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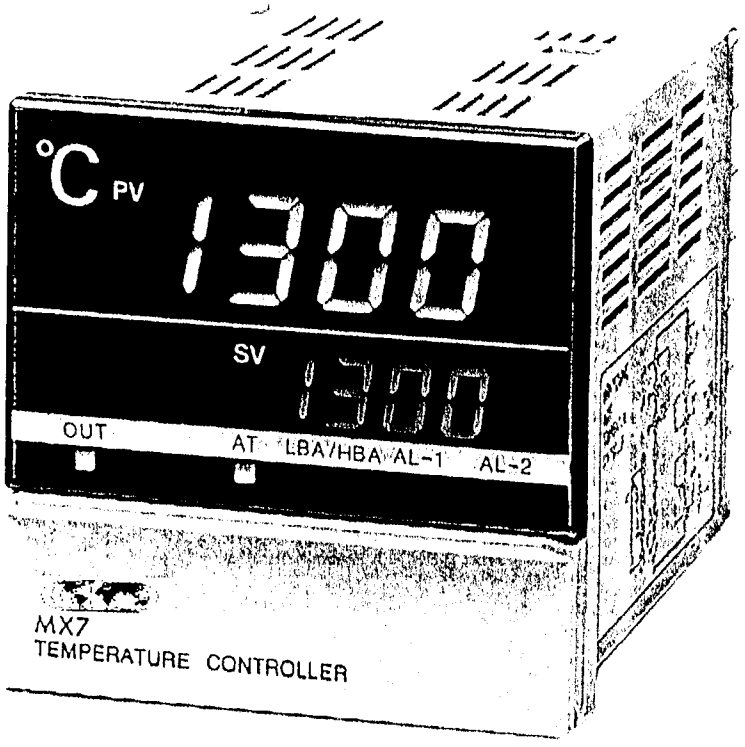
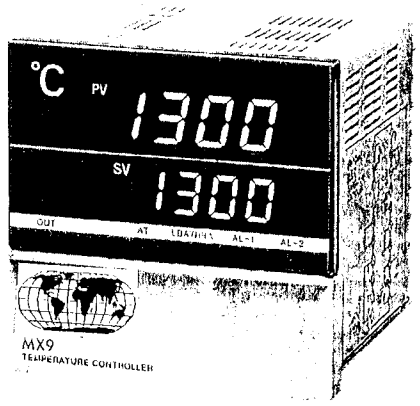
MX7
TEMPERATURE CONTROLLER
MANUAL



TEMPERATURE CONTROLLER

MX-F Series

- RAMP function
- PID Auto-tuning
- Universal input
- ℃/℉, Reverse/Direct action selectable
- Remote/Local input selectable



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■ Model and suffix code (MX-F Series)

MODEL	SUFFIX CODE					DESCRIPTION
MX □	— □	□	□	□	□	MX2/3/4/7/9
CONTROL	F					Normal PID Auto-tuning
OUTPUT		M				Relay contact
		C				Current (4~20㎃ DC)
		S				SSR drive pulse voltage (0/12V DC)
		V				Voltage (1~5V DC)
* OPTION ① Retransmission output			N			None
			□			Refer to CODE
② Heater Break Alarm(HBA)				N		None
				P		HBA function (CT separately)
③ Remote input					N	None
					□	Refer to CODE

* Option is not valid in MX4-F.
* In current output(C), lamp signal of "OUT" does not flash.

