- The parameters in this mode can be used only when the “security” parameter (protect mode) is set to “0” to “3”.
- This mode contains the main parameters for adjusting control, such as executing AT (auto-tuning), setting the control period, setting PID parameters and setting heater burnout (HBA) conditions.
- To select this mode, press the [↩] key for 1 second minimum. The display changes to the menu display. If you select [Lv-1] then press the [↩] key for 1 second minimum, the controller enters the level 1 mode.
- To select parameters in this mode, press the [↩] key. To change parameter settings, use the [∧] or [∨] keys.
- The following table shows the parameters supported in this mode and the page where the parameter is described.

Symbol	Parameter Name	See
AT	AT Execute/Cancel	Below
P	Proportional band	Below
I	Integral time	Below
d	Derivative time	Below
C-SC	Cooling coefficient	Below
C-db	Dead band	Below
db	Position-proportional dead band	Below
oF-r	Manual reset value	Below
HYS	Hysteresis (heat)	Below
CHYS	Hysteresis (cool)	Below
CP	Control period (heat)	Below
C-CP	Control period (cool)	Below
Ct	Heater current monitor	Below
Hb	Heater burnout	Below

AT Execute/Cancel

Conditions of Use
The controller must be in operation, and control must be advanced PID control.


Function

- Selects the limit cycle of MV change width (40% or 100%) for execution. After AT execution, the "PID" and the "LBA detection time" (Loop Break Alarm) parameters are automatically set.
- During heating and cooling control or position-proportional control, only 100%AT can be executed.


Example of use

- To execute 40%AT, select [AT-1], and to execute 100%AT, select [AT-2]. During execution of auto-tuning, the AT LED flashes. However, note that during heating and cooling control or position-proportional control, [AT-1] is not displayed.
- When AT execution ends, the parameter setting automatically returns to [OFF].


See

● Related description
3−8 Adjusting Control Operation/AT
● Related parameters
"Proportional band" "Integral time" "Derivative time" (level 1 mode)
"LBA detection mode" (level 2 mode)

Proportional band

Integral time

Derivative time

Conditions of Use
The control must be advanced PID control.


Function


Comment

- Sets the PID parameters. Note that PID is automatically set when AT is executed.

Parameter	Setting Range	Unit	Default
Proportional band	0.1 to 999.9	%FS	10.0
Integral time	0 to 3999 *1	Second	233
Derivative time	0 to 39999	Second	40

*1: During position-proportional control, the setting range become 1 to 3999 seconds.


See

● Related parameter
"AT Execute/Cancel" (level 1 mode)

C-SC Cooling coefficient

Conditions of Use
The control must be either heating and cooling control, or advanced PID control.


Function

• In heating and cooling control, P at the cooling side is calculated by the following formula:
Cooling side P = Cooling coefficient x P


Comment

Setting Range	Unit	Default
0.01 to 99.99	None	1.00


See

● Related description
4−1 Selecting the Control Method/Heating and cooling control
● Related parameter
"Proportional band" (level 1 mode)


Model

E5AK-TAA2

C-db Dead band

Conditions of Use
The control system must be heating and cooling control.


Function

• Sets the output dead band width in a heating and cooling control system. A negative setting sets an overlap band.


Comment

Setting Range	Unit	Default
-19.99 to 99.99	%FS	0.00


See

● Related description
4−1 Selecting the Control Method/Heating and cooling control


Model

E5AK-TAA2

db Position-proportional dead band

Conditions of Use

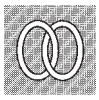
The control must be position-proportional control.

Function

- Sets the output hold width (ON/OFF switching point for open and close output) during position-proportional control.

Comment

Setting Range	Unit	Default
0.1 to 10.0	%	2.0



See

- Related description
  4−1 Selecting the Control Method/Position-proportional control
- Related parameter
  “Open/close hysteresis” (level 2 mode)

Model

E5AK-TPRR2

oF-r Manual reset value

Conditions of Use

The control must be either standard control or advanced PID control, and the “integral time” parameter must be set to “0”.

Function

- Sets the required manipulated variable to remove offset during stabilization of P or PD control.

Comment

Setting Range	Unit	Default
0.0 to 100.0	%	50.0

Model

E5AK-TAA2

HYS Hysteresis (heat)

CHYS Hysteresis (cool)

Conditions of Use

The control system must be ON/OFF control.

Function

- Sets the hysteresis for ensuring stable operation at ON/OFF switching.
- In a standard control system, use the “hysteresis (heat)” parameter. The “hysteresis (cool)” parameter cannot be used.
- In a heating and cooling control system, the hysteresis can be set independently for heating and cooling. Use the “hysteresis (heat)” parameter to set the heating side hysteresis, and use the “hysteresis (cool)” parameter to set the cooling side hysteresis.

Comment

Parameter	Setting Range	Unit	Default
Hysteresis (heat)	0.01 to 99.99	%FS	0.10
Hysteresis (cool)	0.01 to 99.99	%FS	0.10

See

● Related description
4−1 Selecting the Control Method/ON/OFF control
● Related parameters
“Control output 1 assignment” “Control output 2 assignment” (setup mode)
“PID/ON/OFF” (expansion mode)

Model

E5AK-TAA2

CP Control period (heat)

C-CP Control period (cool)

Conditions of Use

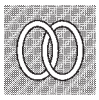
Relay, SSR or voltage output must set as the outputs, and the control must be set to advanced PID control, standard control or heating and cooling control.

Function

- Sets the pulse output period. Set the control period taking the control characteristics and life expectancy of the controller into consideration.
- In a standard control system, use the “control period (heat)” parameter. The “control period (cool)” parameter cannot be used.
- In a heating and cooling control system, the control period can be set independently for heating and cooling. Use the “control period (heat)” parameter to set the heating side control period, and use the “control period (cool)” parameter to set the cooling side control period.

Comment

Parameter	Setting Range	Unit	Default
Control period (heat)	1 to 99	Second	20
Control period (cool)	1 to 99	Second	20



See

● Related description

3−3 Setting Output Specifications

● Related parameters

“Control output 1 assignment” “Control output 2 assignment” (setup mode)

Model

E5AK-TAA2

Ct Heater current monitor

Conditions of Use
The HBA output function must be assigned as the output.

Function

- Measures the current value of the heater from CT input.
- This parameter is not displayed when the linear output unit (E53-C□, E53-V□) is mounted.

Monitor

Monitor Range	Unit
0.0 to 55.0	A

- [FFFF] is displayed when 55.0 A is exceeded.

See

● Related description
4−9 How to Use the Heater Burnout Alarm

● Related parameters
“Heater burnout” (level 1 mode)
“HBA latch” (option mode)

Model

E5AK-TAA2

Hb Heater burnout

Conditions of Use
The HBA output function must be assigned as the output

Function

- Outputs the heater burnout alarm when the heater current value falls below this parameter setting.
- When the set value is “0.0”, the heater burnout alarm is “OFF”. When the set value is “50.0”, the heater burnout alarm is “ON”.

Comment

Setting Range	Unit	Default
0.0 to 50.0	A	0.0

See

● Related description
4−9 How to Use the Heater Burnout Alarm

● Related parameters
“Heater current monitor” (level 1 mode)
“HBA latch” (option mode)

Model

E5AK-TAA2