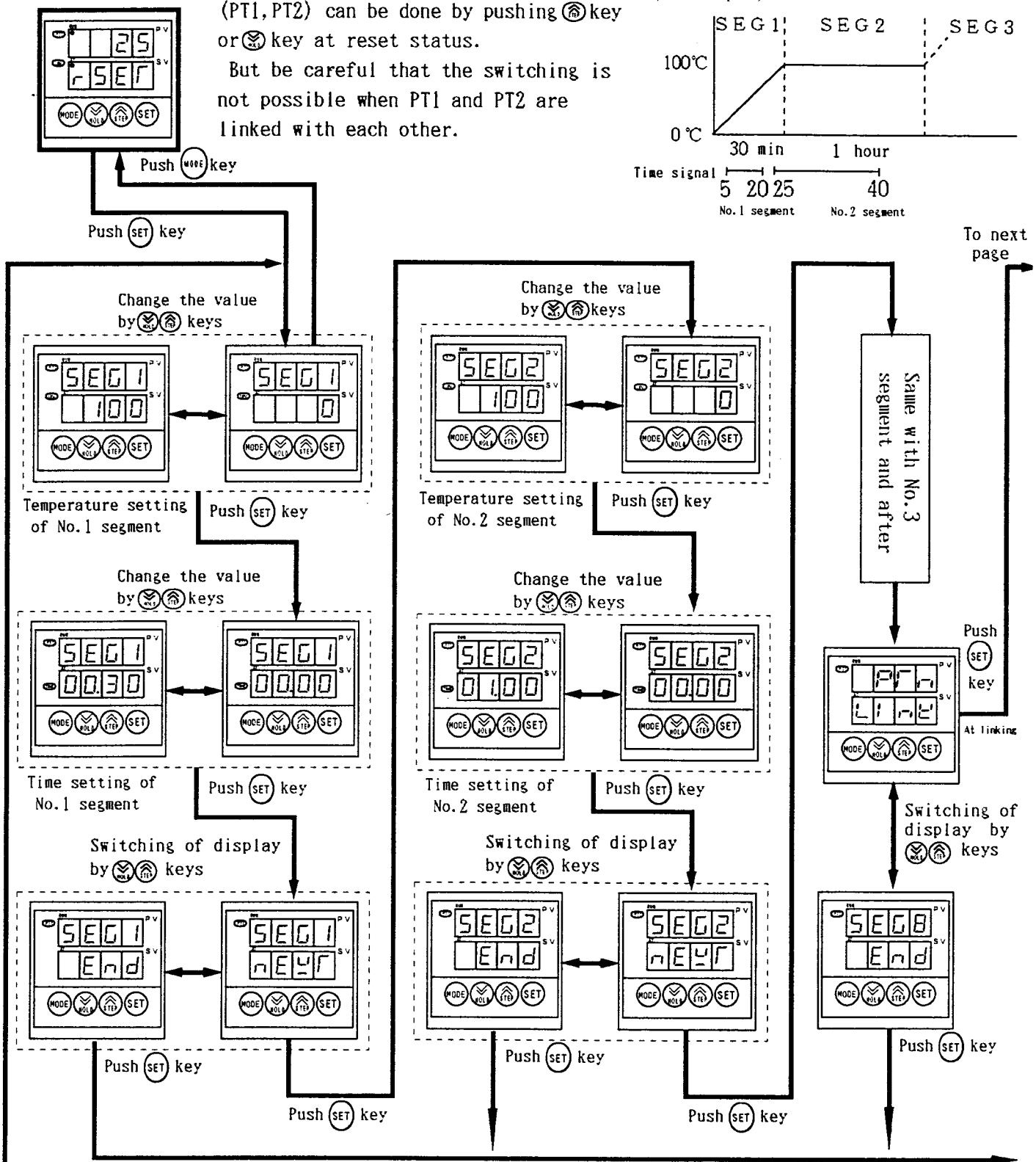


9. Setting method of program pattern (1)

The switting between PT1←→PT2

The switching of the program pattern (PT1, PT2) can be done by pushing ⏫ key or ⏬ key at reset status.