CODE				
	① DC 0~10㎷	② DC 0~100㎷	③ DC 0~1V	④ DC 0~5V
	⑤ DC 0~10V	⑥ DC 1~5V	⑦ DC 0~20㎃	⑧ DC 4~20㎃

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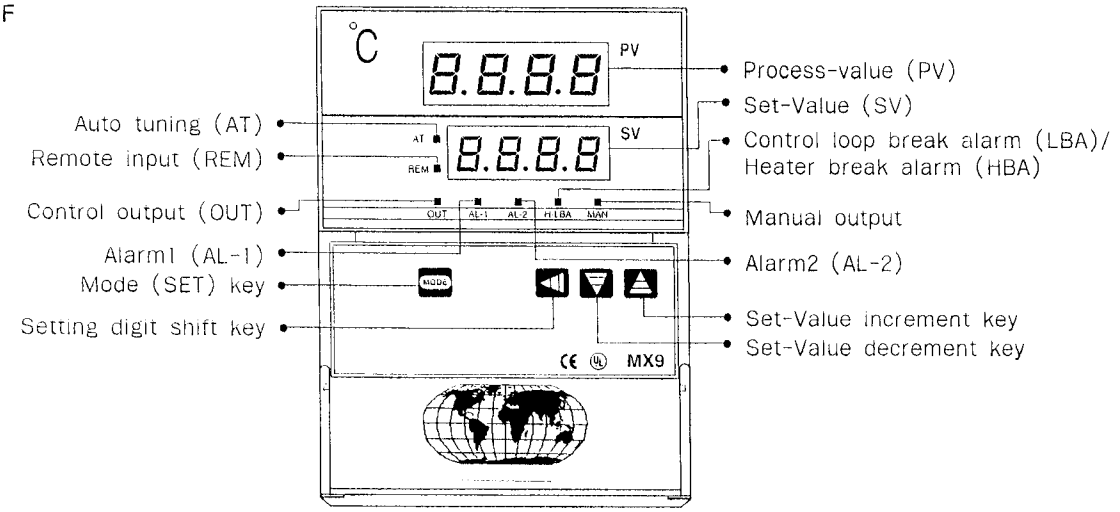
Functional Description

MX9-F



Input and Range

Signal	Input	Temperature range	
tCA	K	-50~1372°C (-50.0~999.9°C)	-50~2500°F (-50.0~999.9)
JIC	J	-100~1100°C (-100.0~999.9°C)	-100~2000°F (-100.0~999.9)
ECr	E	0~600°C (0.0~600.0°C)	0~1100°F (0.0~999.9)
tCC	T	-100~400°C (-100.0~400.0°C)	-100~750°F (-100.0~750.0)
d-Pt	Pt 100Ω (DIN)	-199~650°C (-199.9~650.0°C)	-199~1200°F (-199.9~999.9)
J-Pt	Pt 100Ω (JIS)	-199~650°C (-199.9~650.0°C)	-199~1200°F (-199.9~999.9)

Signal	Input	Temperature range	
rPr	PR(R)	0~1760°C	32~3200°F
bPr	PR(B)	0~1760°C	32~3200°F
SPr	PR(S)	0~1760°C	32~3200°F
U-1	1~5V 4~20mA	-199~3200 (1°C Mode) -1999~9999 (0.1°C Mode)	
U-2	0~5V 0~20mA	-199~3200 (1°C Mode) -1999~9999 (0.1°C Mode)	

** Cautions for input selection

1) When you select input mode, you must shift jump switch inside of PCB to CORRECT position first.
2) Afterwards select each input mode by key operation.

Input	T.C./Voltage	RTD	Current
Switch position	 TC	 PT	 R

Setting of constants in display

Signal on PV display	Name	Description	Setting range	Initial set
SH I	Temp. range	Temperature range in ramp	-199~3200 (-199.9~999.9)	-
r-AnP	Ramp	Ramp(Rate) time setting	0~540 minutes	-
*P	Proportional band	Set when proportional control is performed.	1 to span °C(°F) 0.1~999.9 °C(°F)	20 °C(°F)
A	Anti-reset windup	Prevents overshoot and/or undershoot caused by integral action effect.	0~100°C(°F)	100°C(°F)
*I	Integral time	Eliminates offset occurring in proportional control. Integral action turns OFF with this action set to "0".	0 to 3600 sec.	240 sec.
*d	Derivative time	Prevents ripples by predicting output change thereby improving control stability. Derivative action turns OFF with this action set to "0".	0 to 3600 sec.	60 sec.
HYS	Hysteresis (in ON/OFF action)	Displays hysteresis Set-Value for main output.	0.1~100.0	1°C(°F)
C	Proportioning cycle	Displays manipulated output cycle(sec.).	1 to 100 sec. (0.1 to 100.0 sec.)	Relay contact output : 20 sec. Voltage pulse output : 2 sec.

