HAKKO HOT AIR GENERATOR

HAP2000 Series

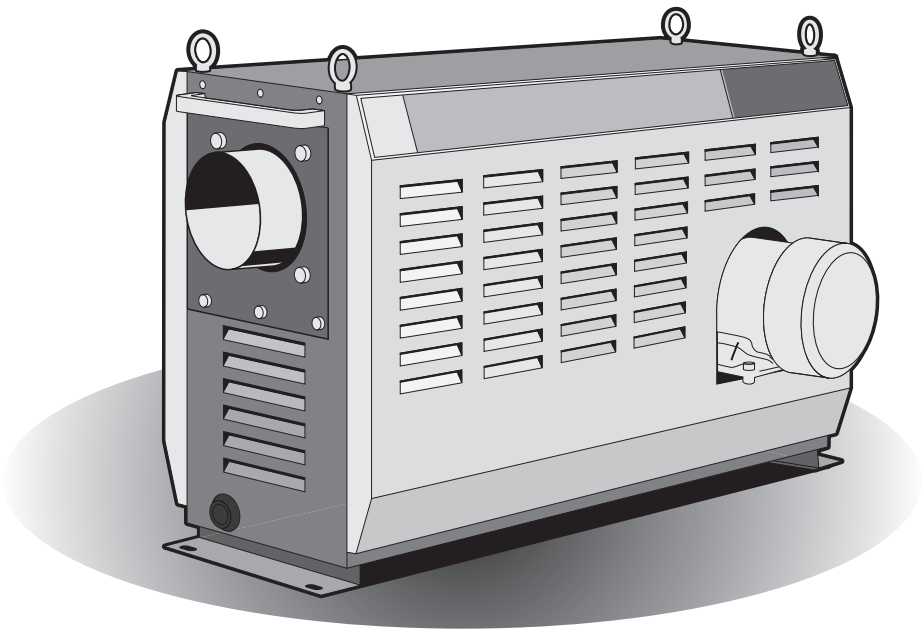
HAP2032(F)/2052(F)/2077(F)
HAP2082(F)/2102(F)
HAP2152H(F)/2202H(F)
HAP2302H(F)/2403H(F)
HAP2053T/2103T

INSTRUCTIONS MANUAL

Thank you for your choosing our product.

Please read this instructions manual before use and remember to keep it in within reach for future reference.

Please check the following items after receiving the product.
- Check if the nameplate matches the product you ordered.
- Check if the product is damaged or deformed due to transport or other accidents.
- Ensure that the bolts and nuts are not loosen.



HAKKO ELECTRIC CO., LTD.

B3-2068-05

CONTENTS

PREFACE

This manual describes how to install, operate, inspect and maintain the HAKKO Hot Air Generator “HAP2000 series”. Before operating the product, please read this manual carefully and fully understand it to use it correctly.
Be sure to keep this manual close to the product so that you can read it whenever you have any questions. If it is loss or becomes unreadable due to stain, please contact us.

IMPORTANT SAFETY INFORMATION

Read and understand this manual carefully and follow the instructions in this manual when handling the HAP2000 series of HAKKO Hot Air Generators.

In order to generate hot air, HAP2000 series has high temperature parts that may cause burns, moving parts that may get caught with foreign object(s), and high voltage parts that may cause electric shock. If not handled properly, they can cause fatal accidents, fire hazards and other damage(s).

It is very difficult to anticipate all potential hazards, nevertheless this document describes all the hazards we know of. Paying attention to the warnings and following the instructions in this manual will ensure a better safety for the user.

Danger warnings are classified into the following three stages, as shown by the warning labels affixed to the product itself and in this manual.

⚠DANGER	**Indicates anything that will ultimately result in death or serious injury if the instructions are not followed.**
⚠WARNING	**Indicates anything that will potentially result in death or serious injury if the instructions are not followed.**
⚠CAUTION	**Indicates anything that could result in injury or property damage if the instructions are not followed.**

Modifying HAKKO Hot Air Generator without consulting us or making repairs undescribed in this manual may have a serious impact on safety. Please do not modify or repair it in by yourself.

SAFETY PRECAUTIONS (Instructions must be followed)

⚠DANGER

● Do not use the product in atmospheres containing combustible or flammable gasses or to heat these gases.

This device is not explosion-proof. Never use it for combustible or flammable gas heating or in these atmospheres. It may cause fire hazards and/or explosion.

⚠WARNING

● When using Hot Air Generator in a factory line for powdered materials, be sure to install a check valve at the air outlet.

If the powder flows back from the air outlet, it may cause fire or explosion.

● Do not touch hot parts with bare hands.

The temperature around the hot air outlet becomes high. Do not touch it with your bare hands. It may cause burns.

● Do not remove the cover while the product is running.

Do not run or operate the product with the cover on the side of the main unit removed. It may cause fire, electric shock or burns.

● Do not block the air inlet or air outlet.

It may cause a fire or malfunction.

● Do not splash water on the main unit and controller, and do not use it in a place where water splashes.

It may cause a short circuit, electric shock or malfunction.

● Do not operate the circuit breaker or controller with wet hands.

It may cause an electric shock.

● Do not use in an environment where dust or lint are present.

Trapped dust or lint will be heated inside the hot air generator, resulting in flame bursting out of the air outlet, which will cause a fire.

● Do not disassemble or modify.

Never disassemble or modify the product. It may cause fire, electric shock or malfunction.

⚠WARNING

● Do not touch the heater power terminals.

Do not touch the heater power terminals or power supply during operation. It may cause electric shock or burns.

● Do not put your hands or objects in the air inlet or air outlet.

It may cause burns, injury or malfunction.

⚠CAUTION

● Keep the temperature settings in the appropriate range.

Keep the temperature settings in the appropriate range of the air outlet of each model. Otherwise, it may cause fire or malfunction if the temperature settings are too high.

● Keep the temperature of the air inlet at appropriate range.

When using the product in recirculation system, please keep the air inlet temperature in appropriate range of each model. If the temperature is higher or lower than this, it may cause a fire or malfunction.

● Use the correct power supply voltage.

Do not use power supply voltage other than that indicated for the product. Otherwise, it may cause fire, electric shock or malfunction.

● Be sure to ground the product.

Be sure to attach the ground circuit before use. Failing to do so may cause electric leakage or electric shock.

● Perform routine inspections for the air outlet, air inlet, and the inner side of connecting ducts.

Clogged foreign matter may cause fire or malfunction.

● Do not place flammable materials near the air inlet.

If flammable materials are drawn into the air inlet, it may cause a fire or malfunction.

● Do not place flammable materials near the air outlet.

It may cause a fire.

● Do not heat corrosive gas or humid air.

It may cause electric shock or malfunction.

● This product is not for outdoor use.

This device is for indoor use only. Do not use it for outdoors where there is wind or rain. It may cause electric shock or malfunction.

● Do not use the device in a closed environment.

The main body will become hot and it may cause a fire or malfunction.

《Main Specifications》

HAP2000 SERIES

Model No.		HAP2032	HAP2052	HAP2077	HAP2082	HAP2102
Product code		00013241	00013242	00013243	00013244	00013245
Power supply		3-Phase 200V (50/60Hz)				
Total power rating		3.2 kW	5.2 kW	7.7 kW	8.3 kW	10.3 kW
Heater power rating		3 kW	5 kW	7.5 kW	8 kW	10 kW
Temperature range of air outlet		R.T.～350 ℃ *1				
Temperature control method		PID control (SSR drive)				
Air volume (50/60Hz) Reference value		4.0／4.8 m³/min (Air damper fully open) 3.2／3.8 m³/min (Air damper 2/3 open) 2.0／2.4 m³/min (Air damper 1/3 open)			6.7／7.8 m³/min (Air damper fully open) 5.7／6.6 m³/min (Air damper 2/3 open) 3.6／4.3 m³/min (Air damper 1/3 open)	
Air volume control method		Adjustable air damper				
Diameter of the air inlet		ϕ75㎜ (Adjustable air damper attached)			ϕ100㎜ (Adjustable air damper attached)	
Air outlet diameter		ϕ73㎜ (Stainless steel pipe)			ϕ98 ㎜ (Stainless steel pipe)	
Air inlet temperature range		−10℃～230℃				
Blower	Maximum air volume (50/60Hz)	5.4／6.2 m³/min			8.8／10.4 m³/min	
Blower	Maximum static pressure (50/60Hz)	0.63／0.91 kPa			0.95／1.35 kPa	
Blower	Blower power rating	3-Phase 200V 0.15 kW			3-Phase 200V 0.3kW	
Blower	Noise at maximum air volume (50/60Hz) *2	70／74 dB			75／78 dB	
Power cable (2PNCT 4core)		2㎟ × 3m		3.5㎟ × 3m		5.5㎟ × 3m
Weight		30 kg			37 kg	38 kg

*1 : Air temperature varies depending on usage conditions. Please use it below the maximum temperature.
*2 : This is the value of the blower alone. The actual noise varies greatly depending on the conditions.

Model No.		HAP2152H	HAP2202H	HAP2302H	HAP2403H
Product code		00013246	00013247	00013248	00013249
Power supply		3-Phase 200V (50/60Hz)			
Total power rating		16.5 kW	21.5 kW	31.5 kW	41.5 kW
Heater power rating		15 kW	20 kW	30 kW	40 kW
Temperature range of air outlet		R.T.～350℃ *1			
Temperature control method		PID control (SSR drive)			
Air volume (50/60Hz) Reference value		15.0／17.5 m³/min (Air damper fully open) 12.4／14.8 m³/min (Air damper 2/3 open) 7.5／ 9.1 m³/min (Air damper 1/3 open)		23／27 m³/min (Air damper fully open) 17／21 m³/min (Air damper 2/3 open) 5.5／6.5 m³/min (Air damper 1/3 open)	
Air volume control method		Adjustable air damper			
Diameter of the air inlet		ϕ125㎜ (Adjustable air damper attached)		ϕ148㎜ (Flanged damper attached)	
Air outlet diameter		ϕ123㎜ (stainless steel pipe)		ϕ148㎜ (Stainless steel pipe)	
Air inlet temperature range		−10℃～230℃			
Blower	Maximum air volume (50/60Hz)	20.8／24.0 m³/min		30／34 m³/min	
Blower	Maximum static pressure (50/60Hz)	1.65／2.37 kPa		1.95／2.8 kPa	
Blower	Blower power rating	3-Phase 200V 1.5kW			
Blower	Noise at maximum air volume (50/60Hz) *2	85 ／ 90 dB		87／90 dB	
Power cable (2PNCT 4core)		14㎟ × 3m	22㎟ × 3m	38㎟ × 3m	
Weight		74 kg	82 kg	125 kg	128 kg

*1 : Air temperature varies depending on usage conditions. Please use it below the maximum temperature.
*2 : This is the value of the blower alone. The actual noise varies greatly depending on the conditions.

HAP2000F SERIES

Model No.		HAP2032F	HAP2052F	HAP2077F	HAP2082F	HAP2102F
Product code		00013250	00013251	00013252	00013253	00013254
Power supply		3-Phase 200V (50/60Hz)				
Total power rating		3.2 kW	5.2 kW	7.7 kW	8.3 kW	10.3 kW
Heater power rating		3 kW	5 kW	7.5 kW	8 kW	10 kW
Temperature range of air outlet		R.T.～350 ℃*1				
Temperature control method		PID control (SSR drive)				
Air flow adjustment range (30～60Hz)		2.3 ～ 4.8 m³/min			3.7 ～ 7.8 m³/min	
Air flow adjustment type		Inverter varies blower's revolution speed to adjust air intake.				
Inverter frequency		30 ～ 60 Hz				
Diameter of the air inlet		φ75 ㎜			φ100㎜	
Air outlet diameter		φ73㎜ (Stainless steel pipe)			φ98㎜ (Stainless steel pipe)	
Air inlet temperature range		−10℃～230℃				
Blower	Maximum air volume (60Hz)	6.2 m³/min			10.4 m³/min	
	Maximum static pressure (60Hz)	0.91 kPa			1.35 kPa	
	Blower power rating	3-Phase 200V 0.15 kW			3-Phase 200V 0.3 kW	
	Noise at maximum air volume (60Hz)*2	74 dB			78 dB	
Power cable (2PNCT 4core)		2㎟×3m		3.5㎟×3m		5.5㎟×3m
Weight		30 kg			37 kg	38 kg

*1 : Air temperature varies depending on usage conditions. Please use it below the maximum temperature.
*2 : This is the value of the blower alone. The actual noise varies greatly depending on the conditions.

Model No.		HAP2152HF	HAP2202HF	HAP2302HF	HAP2403HF
Product code		00013255	00013256	00013257	00013258
Power supply		3-Phase 200V (50/60Hz)			
Total power rating		16.5 kW	21.5 kW	31.5 kW	41.5 kW
Heater power rating		15 kW	20 kW	30 kW	40 kW
Temperature range of air outlet		R.T.～350℃*1			
Temperature control method		PID control (SSR drive)			
Air flow adjustment range (30～60Hz)		8.8 ～ 17.5 m³/min		14 ～ 27 m³/min	
Air flow adjustment type		Inverter varies blower's revolution speed to adjust air intake.			
Inverter frequency		30 ～ 60Hz			
Diameter of the air inlet		φ125 ㎜		φ148 ㎜ pipe	
Air outlet diameter		φ123 ㎜ (Stainless steel pipe)		φ148 ㎜ (Stainless steel pipe)	
Air inlet temperature range		−10℃～230℃			
Blower	Maximum air volume (60Hz)	24.0 m³/min		34 m³/min	
	Maximum static pressure (60Hz)	2.37 kPa		2.8 kPa	
	Blower power rating	3-Phase 200V 1.5 kW			
	Noise at maximum air volume (60Hz)*2	90 dB		90 dB	
Power cable (2PNCT 4core)		14㎟×3m	22㎟×3m	38㎟×3m	
Weight		74 kg	82 kg	125 kg	128 kg

*1 : Air temperature varies depending on usage conditions. Please use it below the maximum temperature.
*2 : This is the value of the blower alone. The actual noise varies greatly depending on the conditions.

SUMMARY

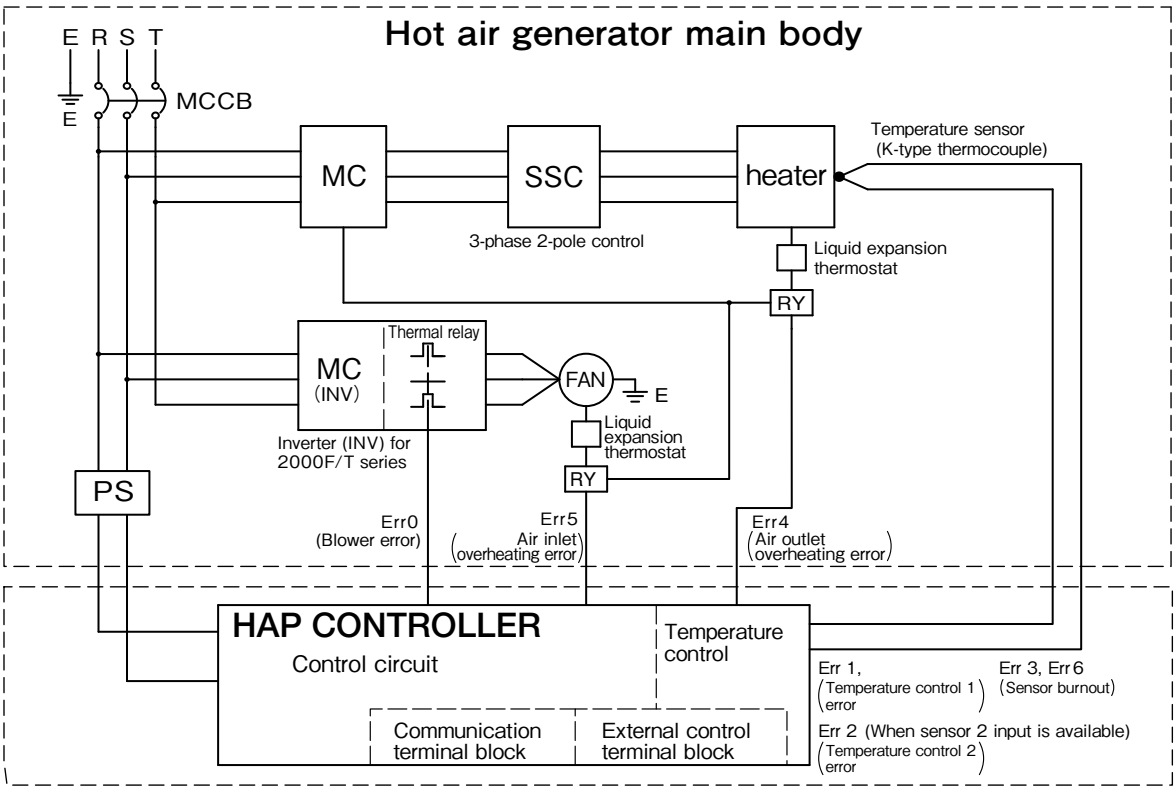
《Main Specifications》 HAP2000T Series
《Circuit diagram》

HAP2000T SERIES

Model No.		HAP2053T	HAP2103T
Product code		00013295	00013296
Power supply		3-Phase 200V (50/60Hz)	
Total power rating		5.4 kW	11.5 kW
Heater power rating		5 kW	10 kW
Temperature range of air outlet		R.T.～300℃*	
Temperature control method		PID control (SSR drive)	
Air flow adjustment range (30～60Hz)		3.2 ～ 6.5 m³/min	7.2 ～ 14.7 m³/min
Air flow adjustment type		Inverter varies blower's revolution speed to adjust air intake.	
Inverter frequency		30 ～ 60 Hz	
Diameter of the air inlet		φ120㎜	φ150㎜
Air outlet diameter		φ73㎜ (Stainless steel pipe)	φ98㎜ (Stainless steel pipe)
Air inlet temperature range		–10℃～150℃	
Blower	Maximum air volume (60Hz)	9.4 m³/min	16 m³/min
	Maximum static pressure (60Hz)	3.0 kPa	5.5 kPa
	Blower power rating	3-Phase 200V 0.4kW	3-Phase 200V 1.5kW
	Noise at maximum air volume (60Hz)	81 dB	87 dB
Power cable (2PNCT 4core)		3.5㎟ × 3m	8㎟ × 3m
Weight		44 kg	76 kg

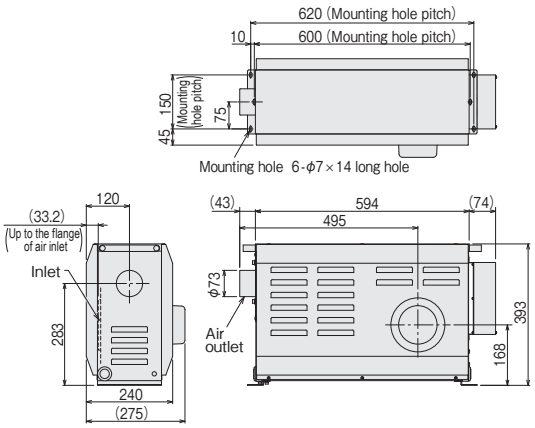
* : Air temperature varies depending on usage conditions. Please use it below the maximum temperature.