But be careful that the switching is not possible when PT1 and PT2 are linked with each other.

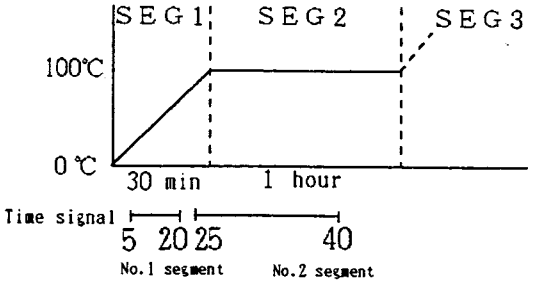


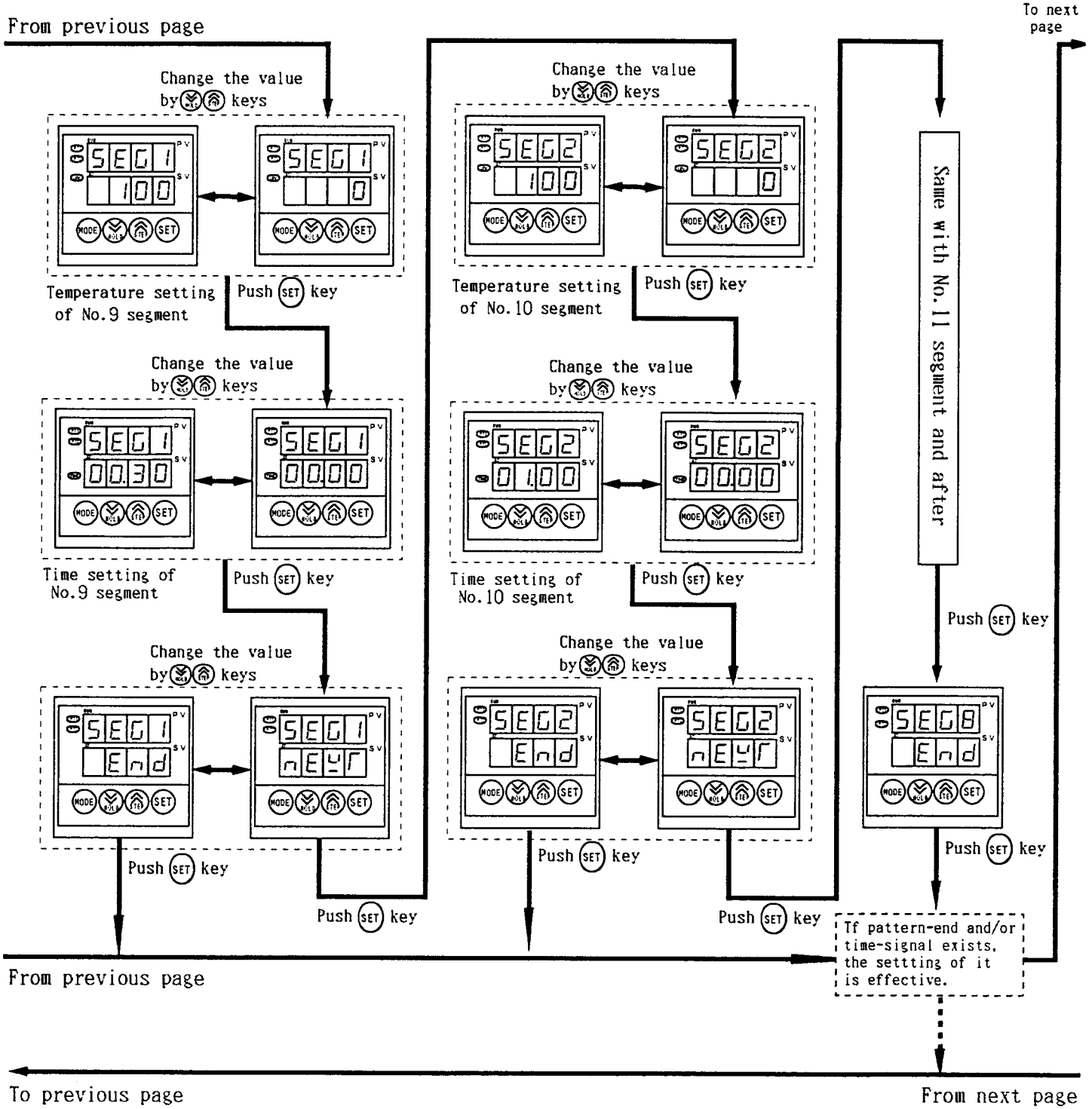
10. Setting method of program pattern (2)