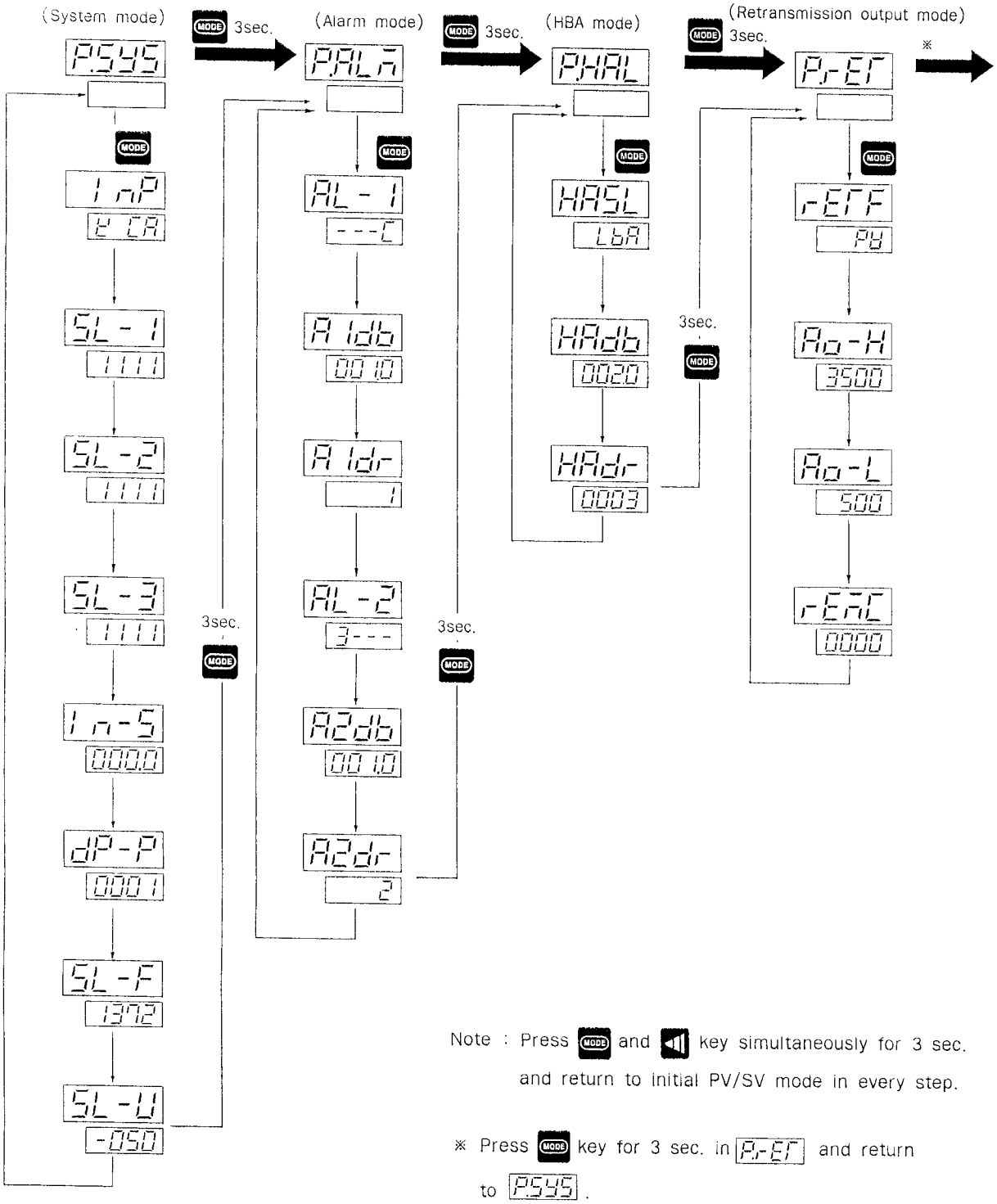
*Automatically set by Auto-tuning

Alarm mode

non	None
---C	Deviation high alarm
]---	Deviation low alarm
---E	Hold function of high alarm
3---	Hold function of low alarm
-C]-	Band alarm
]--C	High and low alarm

3--C	Low alarm hold function of high/low alarm
]--E	High alarm hold function of high/low alarm
3--E	Hold function of high/low alarm
I--C	Process high alarm
I--E	Hold function of process high alarm
]--I	Process low alarm
3--I	Hold function of process low alarm