《CIRCUIT DIAGRAM》

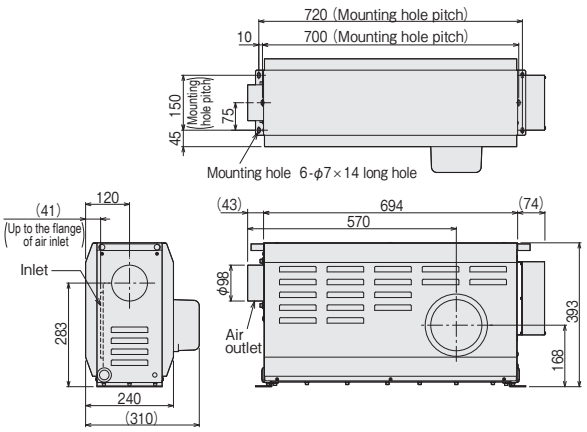


《DIMENSIONS》

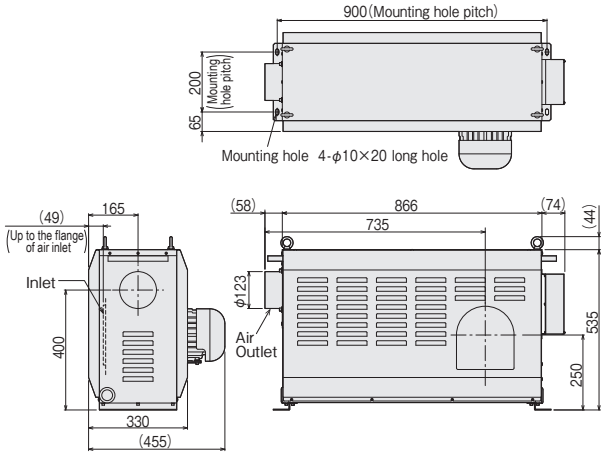
HAP2032 ／ HAP2052 ／ HAP2077
HAP2032F ／ HAP2052F ／ HAP2077F



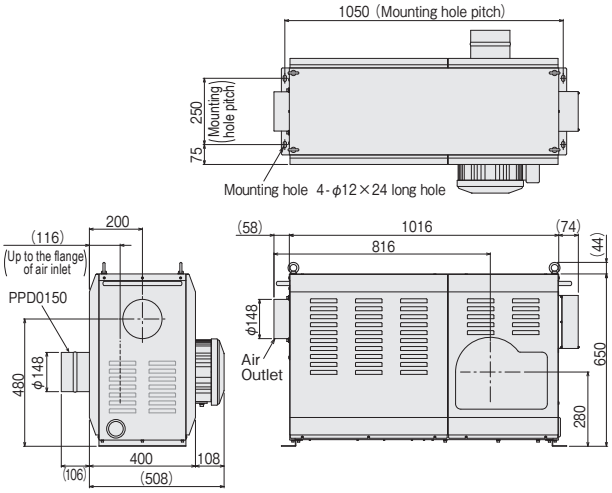
HAP2082 ／ HAP2102
HAP2082F ／ HAP2102F



HAP2152H ／ HAP2152HF
HAP2202H ／ HAP2202HF

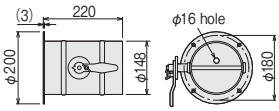


HAP2302H ／ HAP2302HF
HAP2403H ／ HAP2403HF

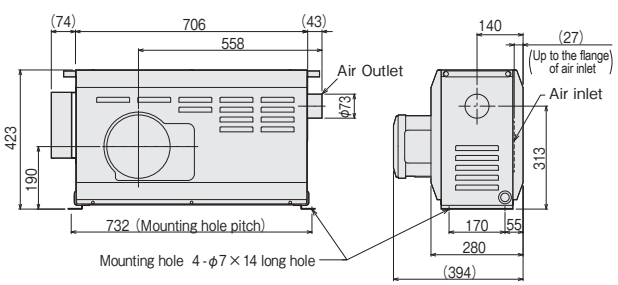


Single flange damper (model number: PPD0150) is attached to the air inlet of HAP2302H and HAP2403H.

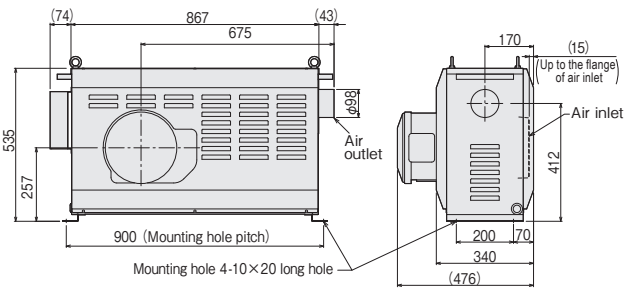
Flanged duct connector (model number: PSZ6150)" is attached to the air inlet of HAP2302HF and HAP2403HF.



HAP2053T

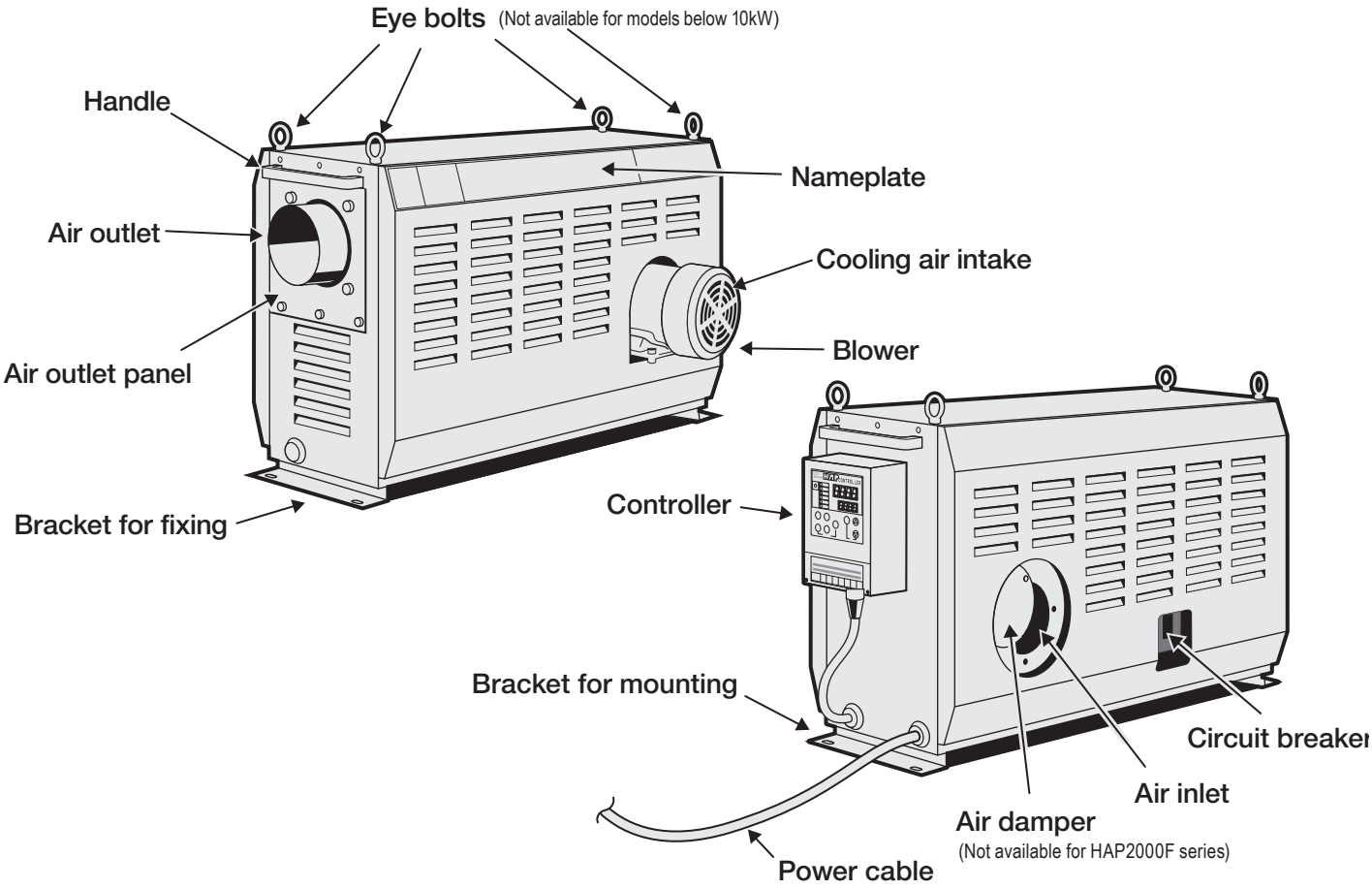


HAP2103T

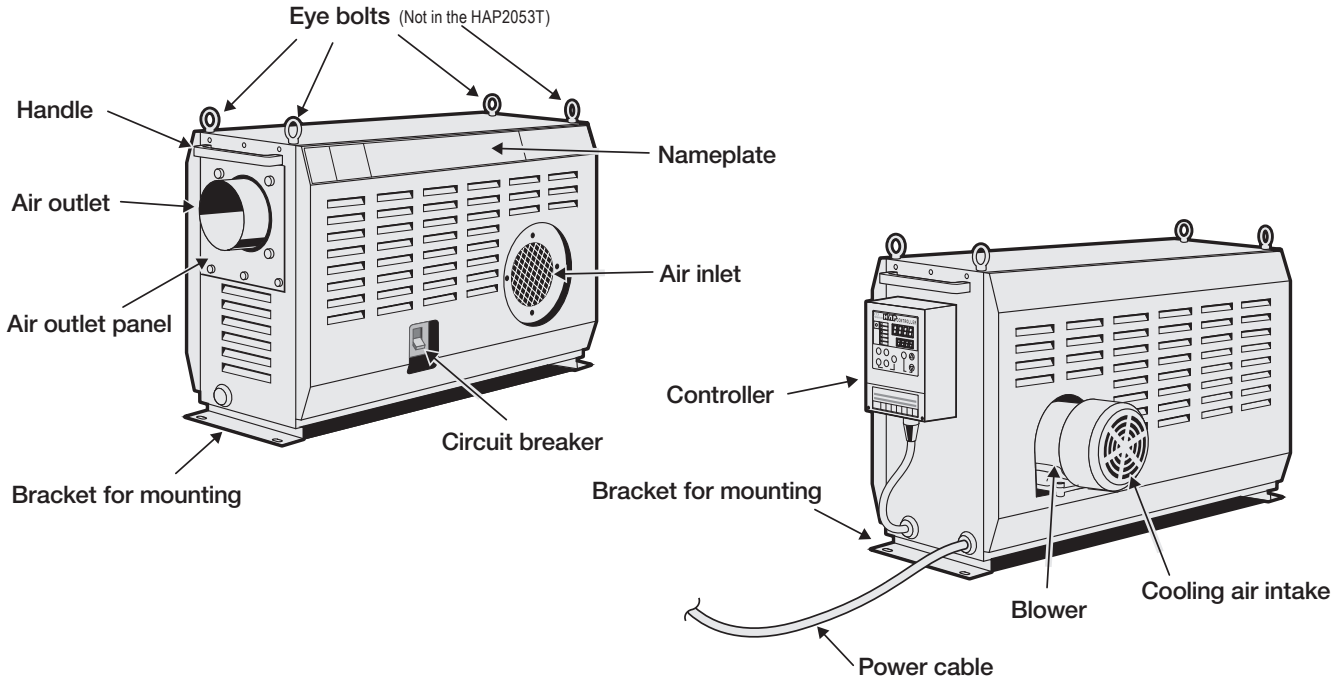


《MAIN BODY》

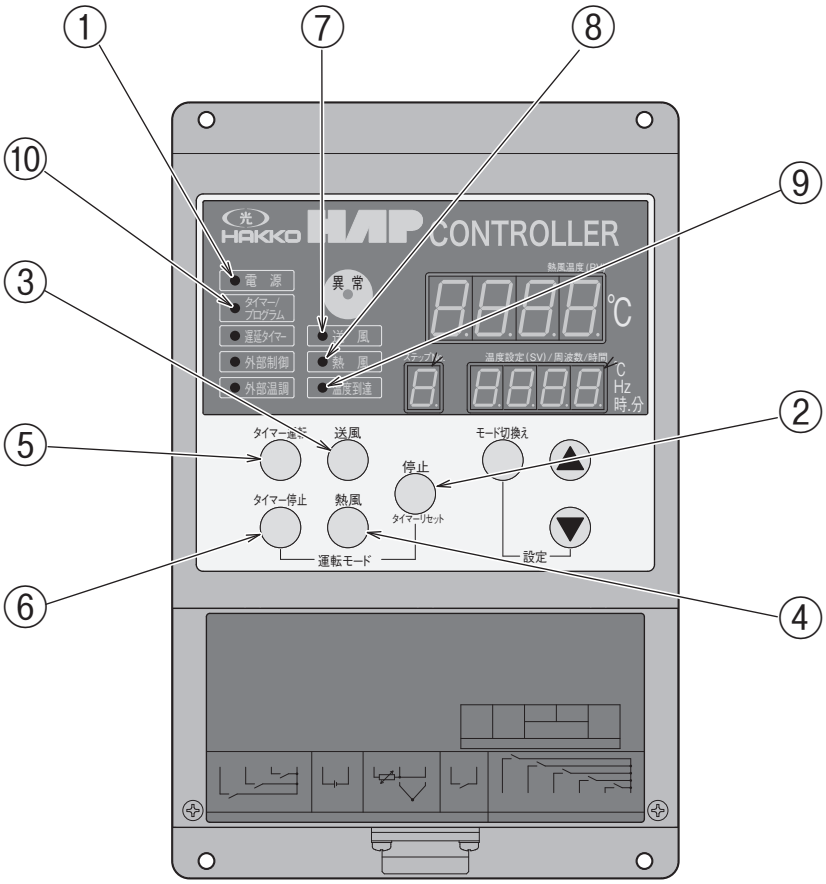
■ HAP2000 series ／ HAP2000F series



■ HAP2053T ／ HAP2103T



《CONTROLLER》



① Power lamp

Lights when the circuit breaker is "ON".

② Stop key

Press to stop the operation of the hot air generator. If pressed while running hot air operation, the hot air generator will switch to blower operation and the delay timer will start a countdown. When the countdown ends, the hot air generator will come to a complete stop.

③ Blower key

Press to start blower operation. If pressed while running hot air operation, the hot air generator will switch to blower operation and the delay timer will start a countdown. However, blower operation will continue to run even after the countdown ends.

④ Hot air key

Press to start hot air operation.

⑤ Timer operation key

Press to start the hot air operation after timer set time.

⑥ Timer stop key

Press to stop the hot air operation after timer set time. When the hot air operation is stopped, the delay timer will automatically run the Blower operation for 1 minute before complete stopping. The time of the delay timer can be changed in the parameter settings.

⑦ Blower lamp

Lights up during blower operation. It blinks only after the blower operation is stopped when the delay timer countdown ends.

⑧ Hot air lamp

Lights up during hot air operation.

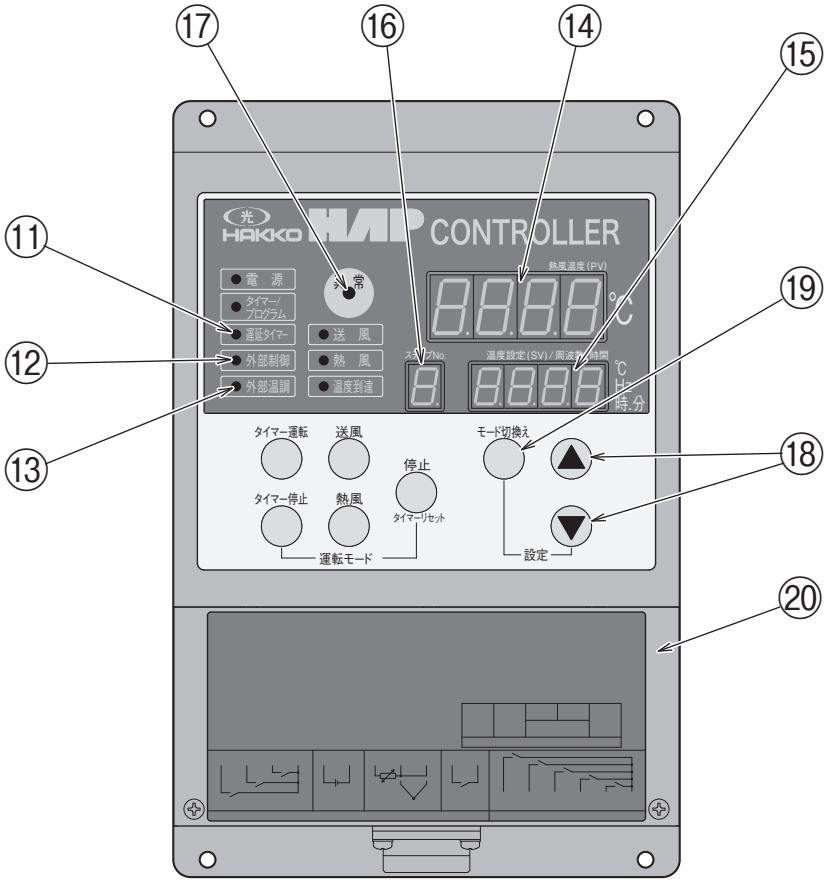
⑨ Temperature reaching lamp

Lights when the Temperature Reached Signal output is "ON".

