Notes: (for preceding page)

1. Dotted line means in case of option specification.
   (If the options are not designated, the modes cannot be selected.)
2. In any mode, if the " AT " key is pressed, auto-tuning will be started.
   However, if lock function is specified, the auto-tuning cannot work.
3. The indicated value selected by the " △ and ▽ " keys is registered after pressing the " MODE " key. If the key operation is ended after the numeric value is set, approx. 30 seconds later the mode is automatically changed to PV, SV display mode and the setting values are registered.

(1) PV, SV display mode

A mode to indicate a status of control.

Setting mode display	SV display	PV display	Change of setting value
Blank	Main setting value	Actual temperature	No contents of setting items nor setting values can be changed.

(2) Main setting mode

A mode to set a setting value of main control (C1).
The setting range covers the scaling low to high limit setting values.
The setting value is registered when the " MODE " key is pressed.
[Factory adjusted as 0℃, 0℉]

Setting mode display	SV display	PV display	Change of setting value
↳	Main setting value	Actual temperature	The value can be increased or decreased by pressing the " △, ▽ " and " FAST "keys.

(3) Temperature alarm setting mode

A mode to set a temperature alarm setting value.
Setting range is as follows. (Setting ranges differ from the alarm action correspondent to the models. Factory adjusted as 0 ℃, 0℉.)
Value setting: Deviation setting against main setting, except Process value alarm.

(MCR-230-) No alarm action
(MCR-232-) High limit alarm : −100 to 100℃, −200 to 200℉
(MCR-233-) Low limit alarm : −100 to 100℃, −200 to 200℉
(MCR-234-) High/Low limits alarm : ±(1 to 100)℃, ±(1 to 200)℉ ＊
(MCR-236-) High/Low limit range alarm: ±(1 to 100)℃, ±(1 to 200)℉ ＊
(MCR-238-) Process value alarm : Scaling low to high limit setting value

[Option code: H, Applied the standby function]

When power is initially applied to the controller, the function disables alarm action even if the input value is in the range in which the alarm action works, and this also prevents the alarm even if the alarm action point enters the above range as a result of the main setting value change during control.

Once the input value exceeds the alarm action point continuing the control, the standby function will be released and when the input value reaches the point again, the alarm action output will work.

High limit alarm, with standby function : −100 to 100℃, −200 to 200℉
Low limit alarm , with standby function : −100 to 100℃, −200 to 200℉
High/Low limit alarm, w/standby function : ±(1 to 100)℃, ±(1 to 200)℉

Notes: 1. Setting the alarm value to 0 disables the function.
(However, in case of Process value alarm, it works even if 0 is set.)
2. In case rating scale has a decimal point, the setting value is:
-100.0 to 100.0℃,(-200.0 to 200.0℉)
3. Both + and − side of values are simultaneously set for the setting marked by ＊.

Setting mode display	SV display	PV display	Change of setting value
A	Temperature alarm setting value	Actual temperature	The value can be increased or decreased by pressing the " △, ▽ " and " FAST "keys.

(4) Auxiliary temperature alarm setting mode [Option: AL□]

This mode is applied when specified the auxiliary temperature alarm (A2). Setting range, setting method and the function are the same as item (3).

Setting mode display	SV display	PV display	Change of setting value
A.	Auxiliary temp. alarm setting value	Actual temperature	The value can be increased or decreased by pressing the " △, ▽ " and " FAST "keys.

(5) Proportional band setting mode

A mode to set a proportional band of main control (C1).
Setting range is 0.0 to 200.0%. (Factory adjusted as 2.5%.) Setting the proportional band to 0.0 causes the instrument to act as an ON/OFF controller, and when selected heating and cooling control [Option: D], sub-control(C2) also turns to ON-OFF action.

At this time, differential can be set in the differential setting mode of the attached function setting mode.

Setting mode display	SV display	PV display	Change of setting value
P	Proportional band setting value	Actual temperature	The value can be increased or decreased by pressing the " △, ▽ " and " FAST "keys.

(6) Integral time setting mode

A mode to set an integral time value.
Setting range is 0 to 3600 seconds. (Factory adjusted as 200 seconds.)
Setting the integral to 0 disables the function.

Setting mode display	SV display	PV display	Change of setting value
I	Integral time setting value	Actual temperature	The value can be increased or decreased by pressing the " △, ▽ " and " FAST "keys.