Function set mode

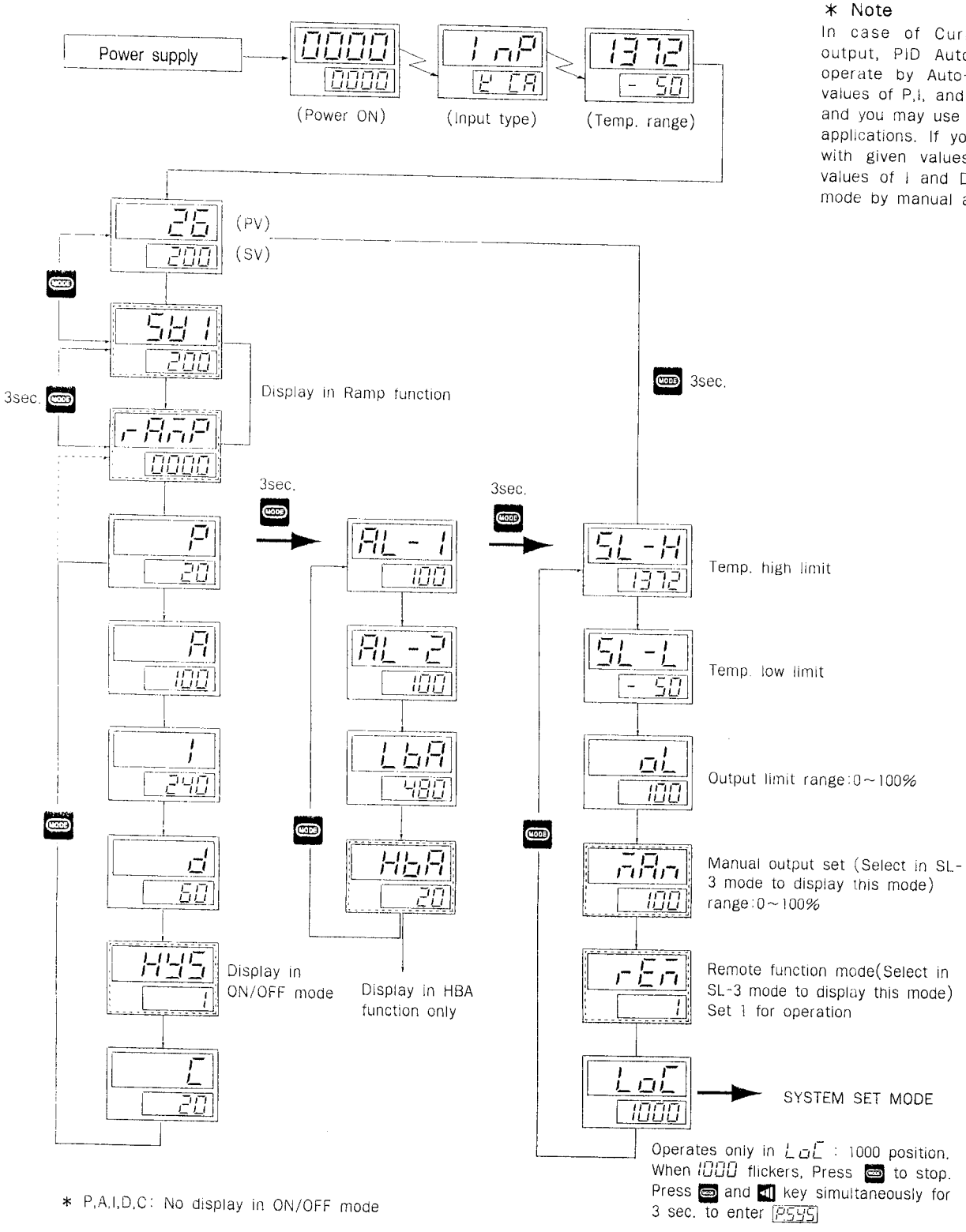


Note : Press MODE and ◀ key simultaneously for 3 sec. and return to initial PV/SV mode in every step.

※ Press MODE key for 3 sec. in P.-ET and return to P.SYS.