⑩ Timer / program lamp

Blinks when timer operation or timer stop is counting. Lights up when the programmed operation enable setting is set to "Enabled: on".

《CONTROLLER》



⑪ Delay timer lamp
Blinks when the delay timer is counting.

⑫ External control lamp
Lights when the external control (external air blow, external hot air) input is enabled.

⑬ External temperature control lamp
Lights when the external temperature control input is enabled.

⑭ Process value display
Displays the air temperature process value(PV). Also use to displays the parameter name for frequency settings, timer settings, timer remaining time monitor display, etc. Lights up when the circuit breaker is "ON".

⑮ Set value display
Displays the air temperature set value(SV). Also use to display set values of each parameter. Shows the error code when an error occurs. Lights up when the circuit breaker is "ON".

⑯ Step display
Displays the current step during programmed operation. Displays some of the timer settings. (e.g. the digit represents the [day] of the timer setting values [day.hour.minute])

⑰ Error lamp
Lights when an error occurs.

⑱ ▲▼ Key (data adjust key)
Change each setting value.

⑲ Mode switching key
Press to switch the display for each parameter sequentially. Press and hold to call up the parameter settings screen.

⑳ External control terminal block cover
It is the cover of the external control terminal block. Remove the cover to view the external control and communication terminal block. Refer to page 21 for a detailed explanation of the external control terminal block.

《INSTALLATION LOCATION》

● Hot air generator is for indoor using only. Please comply with the following.

① Ambient temperature : 0 ～ 40℃
② Relative humidity : less than 80%
③ Do not expose it to combustible or corrosive gas.
④ Indoors unexposed to rain or wind.
⑤ Minimal dust exposure.
⑥ Do not use in confined space. Keep the blower motor cooling air intake at least 50mm away from the wall.
⑦ Flat and solid floor that are not uneven.

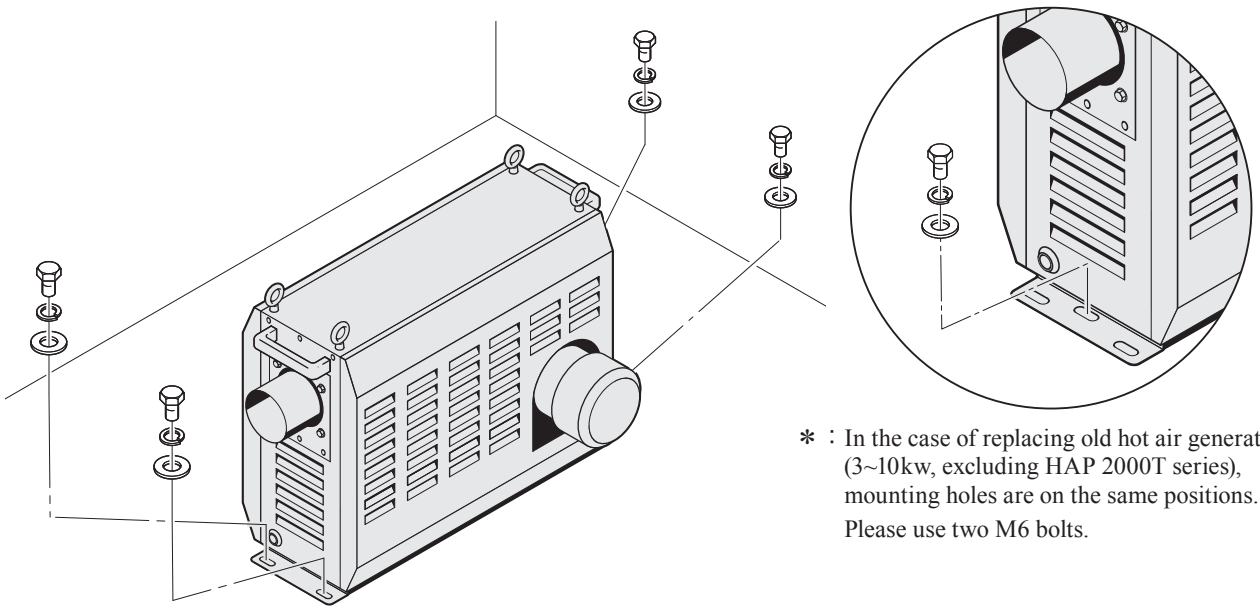
⚠CAUTION

At least two person are required to move the device.

※ The device is normally installed horizontally. For other installation positions, please consult our sales office.

《INSTALLATION PROCEDURE》

(1) Please install horizontally.
(2) Allocate space for maintenance and repair works.
(3) Fix the mounting brackets on the front and back of the device with bolts, washers, and spring washers. Refer to the following table for its size.
(bolts, washers and spring washers are not included)



＊：In the case of replacing old hot air generator (3~10kw, excluding HAP 2000T series), mounting holes are on the same positions. Please use two M6 bolts.

	Model	Power rating	Bolt size	Quantity
＊	HAP2032／HAP2052／HAP2077 HAP2032F／HAP2052F／HAP2077F	3kW／5kW／7.5kW	M6	4
＊	HAP2082／HAP2102 HAP2082F／HAP2102F	8kW／10kW	M6	4
	HAP2152H／HAP2202H HAP2152HF ／ HAP2202HF	15kW／20kW	M8	4
	HAP2302H／HAP2403H HAP2302HF／HAP2403HF	30kW／40kW	M10	4
	HAP2053T	5kW	M6	4
	HAP2103T	10kW	M8	4

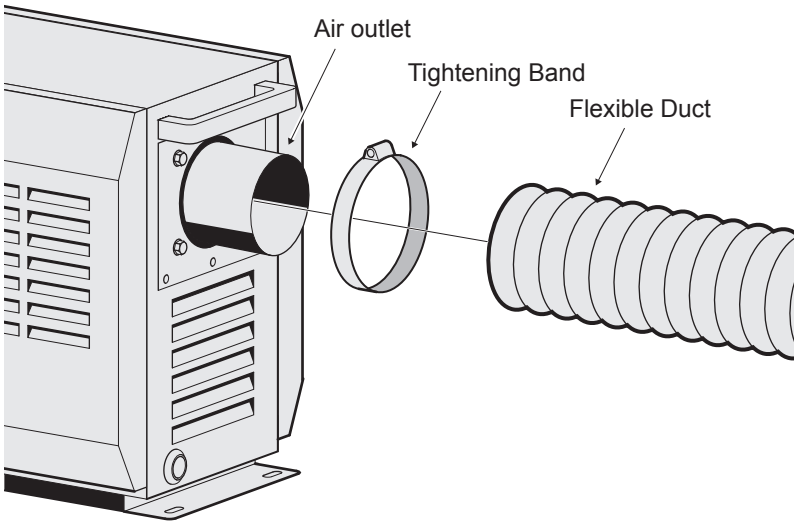
《DUCT INSTALLATION》

(1) To connect a flexible duct to the air outlet, insert the flexible duct into the air outlet and fasten with tightening band.

⚠CAUTION

Use suitable flexible duct materials that can withstand the temperature of the hot air. Unsuitable materials may cause fire hazards.

Please refer to page 52 for flexible duct details

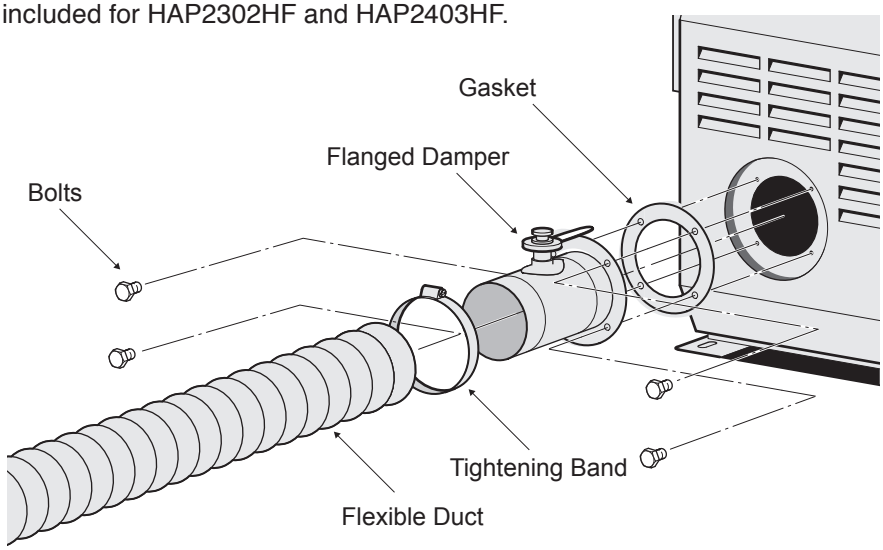


(2) For hot air recirculating systems, please attach "Flexible duct connector" or "Flanged damper" option parts to the air inlet. After installing the option part, insert flexible duct and fasten using tightening band.

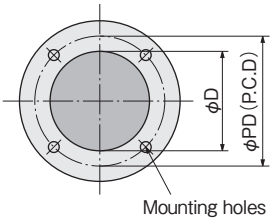
"Flanged damper" are included for HAP2302H and HAP2403H.
"Flexible duct connector" are included for HAP2302HF and HAP2403HF.

* Please refer to dimensions of air inlet/outlet in the specifications below to size the flexible duct.
* Please fix "Flexible duct connector" or "Flange damper" with 4 bolts. (Tightening band and flexible ducts are optional parts.)

Please refer to page 51 and 52 for more details.



Air inlet size



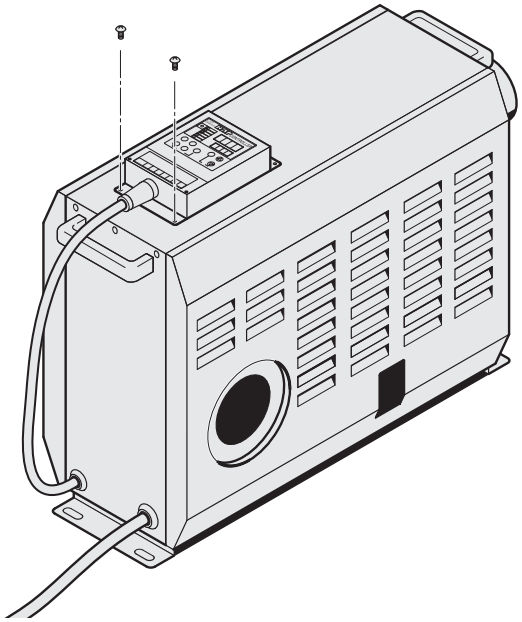
MODEL	φD	φPD	Bolt size/Quantity
HAP2032 ／ HAP2052 ／ HAP2077 HAP2032F ／ HAP2052F ／ HAP2077F	75 ㎜	96 ㎜	M5×12 ／ 4
HAP2082 ／ HAP2102 HAP2082F ／ HAP2102F	100 ㎜	120 ㎜	
HAP2152H ／ HAP2202H HAP2152HF ／ HAP2202HF	125 ㎜	140 ㎜	
HAP2302H ／ HAP2403H HAP2302HF ／ HAP2403HF	150 ㎜	180 ㎜	M8×15 ／ 4
HAP2053T	120 ㎜	140 ㎜	M5×12 ／ 4
HAP2103T	150 ㎜	180 ㎜	M8×15 ／ 4

《WIRING》

(1) Although the controller is attached at the opposite side of the air outlet, the following positions are also possible.

① **Attaching on top of the device** (only for single pass/non-recirculating systems)

Remove the controller from the side cover and fix the controller to the top cover using two M4 screws.



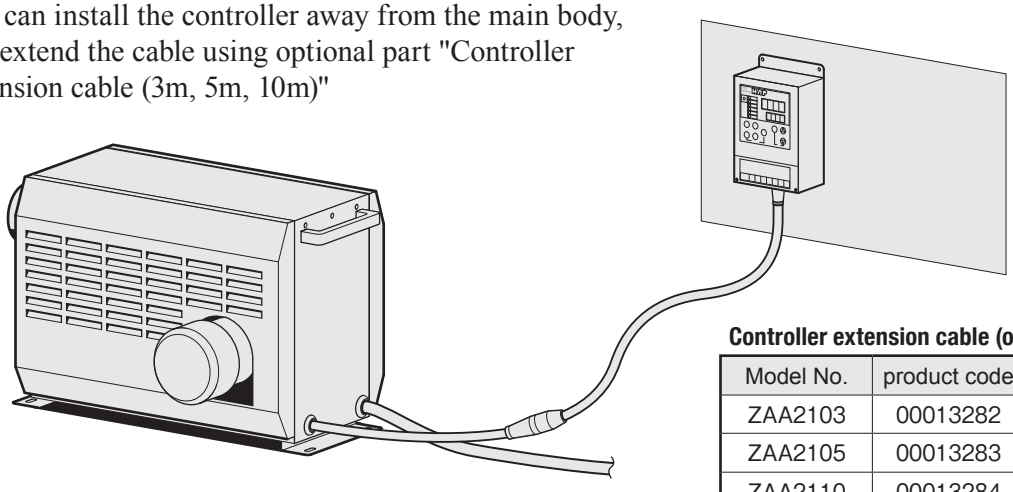
⚠CAUTION

Do not attach the controller to the top of the device if using hot air recirculating system. The temperature on the top of the device is high during hot air recirculating run, which may result in controller breakdown if attached.

MEMO Optional part “Controller extension cable (ZAA2103)” is required to attach the controller to the top of HAP2152(F), HAP2202H(F), HAP2302H(F), HAP2403H(F), and HAP2103T.

② **Attaching to a control panel located away from the device**

You can install the controller away from the main body, and extend the cable using optional part "Controller extension cable (3m, 5m, 10m)"



Controller extension cable (optional parts)

Model No.	product code	length
ZAA2103	00013282	3 m
ZAA2105	00013283	5 m
ZAA2110	00013284	10 m

(2) Please connect the power cable to your equipment's circuit breaker.

The power cables are **R** (red), **S** (white), **T** (black) and earth (green). Fasten cable tightly with ring terminals.

⚠CAUTION

Make sure to shut down the power source before performing electrical wiring.

⚠CAUTION

Make sure to ground the earth (green) wire.

《Test Run & Adjustments》

After finishing the device installation and electrical wiring, perform a test run to check for problems. .....

1. STARTUP

(1) Switch on the user's main circuit breaker (user's facility side).

(2) Switch on the hot air generator circuit breaker. ➡ "Power lamp" of controller lights up.

◯電 源

2. OPERATION

(1) Push "Blower" key of controller. 送 風 ➡ "Blower lamp" of controller lights up and the blower starts to rotate.

◯送 風

Check point: After pushing the "Blower" key, immediately push "Stop" and check the direction of blower rotation through the air inlet. If it is different from the arrow label, rewire the power cables by interchanging the connections of any 2 wires.

※ Not required for inverter equipped models.

⚠CAUTION

If the direction of blower rotation is reversed, the maximum air volume and static pressure will decrease.In addition, overheating might occur frequently depending on conditions. Please use the blower in the correct rotation direction.

(2) Push "Hot air" key of controller. 熱 風 ➡ "Hot air lamp" of controller lights up and heater is switched on.

◯熱 風

Check point: Please check if heater is switched on.The temperature (PV) on controller display will increase.

3. STOP

(1) Push "Stop" key of controller. 停 止 ➡

"Hot air lamp" on controller turns off and heater is switch off.

●熱 風

"Delay timer lamp" and "Blower lamp" begin to blink.

遅延タイマー
送 風

After finishing delay timer counting, "Delay timer lamp" and "Blower lamp" are turned off and blower stops.

●遅延タイマー
●送 風

The "Delay timer lamp" blinks when the delay timer is counting. Blower operation runs during delay timer counting (default setting : 1 min).

Notes

- The delay timer is used to start a countdown at the press of the stop key. During the countdown, only the blower will run in order to cool down the heater after switching it off.
- If the "Delay timer lamp" and "Blower lamp" are blinking at the same time (e.g., when "Stop" is pressed during hot air operation), the blower will stop when the "Delay timer" countdown ends.
- If the "Blower lamp" is lit continuously while the "Delay timer lamp" is blinking (e.g., when "Blower" is pressed during hot air operation), the blower continues to run even after the "Delay timer" countdown ends.
- When the delay timer is counting down, the blower will continue to run even if the stop key is pressed.

⚠CAUTION Please check again if there are any mistakes in the wiring before starting operation. Make sure that the connection between the hot air generator and the ducts are securely tightened.

《BLOWER OPERATION・HOT AIR OPERATION》

(1) Switch on the hot air generator circuit breaker. ➡ "Power lamp" on controller lights up. 

(2) Push "Blower" key to run in blower operation. 

➡ "Blower lamp" lights up and blower starts to rotate. 

(3) Push "Hot air" key to run in hot air operation. 

➡ "Hot air lamp" lights up, blower starts to rotate and heater is switched on. 

(4) Refer to page 20 to adjust the settings for hot air temperature.

《STOP》

(1) Push "Stop" key of controller. 

➡ If pressed during the blower operation, the "Blower lamp" goes out and the blower stops. 

If pressed during hot air operation, the "hot air lamp" goes out, the "delay timer lamp" and "Blower lamp" start to blink, and the the heater is switched off. 

The delay timer will be counting down while the "delay timer lamp" is blinking, and the blower operation runs during this period (1 minute).

When the delay timer countdown ends, the "delay timer lamp" and "Blower lamp" will be turned off and the blower will stop. 

Notes The delay timer is used start a countdown at the press of the stop key. During the countdown, only the blower will run in order to cool down the heater after switching it off.

If the "Delay timer lamp" and "Blower lamp" are blinking at the same time (e.g., when "Stop" is pressed during hot air operation), the blower will stop when the "delay timer" countdown ends.

If the "Blower lamp" is lit continuously while the "Delay timer lamp" is blinking (e.g., when "Blower" is pressed during hot air operation), the blower continues to run even after the “Delay timer” countdown ends.

When the delay timer is counting down, the blower will continue to run even if the stop key is pressed.

(2) Make sure that the blower is stopped before switching off the circuit breaker of the hot air generator. ➡ The power lamp on controller turns off. 

⚠CAUTION For HAP2000 series with inverter (HAP2032F～HAP2403HF, HAP2053T, HAP2103T), after switching off the circuit breaker, please wait more than 5 seconds before switching it on again. Switching on the circuit breaker immediately after switching it off may damage the inverter.

《TIMER OPERATION》

It is the mode in which hot air operation starts after a period of time that was set has passed.

