

















## Level 1 Mode

- 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.
- To select this mode, press the  key for 1 second minimum. The display changes to the menu display. If you select [LW-!] 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.

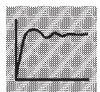
Symbol	Parameter Name	See
	AT Execute/Cancel	below
	Proportional band	below
	Integral time	below
	Derivative time	below
	Cooling coefficient	below
	Dead band	below
	Manual reset value	below
	Hysteresis (heat)	below
	Hysteresis (cool)	below
	Control period (heat)	below
	Control period (cool)	below



## AT Execute/Cancel

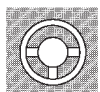
### Conditions of Use

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



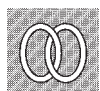
Function

- 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, only 100%AT can be executed.



Example of use

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



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

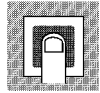
### Conditions of Use

The control must be advanced PID control.



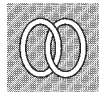
Function

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



Comment

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



See

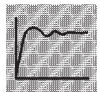
- Related parameter  
“AT Execute/Cancel” (level 1 mode)
- 
- 

**C - 5 C**

## Cooling coefficient

### Conditions of Use

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



Function

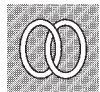
- In heating and cooling control, P at the cooling side is calculated by the following formula:

$$\text{Cooling side P} = \text{Cooling coefficient} \times \text{P}$$



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)

**C - db**

## Dead band

### Conditions of Use

The control system must be heating and cooling control.



Function



Comment



See

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

Setting Range	Unit	Default
-19.99 to 99.99	%FS	0.00

- Related description  
4.1 Selecting the Control Method/Heating and cooling control

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**OF-r****Manual reset value****Conditions of Use**

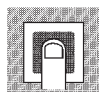
The control must be either standard control or advanced PID control, and the “integral time” parameter must be set to “0”.

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Function

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



Comment

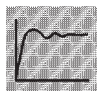
Setting Range	Unit	Default
0.0 to 100.0	%	50.0

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**HYS****Hysteresis (heat)****[HYS]****Hysteresis (cool)****Conditions of Use**

The control system must be ON/OFF control.

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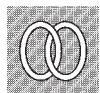
Function

- 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)
- 



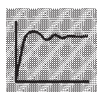
Control period (heat)



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.



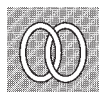
Function

- 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)