(7) Derivative time setting mode

A mode to set a derivative time value.
Setting range is 0 to 1800 seconds. (Factory adjusted as 50 seconds.)
Setting the derivative to 0 disables the function.

Setting mode display	SV display	PV display	Change of setting value
d	Derivative time setting value	Actual temperature	The value can be increased or decreased by pressing the " △, ▽ " and " FAST "keys.

(8) ARW setting mode (Anti-reset windup)

A mode to set an ARW value.
Setting range is 0 to 100%. (Factory adjusted as 50%.)

Setting mode display	SV display	PV display	Change of setting value
A	ARW value	Actual temperature	The value can be increased or decreased by pressing the " △, ▽ " and " FAST "keys.

** Explanation of ARW setting mode **

ARW prevents overshoot caused due to the integral action. It is automatically set using auto-tuning. If operating by manual, duty factor of load for the setting is of standard value, to fix controlling aim.
The less ARW value is, the less excess integral action becomes at transition status, however, it needs time till stabilized.

(9) Dead band setting mode [Option: D]

A mode to set a dead band of main(C1) and sub(C2) control. This mode is to be selected additionally when heating or cooling control output [Option: D] is specified.

Setting range is -10.0% to 10.0% of full scale (equivalent temperature).
Overlap: (−) and Dead band: (+) (Factory adjusted as 0℃, 0℉)

Note: If the control action is selected as ON/OFF action, the overlap and dead band of main control (C1) or sub-control (C2) become null.

Setting mode display	SV display	PV display	Change of setting value
c	Dead band value	Actual temperature	The value can be increased or decreased by pressing the " △, ▽ " and " FAST "keys.

(10) Heater burnout alarm setting mode [Option: W]

A mode to set the heater current, and is applied when heater burnout alarm output [W] is specified.

$$\text{Action point(setting value)\%} = \frac{\text{Heater current}}{\text{Rating current}} \times 100\%$$

Heater current: Maximum current value during operation
Rating current: Specified current (5A, 10A or 20A)

Notes: 1. The setting value can be calculated with above mentioned, however, it is recommended to set 80% of the value. Setting range is 0 to 100%. (Factory adjusted as 0%)
Once alarm action operates, the output is held. To cancel the output, turn the power OFF and ON again, or set the value to 0, and set the value again.
In case sensor burnout works, HB indicator lights and " - - - - " blinks on PV display. And if the sensor is fixed, the display turns to process variable.

2. This option [W] cannot be applied to the type "Current output".

Setting mode display	SV display	PV display	Change of setting value
b	Heater current setting value	Actual temperature	The value can be increased or decreased by pressing the " △, ▽ " and " FAST "keys.