(1) Switch on the hot air generator circuit breaker. ➡ "Power lamp" on controller lights up.

⚠CAUTION
Changes to the timer settings will take effect if you change the timer setting value during timer counting.

(2) Set the temperature of hot air. (refer to page 20 on how to set)

(3) Set time of timer. (refer to page 21 on how to set)

(4) Push "timer operation" key of controller. タイマー運転 ➡ The timer operation starts and the "timer / program lamp" blinks.

After the set time has passed, the "hot air lamp" lights up, and the blower and heater are energized.

At the same time, the "timer / program lamp" goes out.

☞ **To check remaining time of timer**

You can check the remaining time of the timer while the timer is running or stopped. (refer to page 21 on how to check)

《TIMER STOP》

It is the mode in which operation stops automatically after a period of time that was set has passed.

(1) Switch on the hot air generator circuit breaker. ➡ "Power lamp" on controller lights up.

⚠CAUTION
Changes to the timer settings will take effect if you change the timer setting value during timer counting.

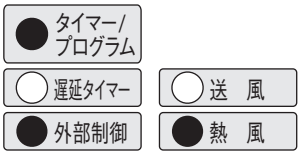
(2) Set temperature of hot air. (refer to page 20 on how to set)

(3) Set time of timer. (refer to page 21 on how to set)

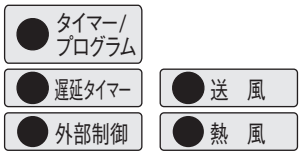
(3) Push "timer stop" key of controller. タイマー停止 ➡ The "hot air" lamp lights up, and the blower and heater are energized.

The timer starts and the "Timer / Program lamp" blinks.

After the set time has passed, the power supply to the heater is cut off and blower is blown for 1 minute. (The delay timer starts counting). During this period, the "hot air lamp" and "Timer / Program lamp" will be turned off, while the "Delay timer lamp" and "Blower lamp" will blink.

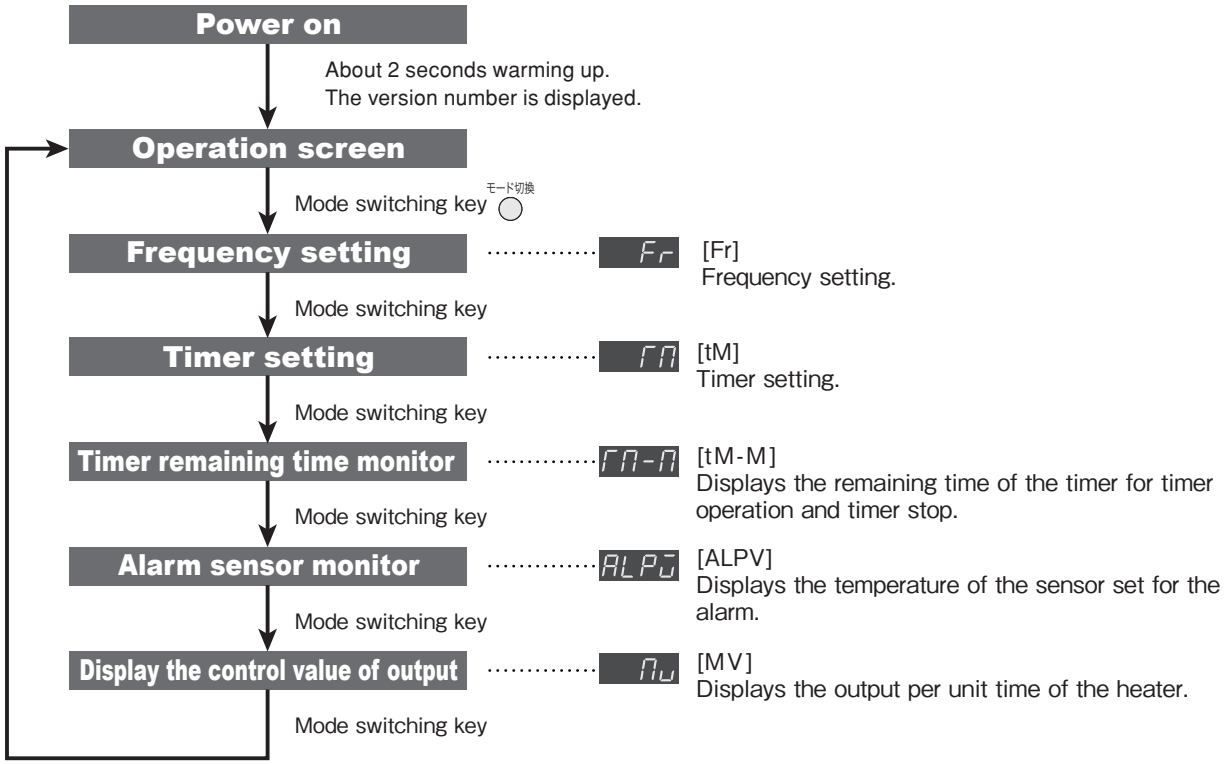


When 1 minute has passed (after the delay timer countdown ends), the power to the blower is cut off and the system is stopped. The "Delay timer lamp" and "Blower lamp" will be turned off.

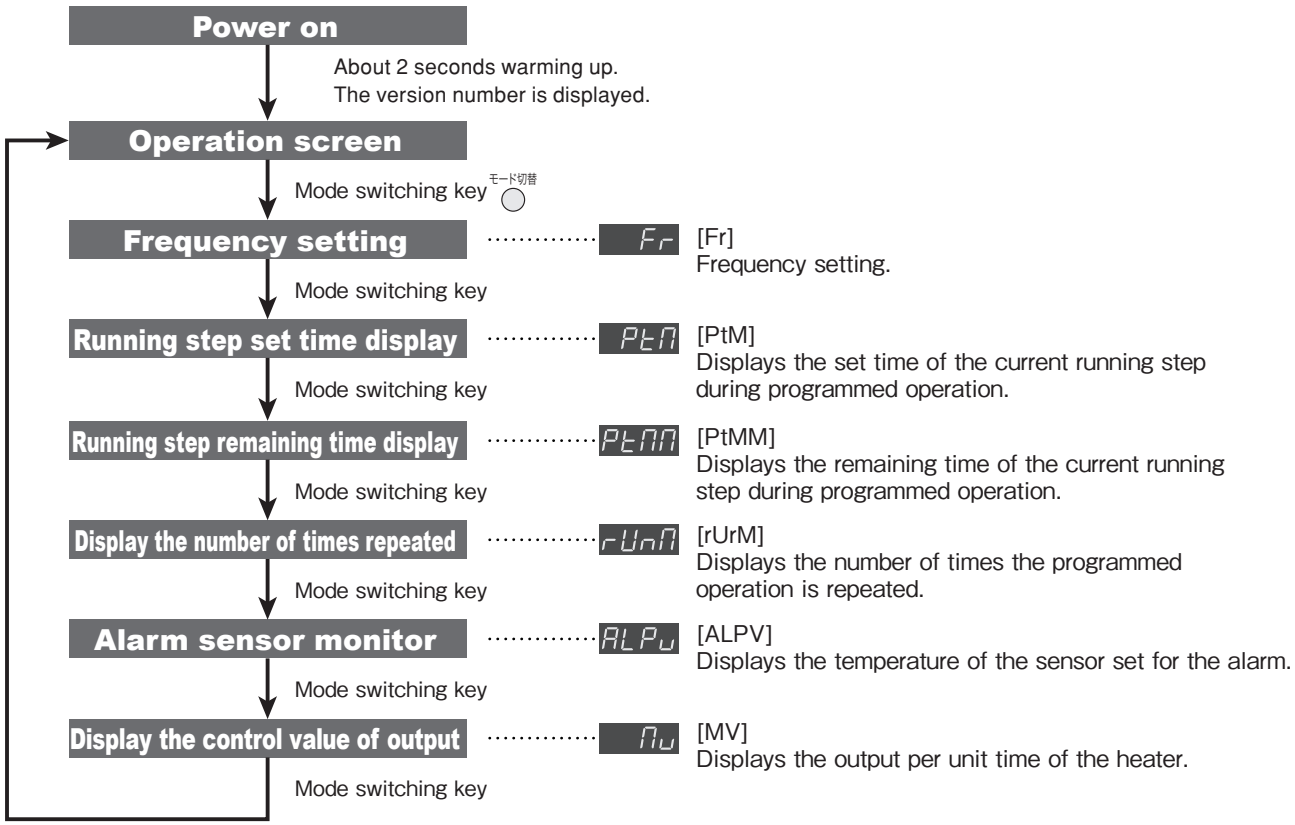


《OPERATING GUIDE》

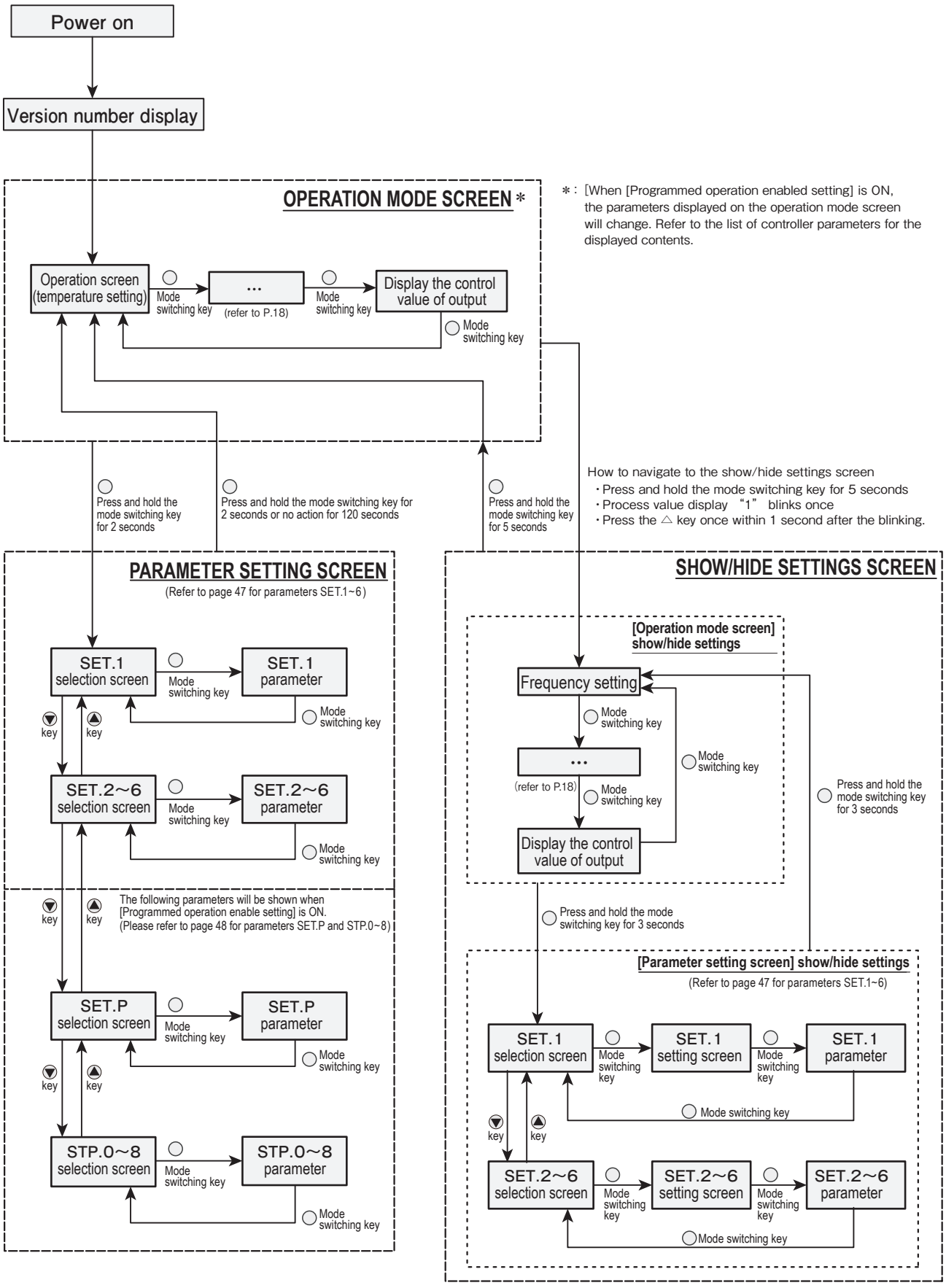
●When programmed operation is disabled (normal setting)



●When programmed operation is enabled



《OPERATING GUIDE》



《HOW TO SET CONTROL TEMPERATURE》

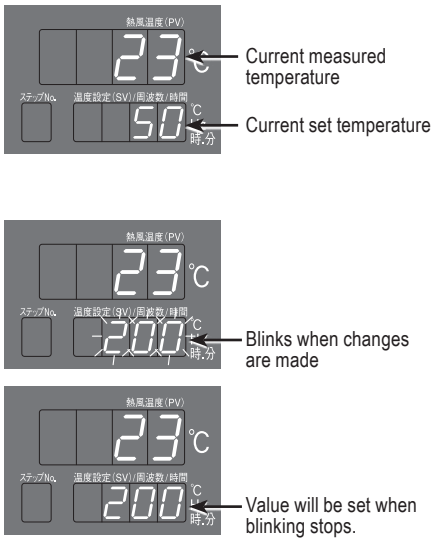
1. Switch on the hot air generator circuit breaker.

   ➡ The "power lamp" lights up.
   After that, the version number (example: "01.00") is shown on the process value display and the setting value display for about 2 seconds.

   ➡ Then, the operation screen is displayed.

2. Press the "Data adjust key " ▲▼ to change the target value of the set value display.

   ➡ After about 3 seconds, blinking will stop and the value will be set.It is also possible to set the value by pressing the mode switching key while blinking.
   (In this case, the screen will move to the frequency setting mode.)



⚠CAUTION Temperature control below the intake air temperature is not possible.

《HOW TO SET FREQUENCY》

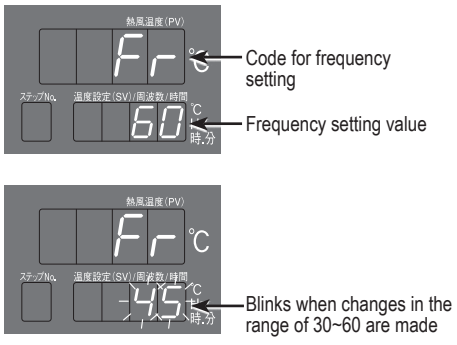
⚠CAUTION This setting is only available for the HAP2000F series and HAP2000T series. Although the setting is displayed in the HAP2000 series, it is disabled because HAP2000 series does not have an inverter.

1. Press the mode switching key once on the operation screen.

   ➡ The process value display switches to " Fr " and the frequency setting screen appears.

2. Press the "Data adjust key" ▲▼ to change the value settings. The settable range is 30 to 60 Hz.

   ➡ After about 3 seconds, blinking will stop and the value will be set.It is also possible to set the value by pressing the mode switching key while blinking.
   (In this case, the screen will move to the frequency setting mode.)

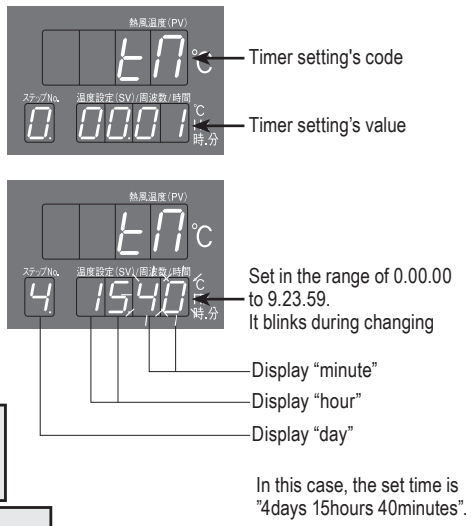


《HOW TO SET TIMER》

Time settings of the timer for "Timer operation mode" and "Timer stop mode".

1. Press the mode switching key twice on the operation screen.
   ➡ The process value display switches to "tM" and the timer setting screen appears.

2. Press the "Data adjust key ▲▼ " to change the value settings.
   The settable range is 0 days 00 hours 00 minutes to 9 days 23 hours 59 minutes.
   ➡ After about 3 seconds, blinking will stop and the value will be set. (In this case, the screen will move to the timer remaining time monitor mode.)



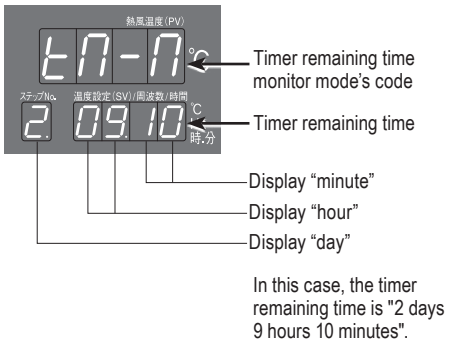
⚠CAUTION **If you set to 0 days 00 hours 00 minutes, the timer, timer run key, and timer stop key will be disabled.**

⚠CAUTION **If you change the set time while the timer is running or stopped, the changed set value becomes effective.**

《HOW TO CHECK REMAINING TIME OF TIMER》

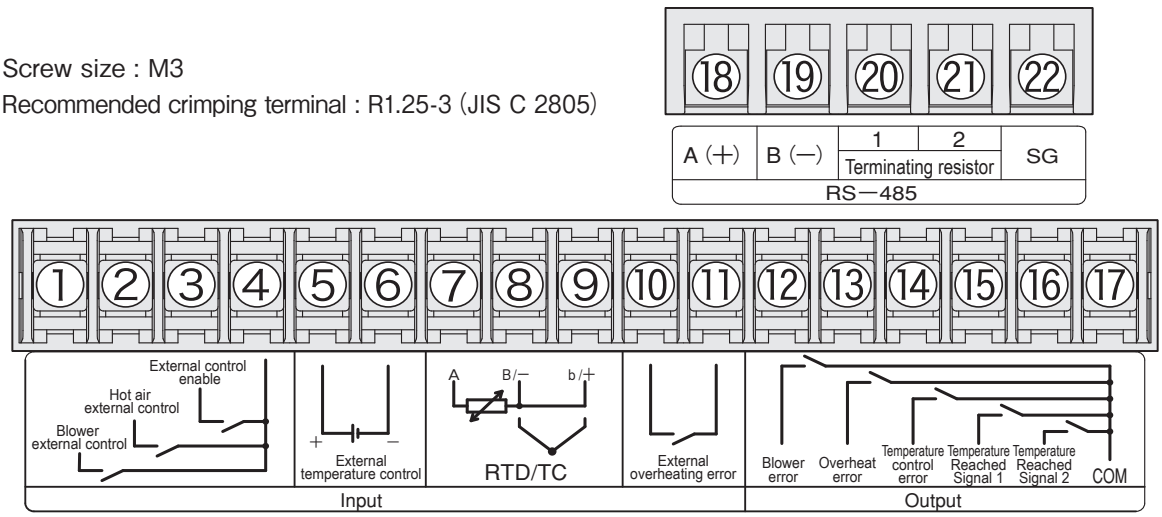
It is possible to check the remaining time of the timer while the timer is running or stopped.