Even if PT1 and PT2 will be linked, the display after 8 segments becomes the display of 1～8 again.
The identification if the segment is 1～8 or 9～16 can be done by the lighting of (PT1) and/or (PT2).
(PT1) or (PT2) only lights = 1～8 segment.
(PT1) and (PT2) light = 9～16 segment.

Setting method in linking the program patterns.

(An example)



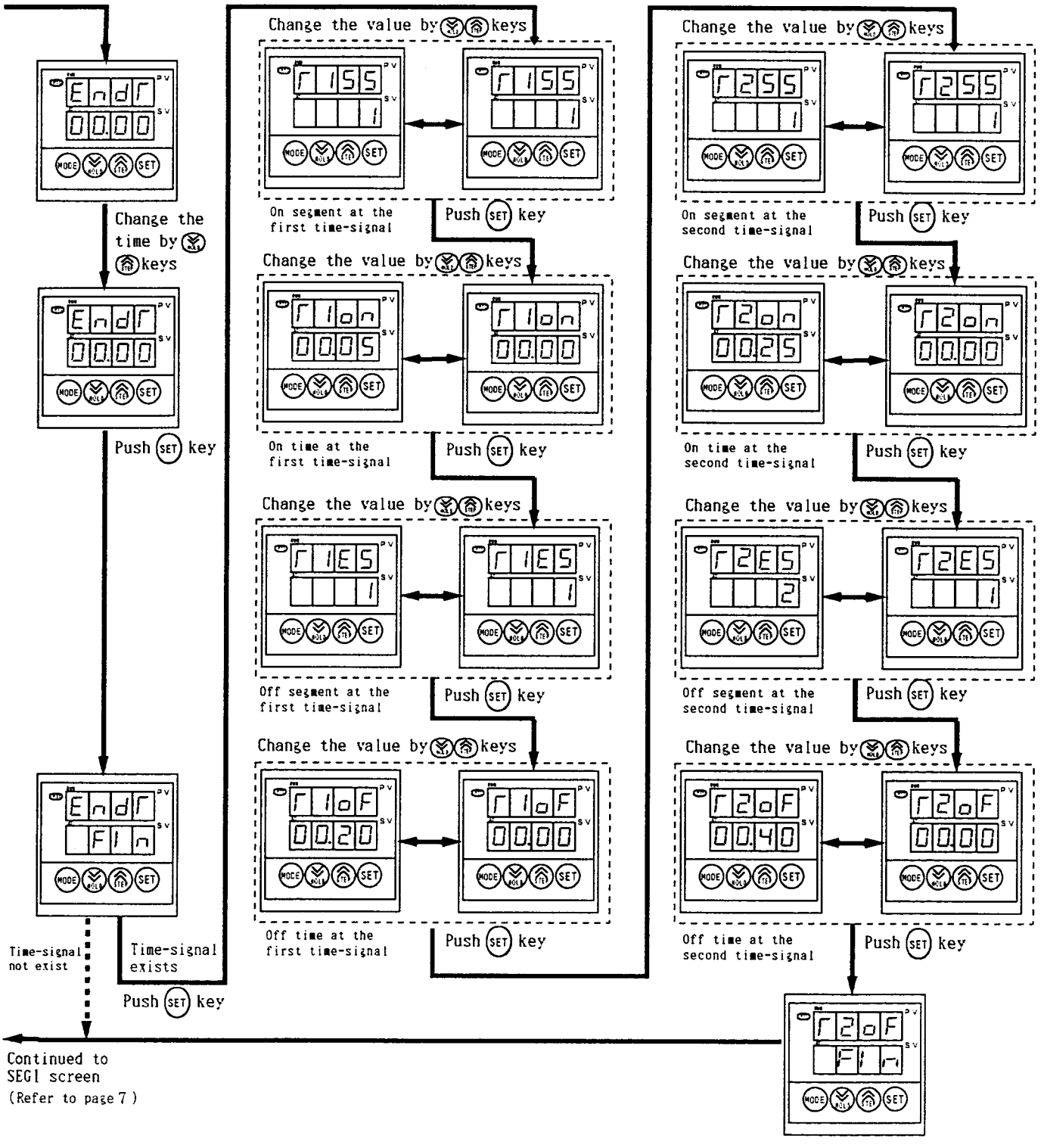


11. Setting method of program pattern (3)

Note: If the time-signal and pattren-end output functions are not selected, the settting characters are not displayed.

Setting for time-signal and output-time of pattern-end.

If (MODE) key is pushed during setting, the display returns to SEG1 screen.



12. Settings for various conditions (Engineer's setting mode)

The engineer's setting mode is for the settings of autotuning, alarms,PID constants, and etc.

How to switch to the Engineer's setting mode

① In the ordinary mode (reset, operation, setting screens) keep on pushing SET key for about more than 3 seconds, then the PG1(parameter group 1) is displayed and the Engineer's setting mode is enabled.

② In this mode, PG(parameter group) can be switched by ∧ key or ∨ key.

③ Display the PG(parameter group) in which the item to be changed is included, and push the SET key to call the necessary character (symbol).

④ The set value(contents) can be changed by ∧ key or ∨ key.

Note : * By the setting of PG14, the number of changeable PG(parametter group) is limited.