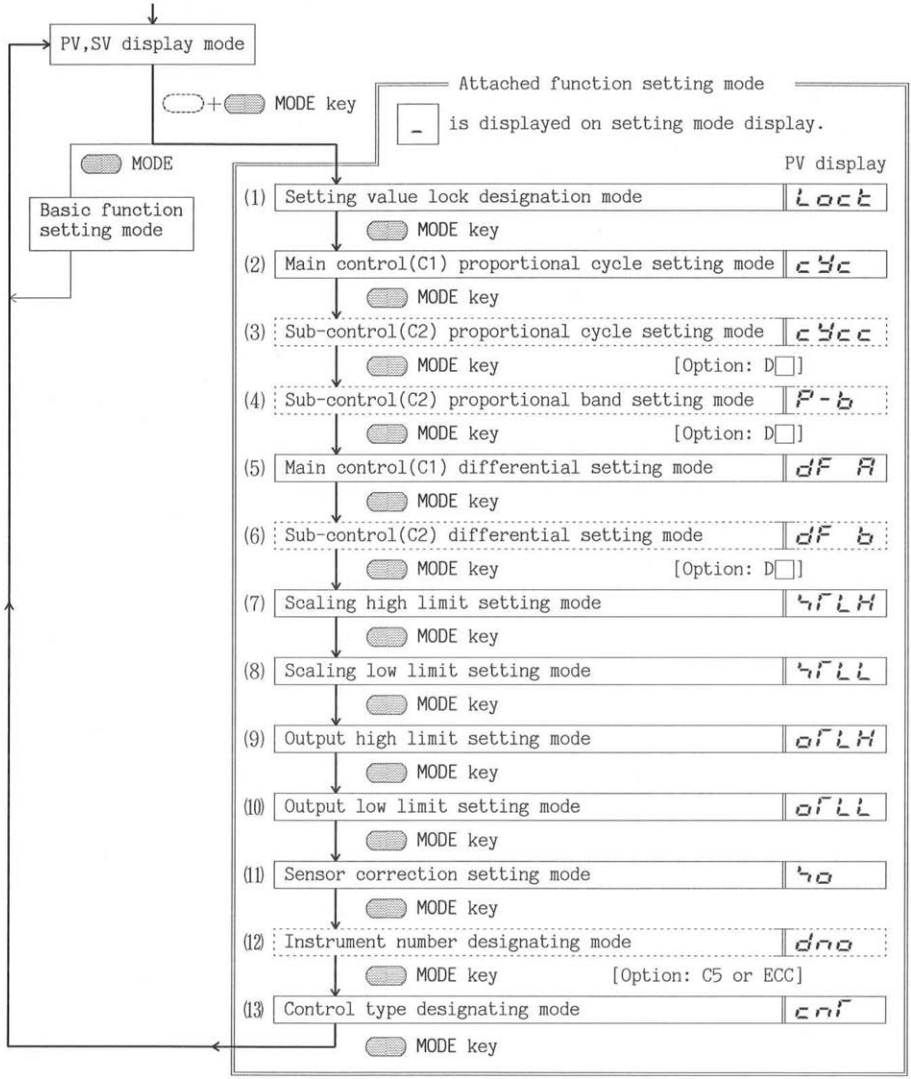
(11) PID auto-tuning (AT) performance

Auto-tuning starts by pressing the " AT " key in PV, SV display mode or basic function setting mode. During auto-tuning is operated, auto-tuning indicator blinks. Auto-tuning is released when pressed the " AT " key again during auto-tuning is operated. After auto-tuning is ended, the Proportional band, the Integral time, the Derivative time and the ARW value are automatically set.
(See item 6.2 for the functions)

Notes: 1. When option SM (setting value memory) is specified, the values gotten are stored only the file memory number being displayed.
2. Auto-tuning will not function if lock mode 1 or 2 is specified in the setting value lock designation mode.
3. The " MODE " key becomes null during PID auto-tuning, and other setting cannot be operated.

5.2 Key operation for attached function (Attached function setting mode)

In the PV,SV display mode, press the " MODE key" while pressing the " " mode auxiliary key, then the mode is changed to attached function setting mode. Further, each time only the " MODE " key is pressed it changes the status as follows:



Notes: 1. Dotted line means in case of option specification.
(If option is not designated, the mode can not be selected.)

2. The indicated value selected by the " △, ▽ key " is registered after pressing the " MODE " key, and in case the key operation is ended setting the values, approx. 30 seconds later it is automatically changed to PV, SV mode and setting values are registered.

(1) Setting value lock designating mode

A mode to designate a lock function of setting value, and the functions are different from the designating status.

Mode 1: No setting values in basic function setting mode can be changed.

Mode 2: Only main setting value is changeable, and other values in basic function setting mode become lock status.

Mode 3: Exclusive use for option ECC, and it does not memorize the main setting value from host device (PC-600, option SVTC) into internal memory but reads the value directly.

Notes: • Do not use the Mode 3 in case the option ECC is not designated.
• When the power supply is turned off, the main setting value turns "0" since the internal memory is not used.

Unlock: A status of lock cancelled, and all setting values can be changed. This mode is used to perform the Auto-tuning by the " AT " key. (Factory adjusted as unlock [lock cancelled] status.)

Note: However, if the " AT " key is pressed just after "Loc 1" or "Loc2" is displayed on SV display, auto-tuning will work, and it turns to Lock mode after the auto-tuning is terminated.

Lock mode	SV display	PV display	Change of the status
Unlock	- -	Lock	With △ key - - ⇨ Loc 1 ⇨ Loc2 ⇨ Loc3
Mode 1	Loc 1		
Mode 2	Loc2		With ▽ key Loc3 ⇨ Loc2 ⇨ Loc 1 ⇨ - -
Mode 3	Loc3		

(2) Main control (C1) proportional cycle setting mode.