1. Press the mode switching key 3 times on the operation screen.
   ➡ The process value display switches to "tM-n" and the screen shifts to the timer remaining time screen.
   Timer remaining time is displayed on the set value display.



《EXTERNAL CONTROL TERMINAL BLOCK》

Screw size : M3
Recommended crimping terminal : R1.25-3 (JIS C 2805)



① Blower external control input terminal *1
Hot air operation is performed by inputting a dry contact signal externally. (Main unit specifications: DC24V / approx. 5mA)

② Hot air external control input terminal *1
Hot air operation is performed by inputting a dry contact signal externally. (Main unit specifications: DC24V / approx. 5mA)

③ External control enable input terminal *2
External control operation is enabled by inputting a dry contact signal externally. (Main unit specifications: DC24V / approx. 5mA)

④ Externally controlled blower / hot air COM

⑤⑥ External temperature control input (+, −) *3
Temperature control is performed externally by inputting SSR signal from an external temperature controller.
(SSR signal: DC12V ~ 24V applied current: approx. 5mA, minimum ON / OFF time: 0.1ms)

⑦⑧⑨ RTD / TC input (external temperature sensor) *3
When you input the external temperature sensor (sensor 2), the temperature is controlled by the external temperature sensor.
K-type thermocouple (grounded or non-grounded type) or 3-wire RTD (Pt100, JPt100) can be used. (RTD current : about 1mA)

⑩⑪ External overheating error input terminal
When the overheat prevention switch closes (contact signal when an error occurs), the external temperature overheating will be detected and the hot air generator will be stopped when an overheating error occurs. (Main unit specifications: DC24V / approx. 5mA, minimum input time 500ms)

⑫ Blower error output terminal
When an error occurs in the blower, the contact output turns "ON".
(Closed when error, contact specifications: AC250V 1A resistance load)

⑬ Overheat output terminal
When the temperature sensor built into the hot air generator body detects an overheating error or when an external overheating error occurs (⑩⑪ when the external overheating error input is "ON"), the contact output turns "ON".

⑭ Temperature control error output terminal
When the thermocouple which is attached to the hot air generator body (sensor 1) or external temperature sensor (sensor 2) detects temperature control error, the contact output turns "ON".
(Closed when error, contact specifications: AC250V1A resistance load)

⑮ Temperature Reached Signal output terminal 1 *3
Turns "On" when there is a Temperature Reached Signal, which depends on the temperature of the thermocouple (sensor 1) located at the air outlet. (Open/close output, contact specifications: AC250V 1A resistance load)

⑯ Temperature Reached Signal output terminal 2 *3
Turns "On" when there is a Temperature Reached Signal, which depends on the external temperature sensor (sensor 2). (Open/close output contact, contact specifications: AC250 1A resistance load)

⑰ ⑫ to ⑯ Output COM

⑱⑲ RS-485 communication terminal (A(+), B(−)) *4
Connect the wiring for RS-485 communication. Use a shielded twisted pair cable for wiring.

⑳㉑ RS-485 communication terminating resistor
The terminating resistor (120Ω) is enabled by short-circuiting ⑳ and ㉑ .
Short-circuit the controller that is the final end of communication to enable it.

㉒ SG (RS-485 signal ground)
Please connect if necessary.

*1 : By closing the circuit for "③④external control enable", "①④ blower external control" and "②④hot air external control" will be enabled.

*2 : If external control operation is enabled in the parameter settings of the controller, "③・④ External control enable input" is disabled.

*3 : It is necessary to set the controller parameters in order to enable "⑤・⑥ external temperature control input", "⑦・⑧・⑨ RTD / TC input","⑮ Temperature Reached Signal output 1", and "⑯ Temperature Reached Signal output 2".

*4 : About RS-485 communication, refer to "HAP Controller Detailed Instructions Manual".

For details on parameter settings, refer to "HAP Controller Detailed Instructions Manual ".

⚠CAUTION Use shielded wires for wiring the external control terminal block. And do not wire control lines and power lines at same time

OPERATION WHEN AN ERROR OCCURS

- If an error occurs, the power supply to the heater and/or the blower will be stopped. In addition, the error lamp lights up and the error code corresponding to each error is displayed.
- Once an error occurs, the error condition continues even if the cause of the error is resolved, and the hot air generator will not start again. To clear the error condition, turn off the power and then turn it on again.

○ Error codes and error details

The following error code is displayed on the set value display.

Error code	Error type	Error Description	Condition of hot air generator after error occurrence	External control terminals signal output*2
Err0	Blower error	The motor current has exceeded the permissible amount. For example, due to the heat generated by the coil of the blower.	stopped	Blower error output
Err 1	Temperature control No.1 error	The temperature sensor (sensor 1, K type thermocouple) attached to hot air generator air outlet has detected an error. By default, it is displayed when the detected temperature is 20 ° C higher than the set temperature.	Blower operation *1	Temperature control error output
Err2	Temperature control No.2 error	The external temperature sensor (sensor 2) has detected an error.	Blower operation*1	Temperature control error output
Err3	Sensor 1 burnout error	The temperature sensor (sensor 1, K type thermocouple) at the air outlet of the hot air generator is disconnected/burnout.	Blower operation*1	Temperature control error output (Err3 and Err1 are displayed alternately.)
	Sensor 1 out of measurement range	The temperature sensor (sensor 1, K type thermocouple) at the air outlet of the hot air generator detected a temperature that could not be measured.	Blower operation*1	
Err4	Overheating error	High temperature is detected from inside the heater box of the hot air generator.	Blower operation*1	Overheat output
Err5	Intake air temperature error	High temperature is detected from the air inlet of the blower.	Blower operation*1	Overheat output
Err6	Sensor 2 burnout error	The external temperature sensor (sensor 2) is disconnected/burnout.	Blower operation*1	Temperature control error output (Err6 and Err2 are displayed at same time.)
	Sensor 2 out of measurement range	The external temperature sensor (sensor 2) detected a temperature that could not be measured.	Blower operation*1	
	Sensor 2 is short-circuited	The external temperature sensor (sensor 2) is short-circuited. ※ In case of resistance temperature detector	Blower operation*1	Temperature control error output
Err7	External overheating error	A sensor connected to the "overheat input" of the external control terminal detected an overheating error.	Blower operation*1	Overheat output

*1 When any of Err1 ~ Err7 occurred, the delay timer will start and the blower will run. If the stop key is not pressed when delay timer is counting or after the countdown ends, the blower will continue to run.
*2 The error output of the external control terminal is the contact output that is "closed" when an error occurs. (specifications: AC250V 1A resistor load)

The above error codes are displayed when the parameter settings of the controller are the default. (except Err6)

If you change parameters not described in this instructions manual, it may not be treated as an error.

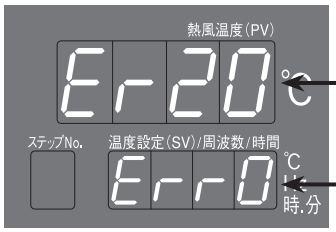
For more information about the controller, refer to "HAP Controller Detailed Instructions Manual".

The following error codes are displayed on the process value display.

Error code	Error type	Error Description	Condition of hot air generator after error occurrence	External control terminals signal output
Err 20*1	Memory error	Controller board is broken	Stop	—
Err 21*1	AD error	Controller board is broken	Stop	—
Err 22	Auto tuning error	Another error occurred while performing auto-tuning	Err0 occurs: Stopped Err1 ~ 7 occurs: Blower operation *2	Err0 occurs: Blower error output Err1,2,3,6 occurs: Temperature control error output Err4.5.7 occurs: Overheat output
		More than 3 hours have passed since the start of auto tuning.	Blower operation	—

*1 : The controller needs to be repaired.

*2 : "Err22" is displayed on the process value display, and "Err0 to Err7" is displayed on the set value display.



"Err20 to Err22" is displayed on the process value display.

"Err0 to Err7" is displayed on the set value display.

Table of numbers and alphabet display

0	1	2	3	4	5	6	7	8	9
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	—	Blank		

《ERRORS AND ITS MEASURES》

If any error occurs, stop the hot air generator and be sure to turn off the power.

If the problem persists even after taking the measures, please contact the branches of HAKKO ELECTRIC Co., Ltd.

⚠CAUTION **If you use in situations where errors occur frequently, it may cause a fire or breakdown.**

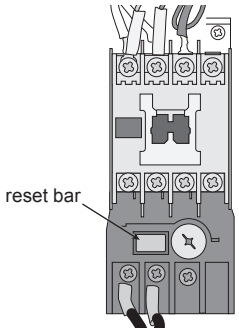
⚠CAUTION **Be sure to shut off the main power before taking any action.**

Error type	Cause	Measures
Abnormal noise is heard from the blower.	Foreign object is clogged in the air inlet.	Check the air inlet.
	The damper plate is loose.	Check the air inlet.
	Bearing is worn.	The blower needs to be replaced.*1
The temperature does not rise.	The supply voltage is low.	Check the supply voltage.
	Too much air volume for the set temperature	Reduce the air volume.
	Blower blades are rotating in the opposite direction.	If the hot air generator does not have an inverter, check the direction of rotation of the blower blades.
	Incorrect parameter settings	"diCT" setting does not meet the purpose. Check the parameter functions and settings in the "HAP Controller Detailed Instructions Manual"*3
	The heater is broken.	The heater needs to be replaced.*1
Blower error (Err0) occurs*2	Foreign object is clogged in the air inlet.	Check the air inlet.
	The air outlet is closed.	Check the air outlet
	Large air resistance in ducts.	Check if there is a cause of large pressure loss in the ducts.
	Foreign object is clogged in the ducts.	Check the ducts.
	The temperature around the hot air generator exceeds 40 ° C.	Use at an ambient temperature of 0-40 ℃.
	Bearing is worn.	The blower needs to be replaced. *1
	Blower, inverter, or thermal relay breakdown.	The broken device needs to be replaced.*1
Temperature control error (Err1, Err2) or overheating temperature abnormality (Err4) occurs.	Foreign object is clogged in the air inlet.	Check the air inlet.
	The air outlet is closed.	Check the air outlet.
	Large air resistance in ducts.	Check if there is a cause of large pressure loss in the ducts.
	Foreign object is clogged in the ducts.	Check the ducts.
	SSR failure.	SSR needs to be replaced*1
	Incorrect parameter settings	Check the parameter functions and settings in the "HAP Controller Detailed Instructions Manual"*3
Sensor 1 burnout error (Err3) occurs.	Burnout of the sensor at the air outlet	The sensor needs to be replaced.*1
	Incorrect parameter settings	Check the parameter functions and settings in the "HAP Controller Detailed Instructions Manual"*3
Abnormal intake air temperature (Err5) occurs.	The temperature of the intake air is too high.	Lower the temperature of the intake air by mixing in fresh air, etc.
Sensor 2 burnout error (Err6) occurs.	The sensor connected to the external control terminal is broken.	Sensor needs to be replaced.
	Incorrect parameter settings	Check the parameter functions and settings in the "HAP Controller Detailed Instructions Manual"*3
External overheating error (Err7) occurs	The polarity of input contacts are reversed.	Input a dry contact that turns ON (closed) when an error occurs
	The air outlet is closed.	Check the air outlet
	Large air resistance in ducts.	Check if there is a cause of large pressure loss in the ducts.
Foul smell is generated when the temperature rises above 250℃	Foreign object is clogged in the air outlet or ducts	Check the outlet and ducts
	Smell of insulation adhesive burning out	The smell will disappears after a few days

＊1：Please contact the branches of HAKKO ELECTRIC Co., Ltd.

＊2：For models "HAP2032 to HAP2403H" that do not have an inverter, remove the side cover on the motor side and press the reset bar (white button) of the electromagnetic contactor when taking error measures.

＊3：Please download from the Hakko Electric website http://www.hakko.co.jp/.



MAINTENANCE

《DAILY INSPECTION AND MAINTENANCE》

1 PRIOR TO OPERATION

- Check that there is nothing in the air inlet.
- Check the connection between the hot air generator and the ducts for looseness.
- Check that there is nothing in the air outlet.

2 DURING OPERATION

- Check the blower for any abnormal noise.
- Check for foul smell.

3 DAILY MAINTENANCE

- If there is dust on the upper side of the hot air generator, please remove it.
- If the controller is dirty, wipe it well with a cloth dampened with water or a mild detergent.

■ ABOUT STORAGE

Please note the following points when not using for a long period of time.

(1) When storing in a packed state

- Store indoors where it is dry and has little temperature change.
- Don't stack.

(2) When storing in the installed state

- Cover the hot air generator with a cloth to prevent water and dust from getting into it.
- Run the blower for a few minutes every three months to ensure that the blower bearing is lubricated.

《DISPOSAL》

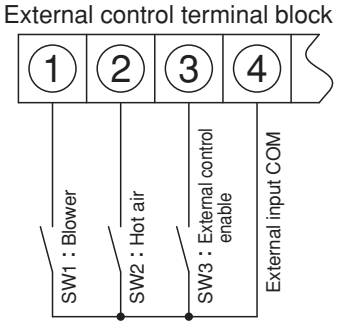
When disposing the hot air generator, dispose properly in accordance with the law.

《EXAMPLE OF EXTERNAL CONTROL TERMINAL 》

This is an example of external control terminal block wiring.Please refer to the circuit design.
(Refer to pages 21 and 22 for the specifications of each terminal.)

> **⚠CAUTION** **Caution! Use shielded wires for the wiring of the external control terminal block.(Excluding external temperature sensor input)Separate the power line from the shielded wire when wiring.**

Ex. 1 Enable external control operation



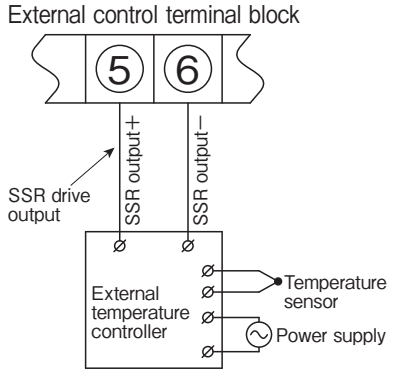
Set the parameter " dI C " to ON. (Refer to page 29) Alternatively, turn on the SW3 external control enable input.

- Blower operation → Blow operation is performed when SW1 is set to ON.
- Hot air operation → Hot air operation is performed when SW2 is set to ON.

When SW1 and SW2 are turned on at the same time, hot air operation is performed.

※ If the external control operation is enabled by setting the parameter " dI C ", the external control enable input of SW3 is disabled.

Ex. 2 Temperature control using an external temperature controller



- **Enable external temperature control input**
  Set the parameter " dI Ct " to ON (refer to page 29).
  Correctly connect the polarities (+,-) of the SSR output.

- **Operating instructions**
  Carried out using "Hot air" and "Stop" key on the internal controller. Turn on (RUN) the external controller output to be feed into the hot air generator SSR, and push "Hot air" key on the internal controller to run hot air operation. Temperature can be controlled with the settings on the external controller with the temperature sensor attached to it. If hot air generator is in stopped state, heater will be off even if SSR input from external controller is on. If "Stop" key is pushed, hot air operation will switch to blower operation and the delay timer will start a countdown. When the countdown ends, blower operation will stop.

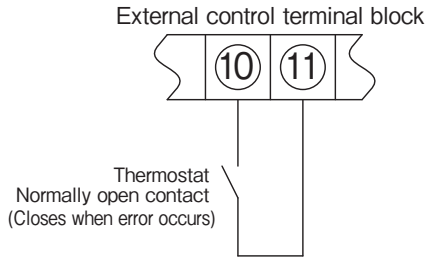
  It is possible to operate using external control. Please refer to "Example 1 Enable external control operation".

※ When the temperature is controlled by an external temperature controller, the hot air generator controller doesn't control the temperature.However, Temperature Control Error 1 for air inlet is still in effect.In the default settings, when the temperature is 20 ℃ higher than the set value of the hot air generator controller, Temperature Control Error 1 occurs (Err 1) and the power supply to the heater stops.

When using the Temperature Control Error 1 to prevent overheating, set the value of the Temperature Control Error 1 to be the same as the set value of the hot air generator controller. If Temperature Control Error 1 is not required, set the maximum operating temperature of the air outlet to 350℃ (maximum set temperature) *1

*1 : For the HAP2000T series, set the maximum operating temperature of the air outlet to 300 ℃

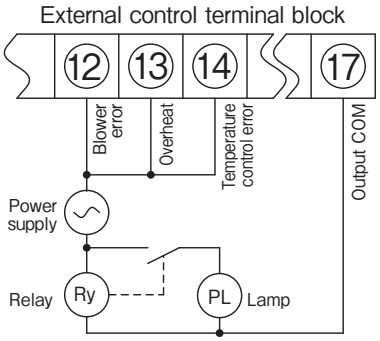
Ex. 3 Detects overheating with an external thermostat.



Connect the thermostat to ⑩⑪ and monitor the overheating. Please use thermostats with normally open dry contacts. (Main unit specifications: DC24V, approx. 5mA)

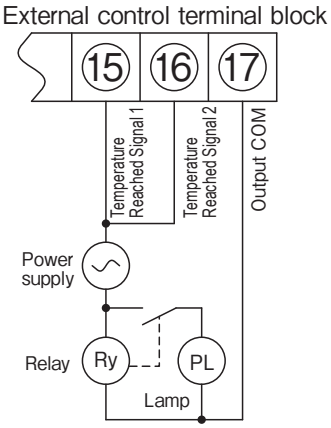
When an overheating is detected and the thermostat contact is closed, an external overheat error (Err7) occurs and the ⑬ overheat output of the external control terminal block turns on.