Operation Manual

Normal mode

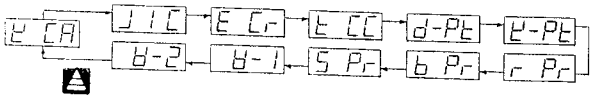


* P,A,I,D,C: No display in ON/OFF mode

* Note

In case of Current and Voltage output, PID Auto-tuning does not operate by Auto-tuning key. Initial values of P,I, and D are programmed and you may use the unit in ordinary applications. If you are not satisfied with given values, you can change values of I and D slightly in normal mode by manual adjustment.

- **InP** : Input mode



- **SL-1**
  1111
  - 0 : Indicator
    1 : Controller
  - 0 : ON/OFF
    1 : PID
  - 0 : Direct control action for cooling
    1 : Reverse control action for heating
  - MX□-F Normal type

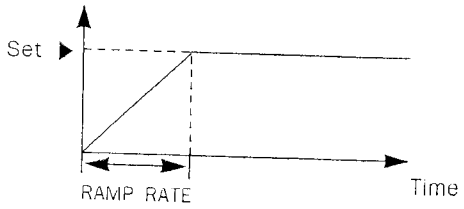
- **SL-2**
  1111
  - 0 : °F
    1 : °C
  - 0 : 0.1°C resolution
    1 : 1°C resolution
  - No function key (Do not modify)
  - 0 : Current output
    1 : Relay or Voltage, Pulse

- **SL-3**
  1111
  - 0 : Remote input function
    1 : No remote input function
  - 0 : Manual output function
    1 : No manual output function
  - No function key (Do not modify)
  - 0 : Ramp function
    1 : No ramp function

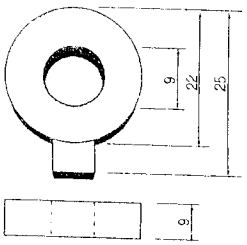
- **In-S** : Input shift value
  range : within free scale range
- **dP-P** : Decimal point selection
  range : 0 ~ 3
  (0001 → 000.0 in PV mode)
- **SL-F** : Span of free scale
  range : -199~3200 -1/1 MODE
  (-1999~9999) -1/10 MODE
- **SL-U** : Zero of free scale
  range : -199~3200 -1/1 MODE
  (-1999~9999) -1/10 MODE
- **AL-1** : Alarm-1 (Refer to alarm mode)
  initial value : Deviation high alarm
- **A1db** : Dead band of AL-1
  initial value : 1
- **A1dr** : Output terminal of AL-1
  1
  - 0 : None
    1 : AL-1 output → AL-1 terminal (initial value)
    2 : AL-1 output → AL-2 terminal
    3 : AL-1 output → LBA/HBA terminal
- **AL-2** : Alarm-2 (Refer to alarm mode)
  initial value : Hold function of low alarm
- **A2db** : Dead band of AL-2
  initial value : 1.0
- **A2dr** : Output terminal of AL-2
  2
  - 0 : None
    1 : AL-2 output → AL-1 terminal (Initial value)
    2 : AL-2 output → AL-2 terminal
    3 : AL-2 output → LBA/HBA terminal
- **HASL** : LBA/HBA function
  LbA
  non | LbA | H25 | H50
  (None) (LBA) (25A HBA)(50A HBA)
- **HAdb** : Dead band of HBA (A)
- **HAdr** : Output terminal of LBA/HBA
  0003
  - 0 : None
    1 : LBA/HBA output → AL-1 terminal
    2 : LBA/HBA output → AL-2 terminal
    3 : LBA/HBA output → LBA/HBA terminal
- **rETF** : Retransmission display
  PV
  non | PV | SV
  (None) (PV) (SV)
- **Ao-H** : Span of retransmission output
  range : 0~4095 initial value :3500
  (Do not modify)
  3500
- **Ao-L** : Zero of retransmission output
  range : 0~4095 initial value :500
  (Do not modify)
  500
- **rEnC** : Remote input calibration
  (Do not modify)
  0000

■ Ramp function

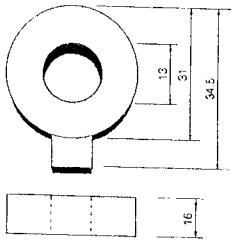
Ramp rate can be adjusted.
(0~540 minutes)



■ CT(Current Transformer)



Model CT-25



Model CT-50

■ PID Auto-Tuning (Valid in Relay and SSR output only)

- Press the key and key at the same time. Then, AT indication lamp flashes to start the Auto-tuning function.
- If Auto-tuning function ends, the AT indication lamp stops flashing automatically.
  When checking the auto-tuned value, press the key and conform in turn.
- When you want Auto-tuning function to be suspended, press the key and key simultaneously, then the AT indication lamp stops flashing to release Auto-tuning function. In this case P.I.D and ARW values are not changed (Maintain the value before the Auto-tuning starts).
- When you want to change the SV(set-value) during Auto-tuning, suspend it and perform PID control using the values before Auto-tuning starts.