(This mode is inapplicable to the current output type.)

Proportional cycle can be set, in case control output of main control (C1) is relay contact or non-contact voltage output type.

In case of ON/OFF action, this setting value becomes null.

Setting range is 1 to 120 seconds.

(Factory adjusted as 30 sec to Relay contact type, 3 sec to Non-contact voltage type.)

Setting mode display	SV display	PV display	Change of setting value
-	Setting value of proportional cycle	cYc	The value can be increased or decreased by pressing the " △, ▽ " and " FAST "keys.

(3) Sub-control (C2) proportional cycle setting mode [Option:D□]

(This mode is inapplicable to the current output type.)

This mode is to be selected additionally when heating/cooling control output [Option: D□] is specified, and the proportional cycle can be set in this mode.

In case of ON/OFF action, this setting value becomes null.

Setting range is 1 to 120 seconds. (Factory adjusted as 15 seconds.)

(Factory adjusted as 30 sec to Relay contact type, 3 sec to Non-contact voltage type.)

Setting mode display	SV display	PV display	Change of setting value
-	Setting value of proportional cycle	cYcc	The value can be increased or decreased by pressing the " △, ▽ " and " FAST "keys.

(4) Sub-control (C2) proportional band setting mode [Option: D□]

This mode is to be selected additionally when heating/cooling control output [Option: D□] is specified, and proportional band of Sub-control (C2) can be set.
Setting range is from -10 to 10. (Factory adjusted as 1.)

Setting mode display	SV display	PV display	Change of setting value
-	Setting value of proportional band (C2)	P-b	The value can be increased or decreased by pressing the " △, ▽ " and " (FAST) "keys.

- Example to set Sub (C2) proportional band

・ In the case, rated scale is 0 to 400℃ and Main (C1) proportional band is 10.0% (40℃), the sub (C2) proportional band should be set as follows.

[Example] If 8℃ is desired for Sub (C2) proportional band, the Sub (C2) proportional band multiplying factor should be 1/5 (0.2), therefore, set the Sub (C2) proportional band setting value to −5. (Refer to below table.)

[Formula] Main proportional band value × Sub proportional band setting value = Sub proportional band value

40℃ [Main proportional band value] × 1/5 (0.2) [−5 (*1) Sub proportional band setting value] = 8℃

Note (*1): Sub (C2) proportional band multiplying factor of Sub (C2) proportional band setting value −5 is 1/5 [0.2].

Sub control Proportional band setting value	−10	−9	−8	−7	−6	−5	−4	−3	−2	−1	0
Sub control Proportional band multiplying factor	1/10	1/9	1/8	1/7	1/6	1/5	1/4	1/3	1/2	1/1	0
Sub control Proportional band value (℃)[Example]	4.0	4.4	5.0	5.7	6.7	8.0	10.0	13.3	20.0	40.0	0

Sub control Proportional band setting value	0	1	2	3	4	5	6	7	8	9	10
Sub control Proportional band multiplying factor	0	1	2	3	4	5	6	7	8	9	10
Sub control Proportional band value (℃)[Example]	0	40	80	120	160	200	240	280	320	360	400

[Example]: Main proportional band is 40℃.

Setting the proportional band to 0.0 causes the instrument to act as an ON/OFF controller, and the differential can be set in (5) differential setting mode.

If main control (C1) proportional band is set to 0.0 (ON/OFF action), the setting (C2) becomes null, and sub-control (C2) also acts ON/OFF action.

(5) Main control (C1) differential setting mode

In case main control (C1) acts ON/OFF action (Setting the Proportional band to 0.0), differential (Dead band of ON/OFF action) can be set in this mode.
Setting range is 0.0 to 100.0℃(200.0℉) (Factory adjusted as 1.0℃[℉])

Setting mode display	SV display	PV display	Change of setting value
-	Setting value of differential	dF R	The value can be increased or decreased by pressing the " △, ▽ " and " (FAST) "keys.

(6) Sub-control (C2) differential setting mode [Option: D□]

This mode is to be selected additionally when heating/cooling control output [Option: D□] is specified. In case Sub-control (C2) acts ON/OFF action, [i.e., proportional band of main control (C1) or sub-control (C2) is set as 0.0] differential can be set.