Ex. 4 Turning on the lamp when an error occurs.



If any of the blower error, overheating error, temperature control error 1 and 2 occurs, the lamp will light up.

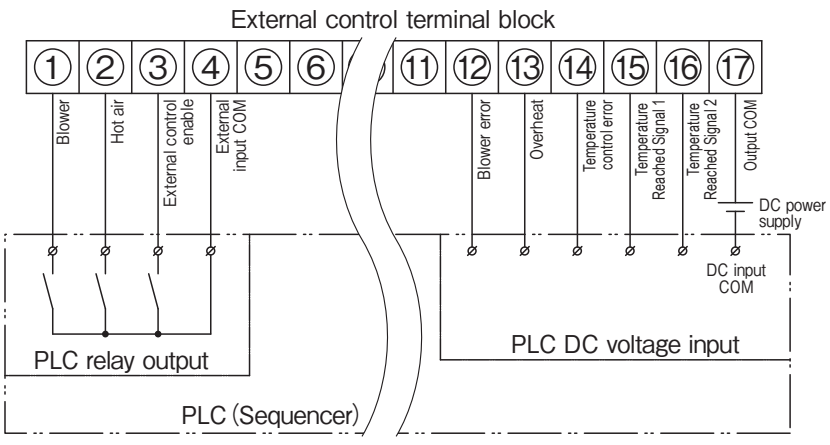
Ex. 5 Output the Temperature Reached Signal and turn on the lamp at the same time.



When the output conditions of Temperature Reached Signal 1 or Temperature Reached Signal 2 are satisfied, the lamp lights up.

※ In order to output the Temperature Reached Signal, it is necessary to set the parameters.
(Refer to P.33 or the HAP Controller Detailed Instructions Manual.)

Ex. 6 Connect to PLC (sequencer)



① ~ ④ : PLC output signals to enable external control for blower operation and hot air operation.

⑫ ~ ⑭ , ⑰ : Output signals to the PLC if an error occurs in the hot air generator.

⑮ ~ ⑰ : Outputs the Temperature Reached Signal to the PLC.

※ If the PLC input is dry contact, DC power supply is not required.

※ For details on DC power supply voltage and polarity or other PLC I/O, please refer to the PLC specifications.

REFERENCE

《USEFUL FUNCTIONS OF HAP CONTROLLER》

The following example 1 to 10 are operation examples in which each parameter and show/hide settings of HAP controller are default.

Example 1

Blower / hot air operation using external control (external control enable setting "diC")

Enable the external control input settings

① Press and hold the "mode switching key" for 2 seconds on the operation screen.

➡ The process value display switches to "SEt.1" and the screen shifts to the parameter setting screen (The process value display switches between "Fr" and "SEt.1" in sequence).

② From the state where "SEt.1" is displayed, press the "mode switching key" twice.

➡ The process value display will switch to "diC".

③ With "diC" displayed, press the "▲ key" once.

➡ The set value display switches to "on" and blinks. After about 3 seconds, the "on" display lights up and the setting is confirmed.The "external control lamp" lights up, and the external control input settings are enabled.

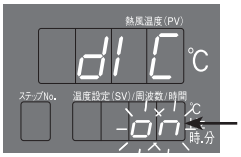
④ Press and hold the "mode switching key" for 2 seconds.

➡ Return to the operation screen.

Top screen of parameter setting screen (SET.1)

External control enable setting code

Disabled with "OFF"



Use the △ key to switch to "on" and it will blink (waiting for confirmation)

Confirm in about 3 seconds or confirm with the mode switching key

Lights up after the setting is confirmed

Notes

- Refer to pages 21 and 22 and connect the dry contacts to the externally controlled blower input, externally controlled hot air input, and externally controlled blower / hot air COM terminals, respectively. Perform the wiring work with the power turned off.
- You cannot change the "diC" setting while running. Stop the hot air generator before changing the settings.

Example 2

Temperature control using an external temperature controller

(external temperature control effective setting "diCT")

Enable the external temperature control input settings.

① Press and hold the "mode switching key" for 2 seconds on the operation screen.

➡ The process value display switches to "SEt.1" and the screen shifts to the parameter setting screen (The process value display switches between "Fr" and "SEt.1" in sequence).

② From the state where "SEt.1" is displayed, press the "mode switching key" three times.

➡ The process value display switches to "diCt".

③ From the state where "diCt" is displayed, press the "▲ key" once.

➡ The set value display switches to "on" and blinks.After about 3 seconds, the "on" display lights up and the setting is confirmed.The "external temperature control lamp" lights up, and the external temperature control input setting is enabled.

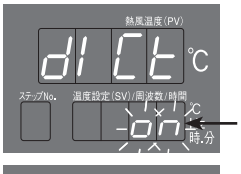
④ Press and hold the "mode switching key" for 2 seconds.

➡ Return to the operation screen.

Top screen of parameter setting screen (SET.1)

External temperature control enable setting code

Disabled with "OFF"



Use the △ key to switch to "on", and it will blink (waiting for confirmation)

Confirm in about 3 seconds or confirm with the mode switching key

Lights up after the setting is confirmed

Notes

- Refer to pages 21 and 22 and connect the SSR control output (DC12 to 24V voltage pulse output) of the external temperature controller to the external temperature control input terminals. Perform the wiring work with the power turned off.
- You cannot change the "diCt" setting while running. Stop the hot air generator before changing the settings.

Example 3

Temperature control using an external temperature sensor connected to the RTD / TC input of the external control terminal block.

The upper deviation limit for the external temperature sensor alarm is +20℃. (When the measured temperature reaches + 20℃ more than setting value, the heater is stopped and the temperature control error output of the external terminal block is turned on.)

Before setting the parameters, connect a K-type thermocouple to the RTD / TC input of the external control terminal with the power supply cut off.

1. Set the sensor that controls the temperature of the hot air generator to the K thermocouple connected to the RTD / TC input (external temperature sensor) of the external control terminal block. (Input sensor selection: "iSEL")

① Press and hold the "mode switching key" for 2 seconds on the operation screen.

➡ The process value display switches to "SEt.1" and the screen shifts to the parameter setting screen. (The process value display switches between "Fr" and "SEt.1" in sequence.)

② With "SEt.1" displayed, press the "▲key" three times.

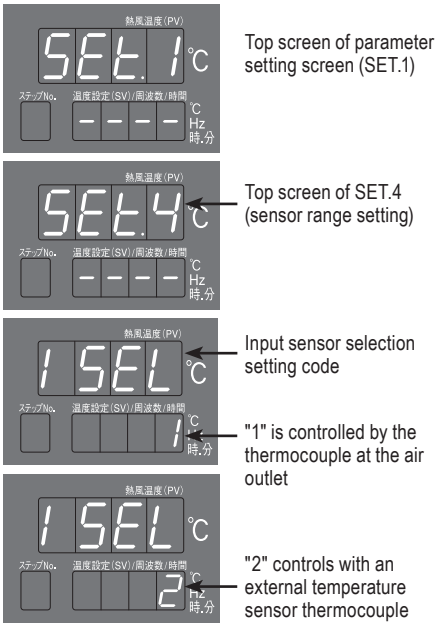
➡ The process value display will switch to "SEt.4". (The process value display switches sequentially to "SEt.2","SEt.3", and "SEt.4".)

③ From the state where "SEt4" is displayed, press the "mode switching key" once.

➡ The process value display will switch to "iSEL".

④ From the state where "iSEL" is displayed, press the "▲key" once.

➡ The set value display switches from "1" to "2" and blinks. After about 3 seconds, the "2" display lights up and the setting is confirmed. It is set to control with an external temperature sensor (sensor 2) connected to the external control terminal.



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2. The alarm setting (alarm type of Temperature Control Error 2: "ALM2") of the thermocouple (sensor 2) **connected to the RTD / TC input (external temperature sensor) is set to upper deviation limit alarm.**
(The default deviation value + 20℃ remains and does not need to be changed.)

① From the state where "iSEL" is displayed, press the "mode switching key" once.

➡ The process value display will switch to "SEt.4".

② From the state where "SEt.4" is displayed, press the "▼ key" once.

➡ The process value display will switch to "SEt.3".

③ From the state where "SEt.3" is displayed, press the "mode switching key" once.

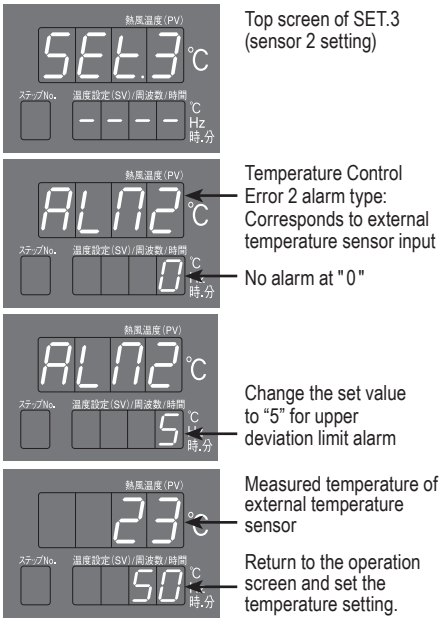
➡ The process value display will switch to "ALM2".

④ With "ALM2" displayed, press the "▲ key" five times.

➡ The set value display switches to "5" and blinks. Approximately 3 seconds later, the "5" display lights up and the setting is confirmed. The alarm type for Temperature Control Error 2 has been set to the upper deviation limit alarm.

⑤ Press and hold the "mode switching key" for 2 seconds.

➡ Return to the operation screen. Set the temperature and operate.



⚠CAUTION

Input sensor selection: When iSEL is set to [2], the temperature of the external temperature sensor (sensor 2) is displayed on the process value display of the operation screen.

⚠CAUTION

By default, the alarm from the internal air outlet thermocouple is also set to stop the heater when it reaches + 20℃ above the set value. Depending on the usage, [Err 1] may occur. In that case, refer to Example 4 on the next page and perform two-point temperature control using an external temperature sensor and the internal air outlet thermocouple.

Example 4

Two-point temperature control using an external temperature sensor connected to the RTD/ TC input of the external control terminal block and the internal thermocouple at the air outlet.

The upper deviation limit for the external temperature sensor alarm is + 30℃. (When the measured temperature reaches + 30℃ above the set value, the heater will be stopped and the temperature control error output of the external terminal block will be turned on.) Also, when the internal thermocouple of the air outlet reaches 280℃, the heater will be turned off and cooldown with blower, and when the temperature drops to 277 ℃, the heater is energized again. (Two-point temperature control with external temperature sensor and air outlet thermocouple)

Before setting the parameters, connect a K-type thermocouple to the RTD / TC input of the external control terminal with the power supply cut off.

1. Set the internal air outlet thermocouple (sensor 1) **alarm setting** (alarm type of Temperature Control Error 1: "ALM1") **to absolute upper limit alarm.**

① Press and hold the "mode switching key" for 2 seconds on the operation screen.

➡ The process value display switches to "SEt 1" and the screen shifts to the parameter setting screen. (The process value display switches between "Fr" and "SEt 1" in sequence.)

② From the state where "SEt 1" is displayed, press the "▲ key" once.

➡ The process value display will switch to "SEt2".

③ From the state where "SEt2" is displayed, press the "mode switching key" once.

➡ The process value display will switch to "ALM1".

④ With "ALM1" displayed, press the "▼ key" four times.

➡ The set value display switches from "5" to "1" and blinks.After about 3 seconds, the "1" display lights up and the setting is confirmed. The alarm type "ALM1" for Temperature Control Error 1 has been set to absolute upper limit alarm.

Top screen of SET.2 (sensor 1 setting)

Temperature Control Error 1 alarm type: Corresponds to the internal air outlet thermocouple

Upper deviation limit alarm with "5"

Change the set value to "1" to set the alarm to absolute upper limit

2. Change the set value of Temperature Control Error 1 so that the power of the heater is cut off when the internal air outlet thermocouple (sensor 1) **reaches 280℃.** (Temperature Control Error 1 trigger value: "AL1")

① From the state where "ALM1" is displayed, press the "mode switching key" once.

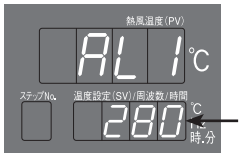
➡ The process value display will switch to "AL 1".

② From the state where "AL 1" is displayed, press the "▲ key" to set the set value to "280".

➡ The process value display is set to "280" and blinks. Approximately 3 seconds later, the "280" display lights up and the setting will be confirmed. The trigger value for "AL 1" Temperature Control Error 1 has been set to 280℃ .

Temperature Control Error 1 trigger value settings Corresponds to the internal air outlet thermocouple

Default value "20"



Set to "280"

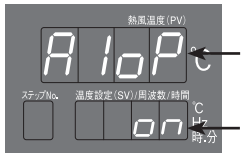
3. Change the self-holding setting of Temperature Control Error 1 and set it so that the power to the heater is restored when the error state is released. (Temperature Control Error 1 self-holding setting: "A1oP")

① From the state where "AL 1" is displayed, press the "mode switching key" once.

➡ The process value display will switch to "A1oP".

② With "A1oP" displayed, press the "▼ key" once.

➡ The set value display switches from "on" to "oFF" and blinks.After about 3 seconds, the "oFF" display lights up and the setting is confirmed. Temperature Control Error 1 self-holding setting "A1oP" is set to "off: No self-holding".



Self-holding setting of Temperature Control Error 1 Corresponds to internal air outlet thermocouple

Self-holding with "on"

No self-holding with "off"

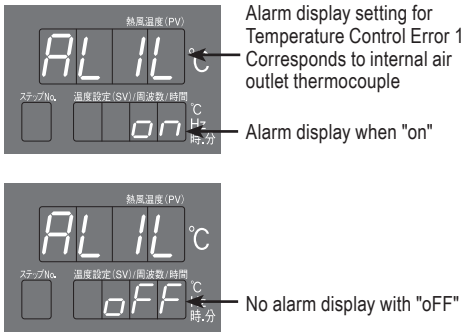
4. Change the display setting of Temperature Control Error 1 so that the internal air outlet thermocouple (sensor 1) **does not display an error when the trigger temperature is reached.** (Temperature Control Error 1 alarm display: "AL1L")

① From the state where "A IoP" is displayed, press the "mode switching key" once.

➡ The process value display will switch to "AL IL".

② With "AL IL" displayed, press the "▼ key" once.

➡ The set value display switches from "on" to "oFF" and blinks. After about 3 seconds, the "oFF" display lights up and the setting is confirmed. Temperature Control Error 1 alarm display setting "AL IL" has been set to "off: Do not display".



5. The alarm setting (alarm type of Temperature Control Error 2: "ALM2") **of the thermocouple** (sensor 2) **connected to the RTD / TC input** (external temperature sensor) **is set to upper deviation limit alarm.**

① From the state where "AL IL" is displayed, press the "mode switching key" four times.

➡ The process value display will switch to "SEt2".

② From the state where "SEt2" is displayed, press the "▲ key" once.

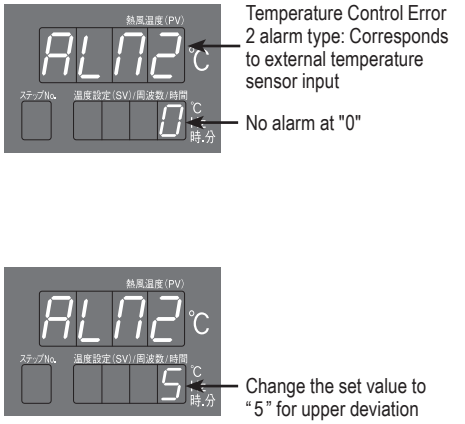
➡ The process value display will switch to "SEt3".

③ From the state where "SEt3" is displayed, press the "mode switching key" once.

➡ The process value display will switch to "ALn2".

④ With "ALn2" displayed, press the "▲ key" five times.

➡ The set value display switches from "0" to "5" and blinks. After about 3 seconds, the "5" display lights up and the setting is confirmed. The alarm type "ALn2" for Temperature Control Error 2 has been set to upper deviation limit alarm.



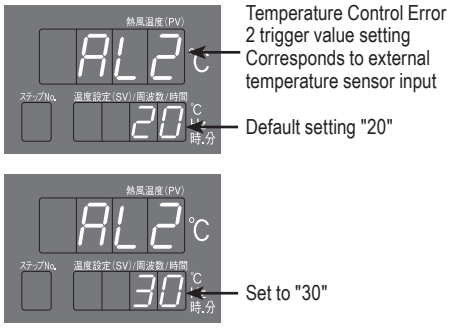
6. Set the trigger value of Temperature Control Error 2 to 30℃, so that the power supply to the heater will be cutoff when the thermocouple (sensor 2) **connected to the RTD/TC input** (external temperature sensor) **is 30℃ above the set value.** (Temperature Control Error 2 trigger value: "AL2")

① From the state where "ALn2" is displayed, press the "mode switching key" once.

➡ The process value display will switch to "AL2".

① From the state where " AL2" is displayed, press the "▲ key" to set the set value to "30".

➡ The set value display is set to "30" and blinks.
After about 3 seconds, the "30" display lights up and the setting is confirmed. The trigger value "AL2" for Temperature Control Error 2 has been set to 30℃.



7. Set the sensor that controls the temperature of the hot air generator to the K thermocouple connected to the RTD / TC input (external temperature sensor) **of the external control terminal block** (input sensor selection : "iSEL").

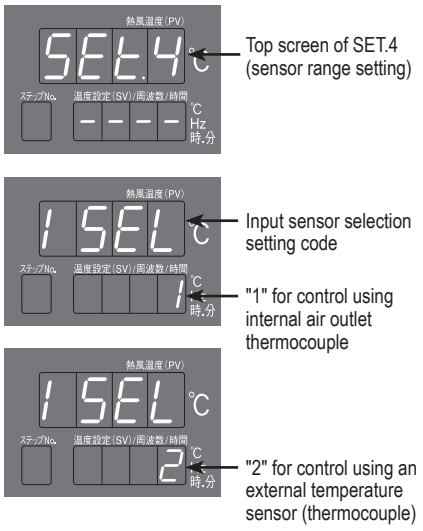
① From the state where "AL2" is displayed, press the "mode switching key" 6 times.
➡ The process value display will switch to "SEt3".

② From the state where "SEt3" is displayed, press the "▲ key" once.
➡ The process value display will switch to "SEt4".