■ Control loop break alarm(LBA)

LBA function starts to measure time from the moment that the PID Computed Value (Output ON time/cycle) become 0% or 100%, and detects the amount of Process Value change at each LBA setting time, and determines by the amount of change whether LBA is to be ON or OFF.

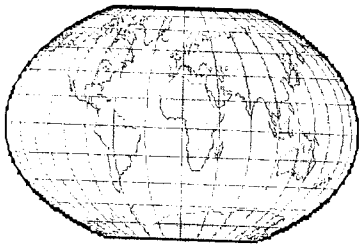
- When the status at a 100% PID computed value continues beyond the LBA setting time, the LBA turns ON if the measured-value(PV) does not rise by 2℃(℉) or more.
  (In direct action, the above alarm turns ON if the measured-value does not fall by 2℃(℉) or more.
- When the status at 0% PID computed value continues beyond the LBA setting time, the LBA turns ON if the measured-value(PV) does not fall by 2℃(℉) or more.

■ Remote input

Set-value of controller can be set or changed from outside of the controller by direct voltage/current signal.
But, the external signal should be input continuously.
(Auto-tuning function is not operated while the external signal is set)

■ Heater break alarm(HBA)

Set-value of HBA to be set about 85% to input of CT but the set-value should be less in case that the ratio of voltage variation is high.
If several heaters are connected in parallel, the alarm may be turned ON even though one circuit is broken.
In such a case, set the value of HBA to be slightly high.
No HBA operates at "0" setting, but HBA operates at "25.0" or "50.0" setting.



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PROGRAMMING MX-7

1 CONNECT 115 VAC TO TERMINALS 18 & 19 CHECK JUMPER ON BOARD

2 CONNECT JUMPER TO TERMINALS 1 & 2

3 PRESS MODE AND HOLD UNTIL SL-H APPEARS

4 PRESS MODE 3 TIMES LOC APPEARS SET TO 1000 PRESS MODE

5 PRESS AND HOLD MODE AND LEFT ARROW KEY FOR 5 SECONDS – P.5Y5 SHOULD APPEAR

6 PRESS MODE INP SHOULD APPEAR SET TO JIC PRESS MODE

7 PRESS MODE SL-1 SHOULD APPEAR SET TO 1111 PRESS MODE

8 PRESS MODE SL-2 SHOULD APPEAR SET TO 0110 PRESS MODE

9 PRESS MODE SL-3 SHOULD APPEAR SET TO 1111 PRESS MODE

10 PRESS MODE AND HOLD P.ALA SHOULD APPEAR

11 PRESS MODE AL-1 SHOULD APPEAR SET TO 1- -C PRESS MODE

12 PRESS MODE 3 TIMES AL-2 SHOULD APPEAR SET TO □- -1 PRESS MODE

13 PRESS MODE AND HOLD P.HAL SHOULD APPEAR

14 PRESS AND HOLD MODE AND LEFT ARROW KEY FOR 5 SECONDS SHOULD GO BACK TO BEGINNING

15 PRESS AND HOLD MODE P SHOULD APPEAR SET TO 8.0 PRESS MODE

16 PRESS MODE A SHOULD APPEAR SET TO 100 PRESS MODE

17 PRESS MODE I SHOULD APPEAR SET TO 90 PRESS MODE

18 PRESS MODE D SHOULD APPEAR SET TO 0000 PRESS MODE

19 PRESS MODE AND HOLD AL-1 SHOULD APPEAR SET TO 500 PRESS MODE

20 PRESS MODE AL-2 SHOULD APPEAR SET TO –50

21 CHECK 4-20 OUTPUT CONNECT RED WIRE FROM CALIB. TO TERM. 14 BLACK WIRE FROM CALIB. TO TERM. 13