* The setting change on and aftter PG6 is not possible unless it is in the reset status.
* If the setting of PG11 - PG13 will be changed,the specifications of the controller will be changed and the operation might be stopped. So, please be careful not to change the settings.

[PG1] Autotuning····· (Default value=0)
The optimum PID constants are calculated and set autonatically by the controller. The autotuning is only effective during operation. When the autotuning ends, the setting returns automatically to 0. If you want to stop the autotuning during the operation, it can be stopped by changing the set value from 0 to 1. In this case, The PID constants just before the auttuning are held.
AT 0 : Autotuning stop
1 : Autotuning start
(The setting of autotuning is only effective during control.)

[PG2] Alarm
AL1 Setting (Deviation alarm, Band alame ; −Span to +Span)
····· (Default value=50)
(Process alarm, Set value alarm ; within the range of setting limiter.)
AL2 Setting (Deviation alarm, Band alame ; −Span to +Span)
····· (Default value=50)
(Process alarm, Set value alarm ; within the range of setting limiter.)

[PG3] PID constants
① Timer control mode,Fixed set-point mode,Program control mode (At the ordinary PID action)
PID Setting (P ; 0 to Span or 0.0 to Span) ····· (Default value=30 or 30.0)
(I ; 0 to 3600) ····· (Default value=240)
(D ; 0 to 3600) ····· (Default value=60)