③ From the state where "SEt4" is displayed, press the "mode switching key" once.
➡ The process value display will switch to "iSEL".

④ From the state where "iSEL" is displayed, press the "▲ key" once.
➡ The set value display switches from "1" to "2" and blinks. After about 3 seconds, the "2" display lights up and the setting is confirmed. It is set to be controlled by an external temperature sensor (sensor 2) connected to the external control terminal.

⑤ Press and hold the "mode switching key" for 2 seconds.
➡ Return to the operation screen. Set the temperature and operate.



⚠CAUTION **With the above settings, the temperature of the external temperature sensor** (sensor 2) **will be displayed on the process value display on the operation screen. The temperature of the internal air outlet thermocouple** (sensor 1) **is displayed on the alarm sensor monitor screen "ALPV".** (See page 18)

Example 5
Output the Temperature Reached Signal

Outputs a Temperature Reached Signal when the internal air outlet thermocouple (sensor 1) is within ±20℃ of the temperature set value.
(Set temperature ±20℃ deviation output, outputs Temperature Reached Signal 1 for external control terminal block if output conditions are met)

Before setting the parameters, turn off the power and complete the wiring for the Temperature Reached Signal output 1 of the external control terminal.

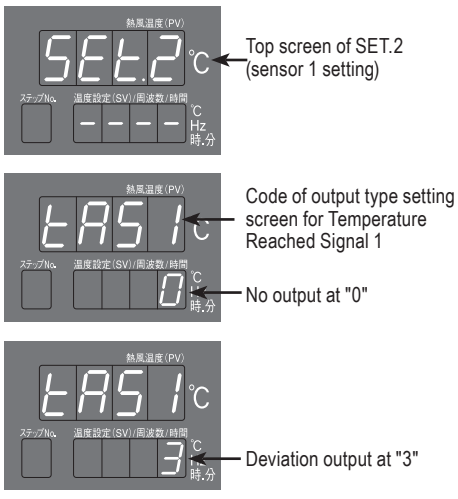
1. Set the output type of Temperature Reached Signal 1 (Temperature Reached Signal output 1 output type setting "tAS1")

① Press and hold the "mode switching key" for 2 seconds on the operation screen.
➡ The process value display switches to "SEt 1" and the screen shifts to the parameter setting screen. (The process value display switches between "Fr" and "SEt 1" in sequence.)

② From the state where "SEt 1" is displayed, press the "▲ key" once.
➡ The process value display will switch to "SEt2".

③ From the state where "SEt2" is displayed, press the "mode switching key" 5 times.
➡ The process value display switches to "tAS 1".

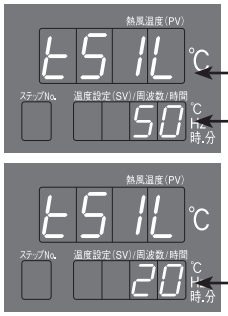
④ From the state where "tAS 1" is displayed, press the "▲ key" three times.
➡ The set value display switches from "0" to "3" and blinks. After about 3 seconds, the "3" display lights up and the setting is confirmed. Temperature Reached Signal output 1 output type setting "tAS 1" has been set to deviation output.



2. Set the lower limit value of Temperature Reached Signal 1 (Temperature Reached Signal output 1 lower limit value setting "tS1L")

① From the state where "tAS1" is displayed, press the "mode switching key" once.
➡ The process value display will switch to "tS1L".

② From the state where "tS1L" is displayed, press "▼ key" to set the value to "20".
➡ The process value display is set to "20" and blinks.After about 3 seconds, the "20" display lights up and the setting is confirmed. Temperature Reached Signal output 1 lower limit setting "tS1L" has been set to 20℃.



Code of the lower limit value setting screen of the Temperature Reached Signal 1

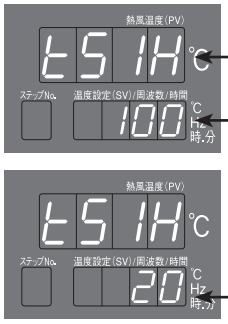
Default value "50"

Set to "20"

3. Set the upper limit of Temperature Reached Signal 1 (Temperature Reached Signal output 1 upper limit setting " t S 1 H ")

① From the state where "tS1L" is displayed, press the "mode switching key" once.
➡ The process value display will switch to "tS1H".

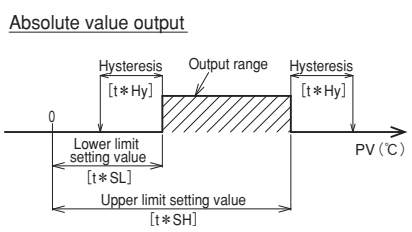
② From the state where "tS1H" is displayed, press the "▼ key" to set the set value to "20".
➡ The process value display is set to "20" and blinks. After about 3 seconds, the "20" display lights up and the setting is confirmed. Temperature Reached Signal output 1 upper limit setting "tS1H" has been set to 20 ℃ .

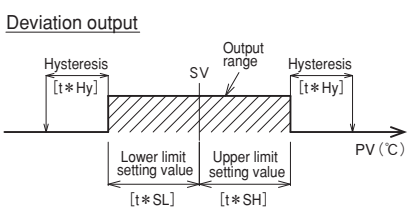


Code of the upper limit value setting screen of the Temperature Reached Signal 1

Default value "100"

Set to "20"





Lights when there is Temperature Reached Signal output

Example 6

Auto-tuning

The PID parameter is automatically determined according to the usage conditions.

① Press and hold the "mode switching key" for 2 seconds on the operation screen.
➡ The process value display switches to "SEt.1" and the screen shifts to the parameter setting screen.

② With "SEt.1" displayed, press the "▲ key" four times.
➡ The process value display will switch to "SEt.5".

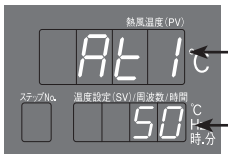
③ From the state where "SEt.5" is displayed, press the "mode switching key" four times.
➡ The process value display switches to "At 1".

④ From the state where "At 1" is displayed, press the "▲▼ key" to set the temperature for auto-tuning.

⑤ After setting the temperature, press the "hot air key" once to start auto-tuning.
➡ During auto-tuning, "At 1" and "Measured temperature" are displayed alternately on the process value display.
"At 1" and "Set temperature" are displayed alternately on the set value display.

After the auto tuning is completed, hot air operation is continued with the automatically calculated PID value. If you press the hot air key once again while auto-tuning is in progress, auto-tuning will be interrupted. Hot air operation will continue after the interruption. (If interrupted, the PID parameter will not change.)

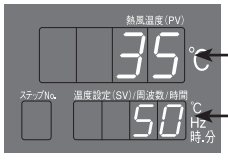
Top screen of SET.5 (control setting)



Low temperature zone auto tuning code

Default value "50" Corresponds to the default setting on the operation screen

The display alternates during auto-tuning



Measured temperature

Auto-tuning temperature

Notes

- By setting the parameter "PID control type setting (tYP)" to [1: Overshoot suppression PID control], the result of auto-tuning will be multiplied by a coefficient to calculate the PID value for overshoot suppression. (For further details, please refer to the HAP Controller Detailed Instructions Manual.)
- By enabling the parameter "3-zone PID enable setting (donE)", the set temperature range is separated into 3, which is low temperature range, medium temperature range, and high temperature range. Auto-tuning is performed for each temperature range, and each will have different PID values. (For further details, please refer to the HAP Controller Detailed Instructions Manual.)

⚠CAUTION

- **Perform auto-tuning while operating hot air under the conditions of use. (Auto tuning can be executed even from the stopped state or the blower operation state.)**
- **During auto-tuning, an overshoot which depends on the set temperature will occur. If you want to suppress overshoot during auto-tuning, please adjust "Auto-tuning sensitivity setting (AtC)". (For details, refer to the HAP Controller Detailed Instructions Manual.)**
- **The set temperature cannot be changed during auto-tuning.**
- **Auto-tuning may take several tens of minutes to complete.**

Example 7

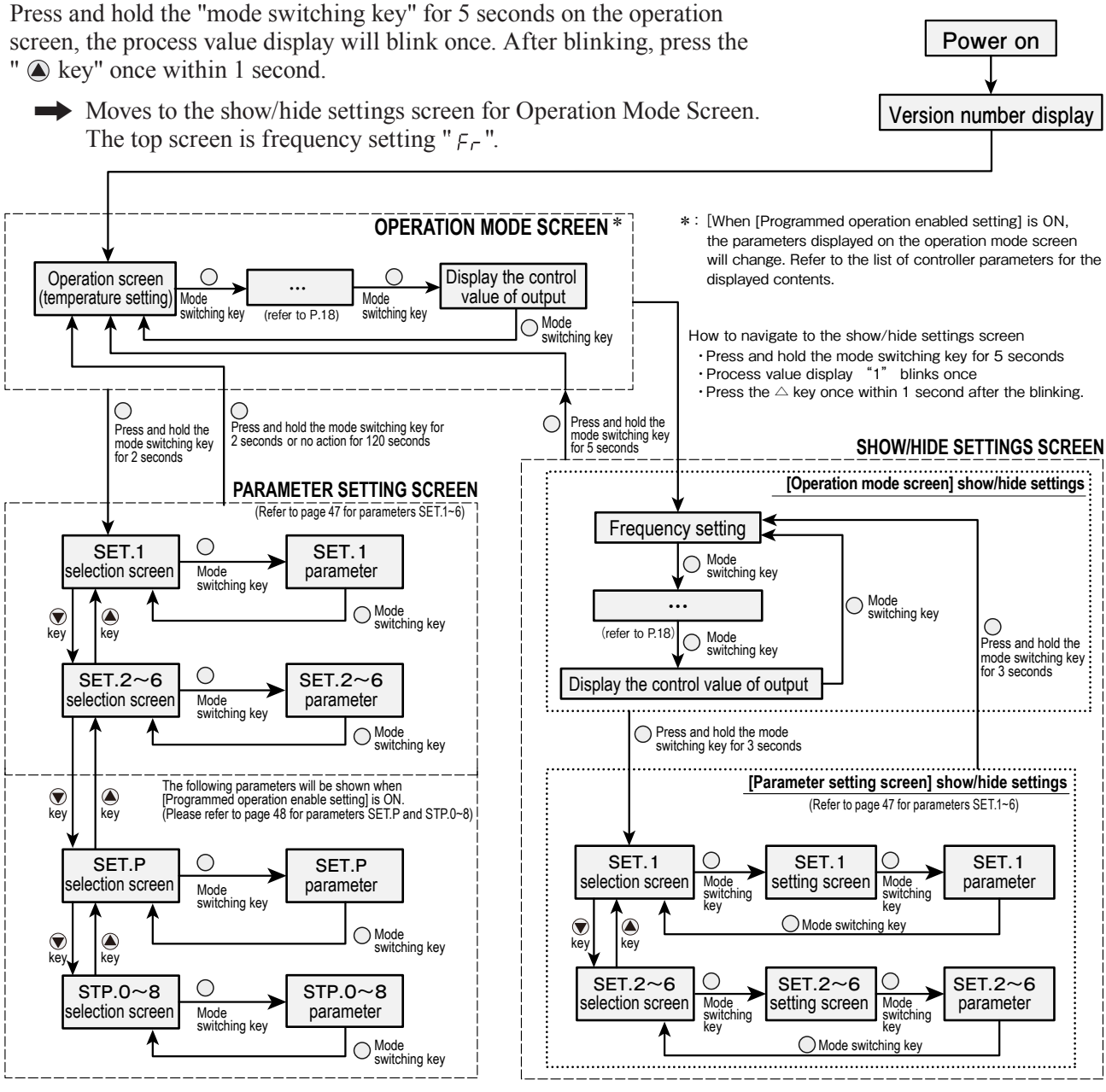
Show/hide display settings

This mode is used to set show/hide display for each parameter and parameter block. (Show/hide settings cannot be made to the parameters for temperature setting and programmed operation mode.)

1. How to navigate to show/hide settings mode

Press and hold the "mode switching key" for 5 seconds on the operation screen, the process value display will blink once. After blinking, press the " ▲ key" once within 1 second.

➡ Moves to the show/hide settings screen for Operation Mode Screen. The top screen is frequency setting " Fr ".

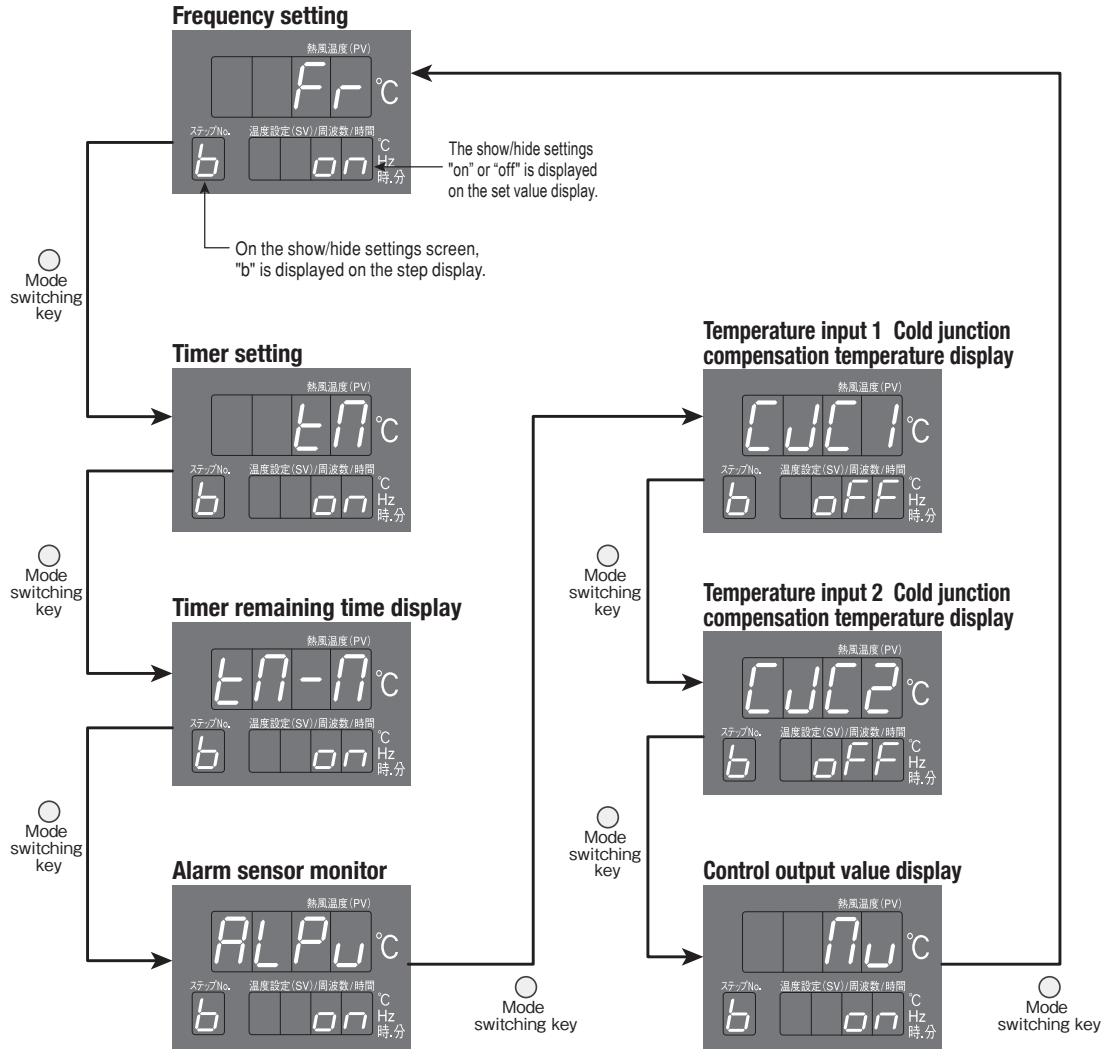


2. Show/hide settings for the parameters on the Operation Mode Screen.

① From frequency setting "Fr" on the top screen, press the "Mode switching key" to change the parameters for show/hide settings

② To switch between show and hide, press the "▲▼ key" to switch the set value to "on" or "oFF".

➡ The "on" or "oFF" display blinks. After about 3 seconds, the "on" or "oFF" display lights up and the setting is confirmed.



3. Show/hide settings in Parameter Setting Mode

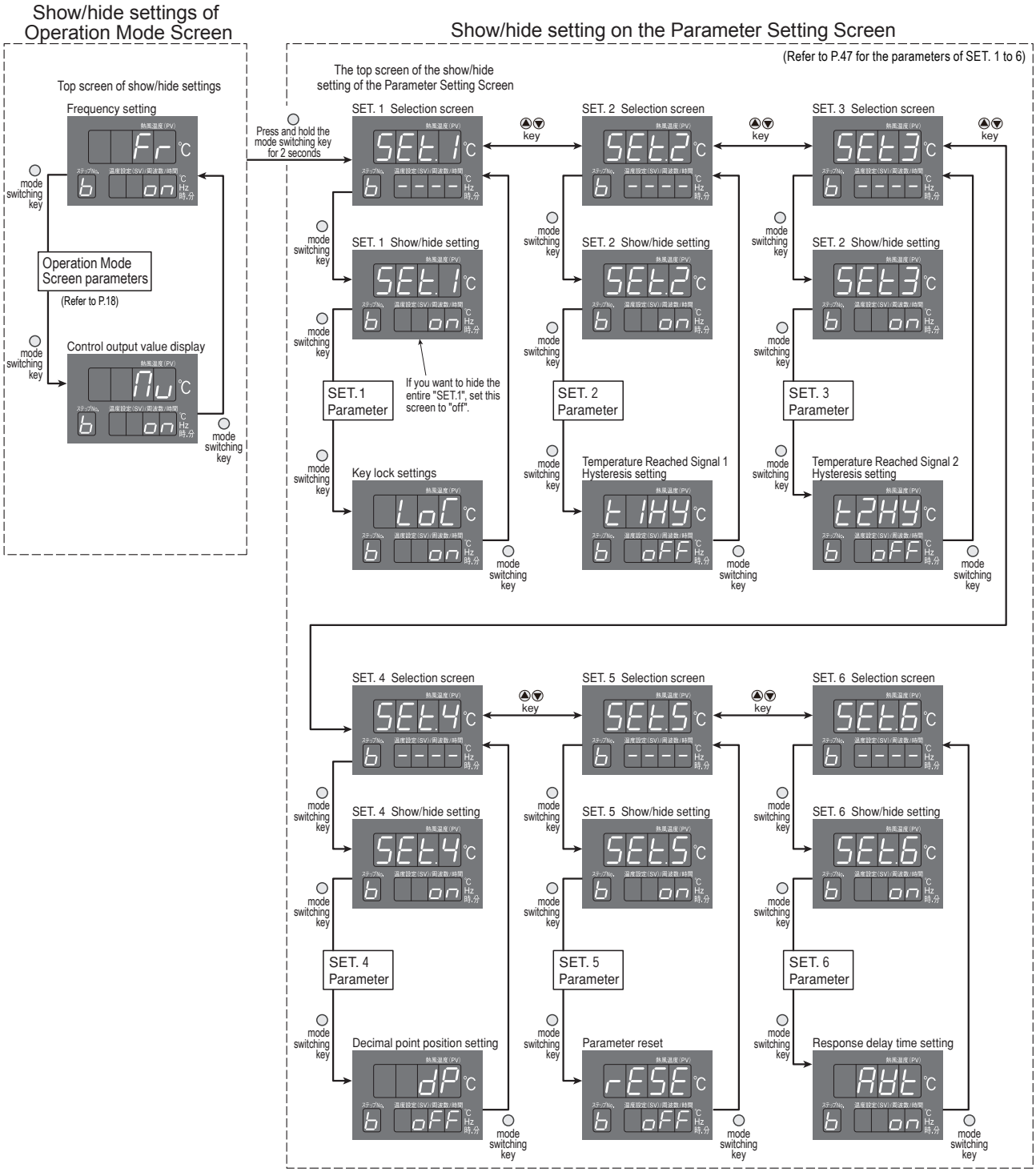
① While in show/hide settings screen for Operation Mode Screen, press and hold the "mode switching key" for 3 seconds.