Setting range is 0.0 to 100.0℃(200.0℉) (Factory adjusted as 1.0℃[℉])

Setting mode display	SV display	PV display	Change of setting value
-	Setting value of differential	dF b	The value can be increased or decreased by pressing the " △, ▽ " and " FAST "keys.

(7) Scaling high limit setting mode

A mode to set high limit of the scale value (rated scale).

Setting range differs from the kinds of sensor. See table 5.1 for the detail

(Factory adjusted as specified rated value.)

Setting mode display	SV display	PV display	Change of setting value
-	High limit value of the scale	SCLH	The value can be increased or decreased by pressing the " △, ▽ " and " FAST "keys.

(8) Scaling low limit setting mode

A mode to set low limit of the scale value (rated scale).

Setting range differs from the kinds of sensor. See table 5.1 for the detail.

(Factory adjusted as specified rated value.)

Setting mode display	SV display	PV display	Change of setting value
-	Low limit value of the scale	SCLL	The value can be increased or decreased by pressing the " △, ▽ " and " FAST "keys.

Table 5.1 Scaling setting value

Input	Setting range (low limit to high limit)		Minimum span	
K	0 to 1200℃,	0 to 2200℉	300℃,	550℉
J	0 to 800℃,	0 to 1600℉	300℃,	550℉
PL－Ⅱ	0 to 1300℃,	0 to 2400℉	300℃,	550℉
R, S	0 to 1600℃,	0 to 3200℉	800℃,	1500℉
B	0 to 1800℃,	0 to 3200℉	800℃,	1500℉
C	0 to 2300℃,	0 to 4200℉	800℃,	1500℉
T	-199.9 to 400.0℃,	-199.9 to 750.0℉	300.0℃,	550.0℉
Pt100	-199.9 to 400.0℃,	-199.9 to 999.9℉	100.0℃,	200.0℉

Note: When setting the scaling range narrower than the minimum span, the accurcy becomes unwarrantable.

(9) Output high limit setting mode

A mode to set the high limit of the control output. Effective to only main output. Setting range is from output low limit value to 100%. [Indication: to 110(%)] (With Current output type, it is effective from output low limit value to 110%.)

(Factory adjusted as 100%)

Setting mode display	SV display	PV display	Change of setting value
-	High limit value of the output	oFLH	The value can be increased or decreased by pressing the " △, ▽ " and " FAST "keys.

(10) Output low limit setting mode

A mode to set the low limit of the control output. Effective to only main output. Setting range is from 0% to output high limit value. [Indication: from −10(%)] (With Current output type, it is effective from −10% to output low limit value.)

(Factory adjusted as 0%)

Setting mode display	SV display	PV display	Change of setting value
-	Low limit value of the output	oFLL	The value can be increased or decreased by pressing the " △, ▽ " and " FAST "keys.

(11) Sensor correction setting mode

A mode to set the sensor correcting value.
Setting range is −30.0 to 30.0℃,(−50.0 to 50.0℉)

(Factory adjusted as 0.0℃[℉].)

Setting mode display	SV display	PV display	Change of setting value
-	Correction value of the sensor	ro	The value can be increased or decreased by pressing the " △, ▽ " and " FAST "keys.

＊ Explanation of sensor correction function ＊

It corrects the input value from the sensor. When a sensor cannot be set at a location where control is desired, the sensor measuring temperature may deviate from the temperature in the controlled location, and when controlling with plural controllers, the accuracy of sensors or the difference of load capacities have influence on the control. Therefore, sometimes measuring temperature (input value) does not accord with the same setting value. In such a case, the control can be accorded with desired temperature by shifting the input value of sensors.

(12) Instrument number designating mode [Option:C5] or [Option: ECC]

A mode to designate the instrument number to MCR-200 when serial communication (RS-485) [Option: C5] or [Option: ECC] is applied. Settable from No. 0 to No. 30

＊ For the Option ECC, all instruments number should be No.31.

(Connectable maximum 31 of MCR-200, Factory adjusted as 0.)

Setting mode display	SV display	PV display	Change of setting value
-	Instrument number setting value	dno	The value can be increased or decreased by pressing the " △, ▽ " and " FAST "keys.

Notes: • [Option: C5] cannot be applied together with [Option: ECC].
• [Option: C5] or [Option: ECC] cannot be applied together with [Option: W].