② Program control mode (At level PID action)
PID1 Setting (P1 ; 0 to Span or 0.0 to Span
; Depends on the input range) ····· (Default value=30 or 30.0)
(I1 ; 0 to 3600) ····· (Default value=240)
(D1 ; 0 to 3600) ····· (Default value=60)
PID2 Setting (P2 ; 0 to Span or 0.0 to Span
; Depends on the input range) ····· (Default value=30 or 30.0)
(I2 ; 0 to 3600) ····· (Default value=240)
(D2 ; 0 to 3600) ····· (Default value=60)
PID3 Setting (P3 ; 0 to Span or 0.0 to Span
; Depends on the input range) ····· (Default value=30 or 30.0)
(I3 ; 0 to 3600) ····· (Default value=240)
(D3 ; 0 to 3600) ····· (Default value=60)

PID4 Setting (P4 ; 0 to Span or 0.0 to Span
; Depends on the input range) ····· (Default value=30 or 30.0)
(I4 ; 0 to 3600) ····· (Default value=240)
(D4 ; 0 to 3600) ····· (Default value=60)

LEVL Setting (LEV1 ; Setting limiter low limit value
~ Setting limiter high limit value)
····· (Default value=Max. range)
(LEV2 ; Setting limiter low limit value
~ Setting limiter high limit value)
····· (Default value=Max. range)
(LEV3 ; Setting limiter low limit value
~ Setting limiter high limit value)
····· (Default value=Max. range)
(CKL ; 1 to 100) ····· (Default value=20 or 2)
(OH ; 0 to 100 or 0.0 to 100.0
; Depends on the input range) ····· (Default value=2 or 0.2)
(MR ; -50.0 to +50.0) ····· (Default value=0.0)

PG4 Wait zone
ZONE Setting (ZONU ; 0 to 99 or 0.0 to 9.9) ····· (Default value=0.0 or 0)
(ZOND ; 0 to 99 or 0.0 to 9.9) ····· (Default value=0.0 or 0)

PG5 Repeated time
RPT Setting (RPT ; 1 to 1000) ····· (Default value=1)
RPTM Impossible to set (Only monitoring)

PG6 Start mode
STAT····· (Default value=0)
0 ; Cold stert
1 ; Power-on stert
2 ; hot stert
PVST····· (Default value=0)
0 ; zero stert (Only Program control mode)
1 ; PV stert (Only Program control mode)

PG7 PV bias
BIAS Setting (BIAS ; -1999 to 9999 or -199.9 to 999.9)
····· (Default value=0.0 or 0)
(RR ; 0.001 to 9.999) ····· (Default value=1.000)

PG8 Setting limitter
SET Setting (SLH ; Within input range,
but a high limit valure > a low limit value)
····· (Default value=Maximum value of a range)
(SLL ; Within input range,
but a high limit valure > a low limit value)
····· (Default value=Minimum value of a range)

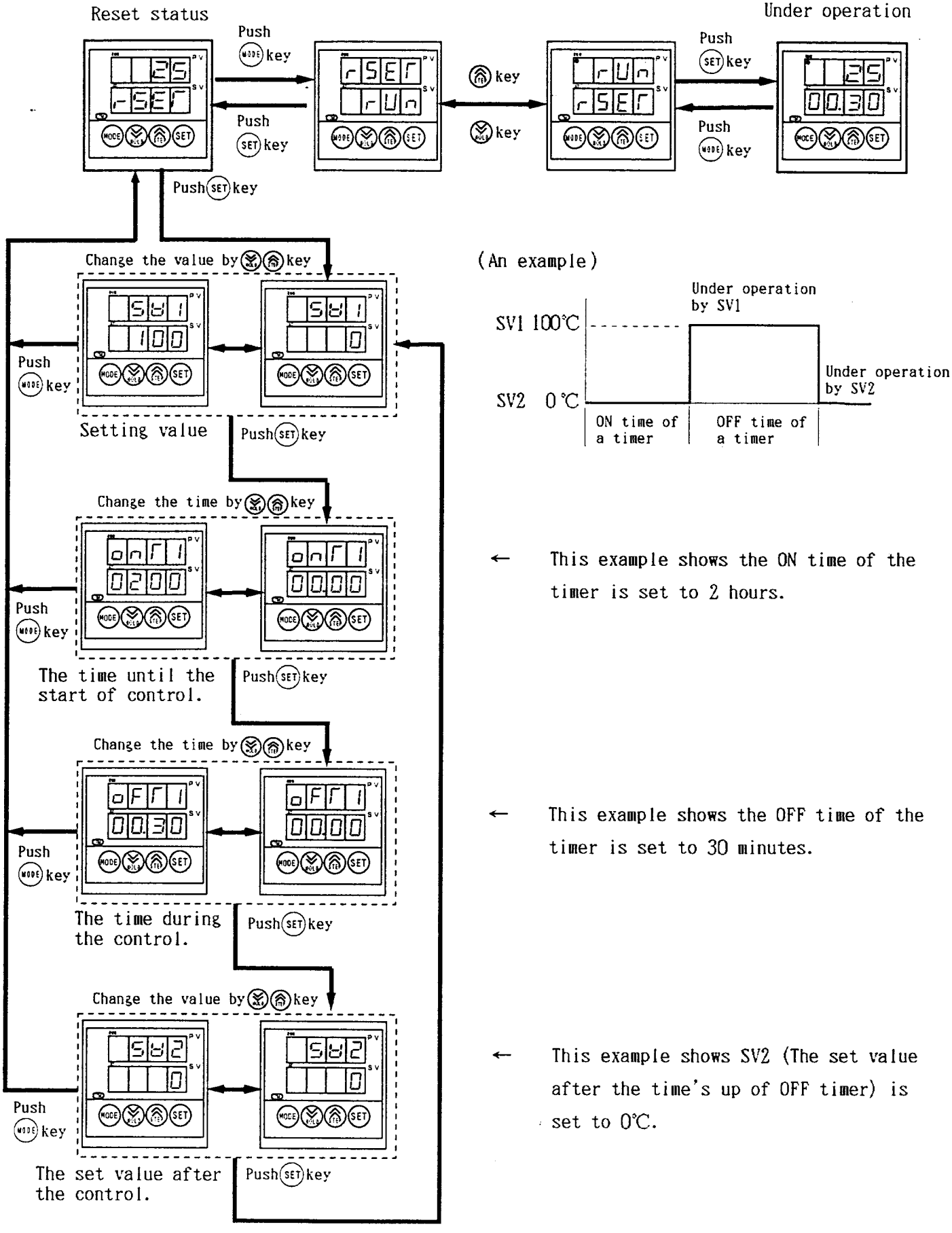
PG9 Output limitter
OUT Setting (OLH ; -5.0~105.0 but a high limit valure > a low limit value)
····· (Default value=105)
(OLL ; -5.0~105.0 but a high limit valure > a low limit value)
····· (Default value=-5)

PG14 Setting data lock ····· (Default value=0000)
LCK LCK (0000 ; PG1~PG5 Possible to change setting)
(0001 ; PG1~PG5 Setting data lock)
(0010 ; PG1~PG9 Possible to change setting)
(0011 ; PG1~PG9 Setting data lock)

(0100 ; PG1~PG13 Possible to change setting)
(0101 ; PG1~PG13 Setting data lock)

Note : The setting of PG11-PG13 is decided beforehand based on the specifications at the order.
The change of these values will cause the mal-function by the change of the ordered specifications.
So, please be careful not to change the preset values.

1 3. Setting method for timer control



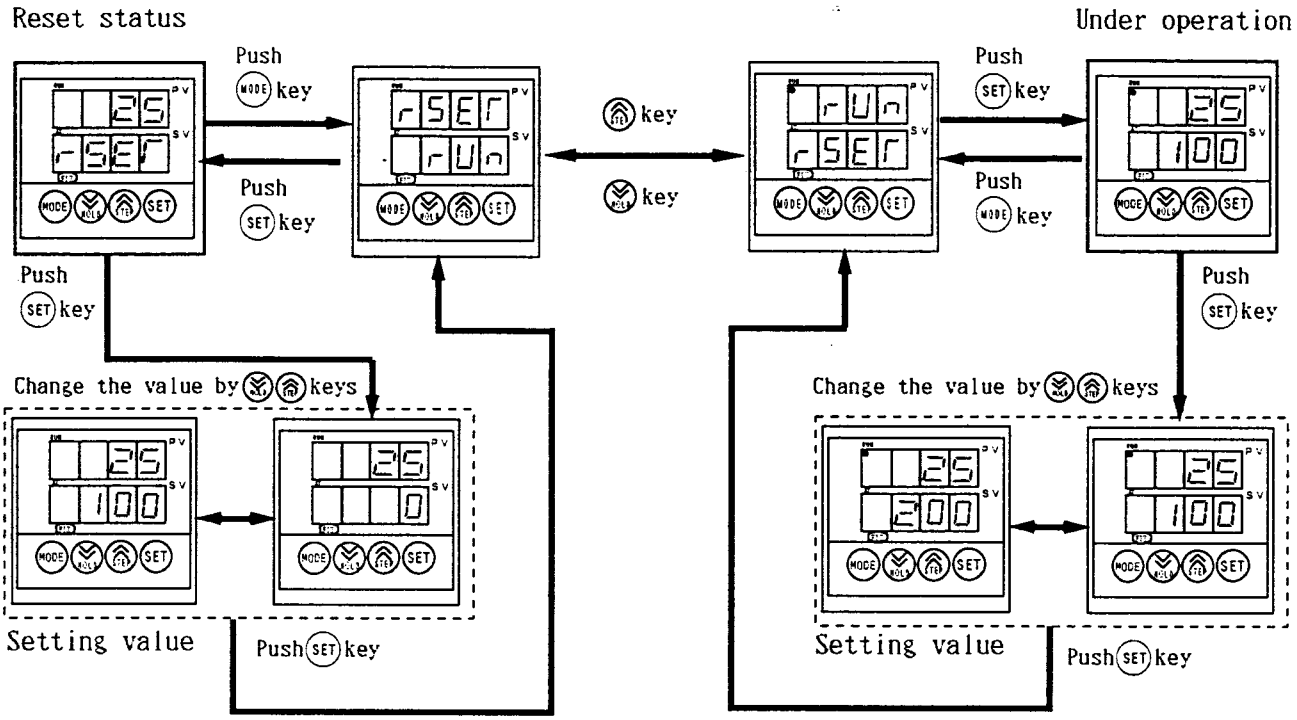
(An example)

← This example shows the ON time of the timer is set to 2 hours.

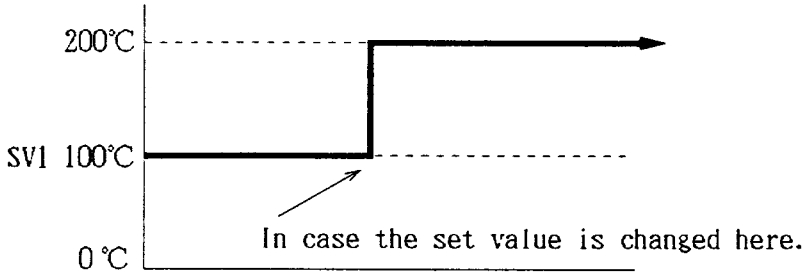
← This example shows the OFF time of the timer is set to 30 minutes.

← This example shows SV2 (The set value after the time's up of OFF timer) is set to 0℃.

14. Setting method for fixed set-point control



(An example)



15. Model Code Table

Type									Contents
REX-P24	□	□	□	–	□	*	□	□	□	–	□	48×48mm size Program Temperature Controler
Control Action	F D L M											PID with Autotuning (Reverse action) PID with Autotuning (Direct action) Level PID with Autotuning (Reverse action) Level PID with Autotuning (Direct action)
Input		□										Refer to Inputs and Range Code
Range			□									Refer to Inputs and Range Code
Control Output				M V 7 8								Relay contact Voltage pulse, 0/12V DC Continuous current:0 to 20mA DC Continuous current:0 to 20mA DC
Contact Input					N Y							None Supplied (2 point)
Contact Output 1							N □					None Specify Contact Output Signal
Contact Output 2								N □				None Specify Contact Output Signal
Water Pproof / Dustproof (NEMA4X)									N 1			None Water Pproof / Dustproof (Use of NEMA 4X front cover)

Type	Code		Range
K	K	16	-200 To 1372 ℃
	K	22	-199.9 To 999.9 ℃
	K	B2	-199.9 To 999.9° F
	K	B3	-330 To 2500 ° F
J	J	14	-199.9 To 999.9 ℃
	J	15	-200 To 1200 ℃
	J	A9	-199.9 To 999.9° F
	J	B1	-330 To 2192 ° F
T	T	01	-199.9 To 400.0 ℃
	T	A1	-199.9 To 752.0 ° F
R	R	02	0 TO 1769 ℃
	R	A2	0 To 3261 ° F
S	S	03	0 To 1769 ℃
	S	A2	0 To 3261 ° F

Type	Code		Range
B	B	02	0 To 1820 ℃
	B	A2	0 To 3308 ° F
E	E	06	-200 To 1000 ℃
	E	A5	-300 To 1832 ° F
N	N	02	0 To 1300 ℃
	N	A2	0 To 2372 ° F
PL II	A	02	0 To 1390 ℃
	A	A2	0 To 2534 ° F
Re/W26R	W	02	0 To 2320 ℃
	W	A4	0 To 4208 ° F
U	U	08	0 To 600 ℃
	U	A4	0 To 1100 ° F
L	L	05	0 To 900 ℃
	L	A2	0 To 1600 ° F

※ Accuracy is not guaranteed between 0 to 400℃(0 to 752° F)for type B and 0 to 32° F for W5Re/W26Re,PLII,and N thermocouple inputs.

Type	Code		Range
Pt100	D	20	-199.9 To 660.0 ℃
	D	A1	-199.9 To 999.9° F
JPt100	P	20	-199.9 To 510.0 ℃
	P	B6	-199.9 To 950.0° F

A	Deviation high alarm	B	Deviation low alarm	C	Deviation high/low alarm
D	Band alarm	E	Deviation high alarm with hold	F	Deviation low alarm with hold
G	Deviation high/low alarm with hold	H	Process high alarm	J	Process low alarm
K	Process high alarm with hold	L	Process high alarm with hold	Q	Deviation high/low alarm with re-hold
R	Deviation low alarm with re-hold	T	Deviation high/low alarm with re-hold	V	Set value high alarm
W	Set value low alarm	Y	Time signal output	Z	Pattern end output / Time-up output

Safety Warning

- Before operating this product, read the instruction manual carefully to avoid incorrect operation.
- This product is intended for use with industrial machines, test and measuring equipment. It is not designed for use with medial equipment.
- If it is possible that an accident may occur as a result of the failure of the product or some other abnormality, an appropriate independent protection device must be installed.
- When installing this product, avoid the following:
  - ※ Direct exposure to sunlight.
  - ※ The ambient temperature is lower than 0℃ degrees or higher than 50℃.
  - ※ In areas subject to high humidity. Ambient humidity should not be lower than 45% or higher than 85%RH.
  - ※ Direct contact with water.
  - ※ Corrosive environments.
  - ※ Hazardous areas containing explosive or flammable gases.
  - ※ Vibration or shock.
  - ※ Areas subject to electrical noise caused by inductive interference, static electricity or magnetic fields.

Due to continuous product improvement, product specifications are subject to change without prior notice.

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