➡ Moves to the show/hide setting screen for Parameter Setting Screen. The top screen is "SET.1" selection screen.

② To switch between show and hide, press the "▲▼ key" to switch the display of the set value display to "on" or "oFF".

➡ The "on" or "oFF" display flashes. After about 3 seconds, the "on" or "oFF" display lights up and the setting is confirmed.

Notes To set the show/hide settings for the entire "SET. ∗ ", set each "SET. ∗ Show/hide settings".



Example 8
Programmed operation

This is a simple programmed operation with 1 pattern and 8 steps. You can configure the hot air / blower / stop operation for each step. In addition, you can also set the temperature, operating frequency of the blower (valid only for HAP2000F series and HAP2000T series), and individual event for each step.
You can switch to the programmed operation mode by setting "Programmed operation enable setting (PrG)" in "SET.5 control settings" to enable “on".

● Program Pattern Example

① Step 1: Set the operation start temperature to 50℃ and raise the temperature to 100℃ over 50 minutes by hot air operation. The operating frequency of the blower is 60Hz.

② Step 2: After raising the temperature to 100℃ , keep this temperature constant for 30 minutes by hot air operation. The operating frequency of the blower is 60Hz.

③ Step 3: Raise the temperature to 200℃ over 60 minutes by hot air operation. The operating frequency of the blower is 40Hz.

④ Step 4: After raising the temperature to 200℃ , keep this temperature constant for 30 minutes by hot air operation. The operating frequency of the blower is 40Hz.

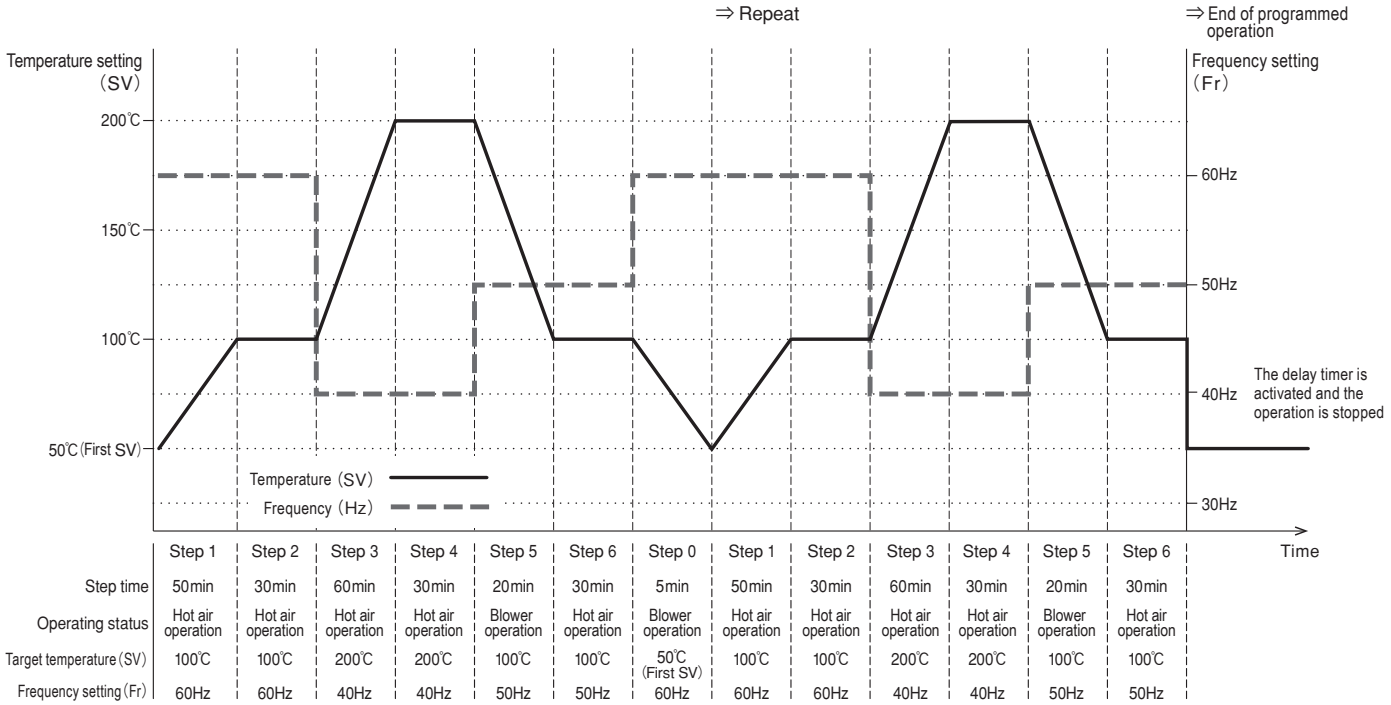
⑤ Step 5: Lower the temperature to 100℃ over 20 minutes by blower operation. The operating frequency of the blower is 50Hz.

⑥ Step 6: After lowering the temperature to 100℃ , keep this temperature constant for 30 minutes by hot air operation. The operating frequency of the blower is 50Hz.

⑦ Repeat steps 1 to 6 once.

⑧ Step 0: To lower the set temperature of 100℃ in step 6 to the operation start temperature of 50℃ in step 1, run blower operation for 5 minutes. The operating frequency of the blower is 60Hz.

⑨ Stop the operation after the program is completed.



	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 0	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6
Step time	50min	30min	60min	30min	20min	30min	5min	50min	30min	60min	30min	20min	30min
Operating status	Hot air operation	Hot air operation	Hot air operation	Hot air operation	Blower operation	Hot air operation	Blower operation	Hot air operation	Hot air operation	Hot air operation	Hot air operation	Blower operation	Hot air operation
Target temperature (SV)	100℃	100℃	200℃	200℃	100℃	100℃	50℃ (First SV)	100℃	100℃	200℃	200℃	100℃	100℃
Frequency setting (Fr)	60Hz	60Hz	40Hz	40Hz	50Hz	50Hz	60Hz	60Hz	60Hz	40Hz	40Hz	50Hz	50Hz

⚠CAUTION **The frequency settings of the blower is valid only for models with an inverter (HAP2000F and HAP2000T types). Parameters can be set for other models, but the operating frequency of the blower does not change because it does not have an inverter.**

● Creating the Program Pattern Example

Parameter settings

Parameter block		Parameter name		Default value	Set value	Unit	Remarks
SET.5	Control settings	PrG	Programmed operation enable setting	off	on	—	The default value of the show/hide settings is "Hide"
SET.P	Program basic settings	SV	First SV setting	50	50	℃	Set the operation start temperature to "50℃ "
		rUn	Repeat count setting	0	1	Times	
		PGMd	Operation mode setting at the end of programmed operation	0	0	—	0 : Stop operation 1 : Continue operation in the state of the final step
STP.0	Step 0 settings	PtM	Step time setting	00.00	00.05	Hours. Minutes	Set the time for step 0
		Con	Operating status setting	1	1	—	1 : Blower operation 2 : Stop
		Fr	Frequency setting	60	60	Hz	
STP.1	Step 1 settings	PtM	Step time setting	00.00	00.50	Hours. Minutes	Setting range : 00.00 ~ 99.59
		Con	Operating status setting	0	0	—	0 : Hot air operation 1 : Blower operation 2 : Stop 3 : Program end*
		SV	Temperature setting	50	100	℃	
		Fr	Frequency setting	60	60	Hz	
STP.2	Step 2 settings	PtM	Step time setting	00.00	00.30	Hours. Minutes	Setting range : 00.00 ~ 99.59
		Con	Operating status setting	0	0	—	0 : Hot air operation 1 : Blower operation 2 : Stop 3 : Program end*
		SV	Temperature setting	50	100	℃	
		Fr	Frequency setting	60	60	Hz	
STP.3	Step 3 settings	PtM	Step time setting	00.00	01.00	Hours. Minutes	Setting range : 00.00 ~ 99.59
		Con	Operating status setting	0	0	—	0 : Hot air operation 1 : Blower operation 2 : Stop 3 : Program end*
		SV	Temperature setting	50	200	℃	
		Fr	Frequency setting	60	40	Hz	
STP.4	Step 4 settings	PtM	Step time setting	00.00	00.30	Hours. Minutes	Setting range : 00.00 ~ 99.59
		Con	Operating status setting	0	0	—	0 : Hot air operation 1 : Blower operation 2 : Stop 3 : Program end*
		SV	Temperature setting	50	200	℃	
		Fr	Frequency setting	60	40	Hz	
STP.5	Step 5 settings	PtM	Step time setting	00.00	00.20	Hours. Minutes	Setting range : 00.00 ~ 99.59
		Con	Operating status setting	0	1	—	0 : Hot air operation 1 : Blower operation 2 : Stop 3 : Program end*
		SV	Temperature setting	50	100	℃	
		Fr	Frequency setting	60	50	Hz	
STP.6	Step 6 settings	PtM	Step time setting	00.00	00.30	Hours. Minutes	Setting range : 00.00 ~ 99.59
		Con	Operating status setting	0	0	—	0 : Hot air operation 1 : Blower operation 2 : Stop 3 : Program end*
		SV	Temperature setting	50	100	℃	
		Fr	Frequency setting	60	50	Hz	
STP.7	Step 7 settings	Con	Operating status setting	0	3	—	0 : Hot air operation 1 : Blower operation 2 : Stop 3 : Program end*

*: If [3: Program end] is set in the operation status setting, the previous step will be the final step. In this program pattern example, to set step 6 as the final step, [3: Program end] is set in step 7.

● Parameter setting procedure

1. Enable the display of "Programmed operation enable setting PrG" by changing the show/hide settings.

① Press and hold the "mode switching key" for 5 seconds on the operation screen, and the process value display will blink once. Press the "▲ key" once within 1 second after blinking.
➡ Moves to the show/hide setting screen of the Operation Mode Screen, and the show/hide setting screen of "Frequency setting" is displayed as the top screen.

② From the "Frequency setting" of show/hide setting screen, press and hold the "Mode switching key" for 3 seconds.
➡ Moves to the show/hide setting screen of the Parameter Setting Screen, and the "SEt. 1 selection screen" is displayed as the top screen.

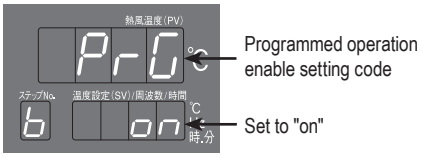
③ From the " SEt. 1 selection screen", press the " ▲ key" 4 times.
➡ The selection screen of "SEt.5 selection screen" is displayed.

④ From the "SEt.5 selection screen", press the "mode switching key" 33 times.
➡ The show/hide settings screen of "Programmed operation enable setting PrG" is displayed.

⑤ From the state where "Programmed operation enable setting PrG" is displayed, press the "▲ key" once.
➡ The set value display switches to "on" and blinks. After about 3 seconds, the "on" display lights up and the setting is confirmed. The show/hide setting of "Programmed operation enable setting PrG" is now "on" and is displayed on SET.5.

⑥ Press and hold the "mode switching key" for 5 seconds to return to the operation screen.

Programmed operation enable setting show/hide setting screen



Notes For details on the show/hide settings, refer to P.35 (Example 7) and the HAP Controller Detailed Instructions Manual.

2. Enable the settings of "Programmed operation enable setting PrG"

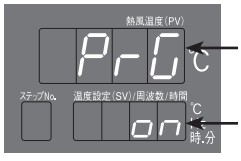
① Press and hold the "mode switching key" for 2 seconds on the operation screen.
➡ The process value display switches to "SEt. 1" and the screen shifts to the parameter setting screen.

② With "SEt. 1" displayed, press the "▲ key" four times.
➡ The process value display will switch to "SEt.5".

③ With "SEt.5" displayed, press the "mode switching key" 8 times.
➡ The process value display will switch to "PrG".

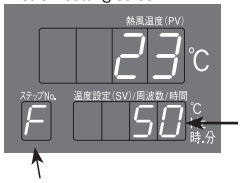
④ From the state where "PrG" is displayed, press the "▲ key" once.
➡ The set value display switches to "on" and blinks.
After about 3 seconds, the "on" display lights up and the setting is confirmed.
The "Timer / Program lamp" lights up, and the programmed operation enable setting is enabled.

⑤ Press and hold the "mode switching key" for 2 seconds.
➡ Return to the operation screen.



The top screen of the operation screen when the programmed operation enable setting is "on"

First SV setting screen



"F" is displayed for first SV setting screen.
Corresponds to the first SV setting of the SET.P program basic settings.

3. Configure the SET.P program basic settings

(1) Set the first SV

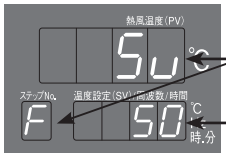
Top screen of SET.P (basic program settings)

① Press and hold the "mode switching key" for 2 seconds on the operation screen.

➡ The process value display switches to "SEt. 1" and the parameter setting screen is displayed.

② With "SEt. 1" displayed, press the "▲ key" 6 times.

➡ The process value display will switch to "SEtP".



First SV setting code

Default value "50" Corresponds to the top screen of the operation screen.

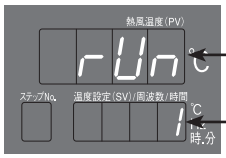
③ From the state where "SEtP" is displayed, press the "mode switching key" once.

➡ The process value display switches to "Su" and "F" is displayed on the step display.

④ From the state where "Su" is displayed, press the "▲▼ key" to set the first SV. (In the program pattern example, no changes are required since the first SV is 50℃ .)

➡ The changed value is displayed on the set value display and blinks. After about 3 seconds, the set value display lights up and the setting is confirmed.

(2) Set the number of repeat count (rUn)



Repeat count setting code

Set to "1"

① From the state where "Su" is displayed, press the "mode switching key" once.

➡ The process value display switches to "rUn".

② From the state where "rUn" is displayed, press the "▲ key" once to set the number of repetitions.

➡ The set value display switches to " 1 " and blinks. After about 3 seconds, the set value display lights up and the setting is confirmed. The number of repeat count (rUn) has been set to 1.

(3) Set the operation mode setting at the end of programmed operation (PGMd)

Code of operation mode setting screen at the end of programmed operation

Default value "0"

① From the state where "rUn" is displayed, press the "mode switching key" once.

➡ The process value display switches to "PGMd".

② From the state where "PGMd" is displayed, press the " ▲▼ key" to set. (Since the program pattern example uses the default value [0: Stop operation], no changes are required.)

➡ The set value is displayed on the set value display and blinks. After about 3 seconds, the set value display lights up and the setting is confirmed.

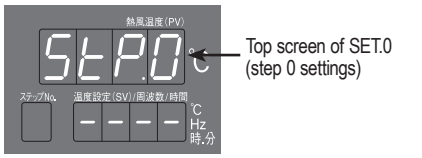
The operation mode setting at the end of programmed operation (PGMd) has been set.

Notes The first SV can also be set on the top screen of the operation screen.

Notes In the SET.P program basic settings, you can also set the weight function. For details, please refer to the HAP Controller Detailed Instructions Manual.

4. Configure the STP. 0 Step 0 settings

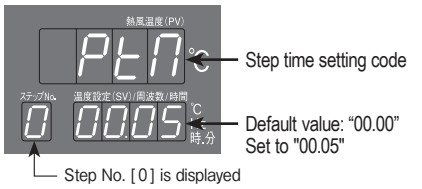
(1) Set the time settings for step 0(PtM)



Top screen of SET.0 (step 0 settings)

① From the state where "PGMd" is displayed, press the "mode switching key" 4 times.
➡ The process value display will switch to "SEtP ".

② From the state where "SEtP" is displayed, press the "▲ key" once.
➡ The process value display switches to "StP0 ".

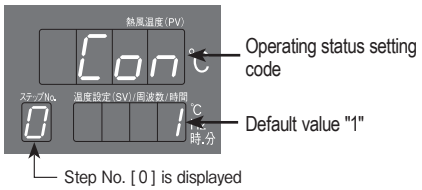


Step time setting code
Default value: “00.00” Set to "00.05"
Step No. [0] is displayed

③ From the state where "StP0" is displayed, press the "mode switching key" once.
➡ " PtM " is displayed on the process value display, and " 0 " is displayed on the step display.

④ From the state where " PtM" is displayed, press the "▲ key" to set the time for step 0. (In this program pattern example, the time setting for step 0: is set to 00.05.)
➡ The changed value is displayed on the set value display and it blinks. After about 3 seconds, the set value display lights up and the setting is confirmed. The time setting (PtM) for step 0 has been set.

(2) Set the operation status (Con) in step 0.

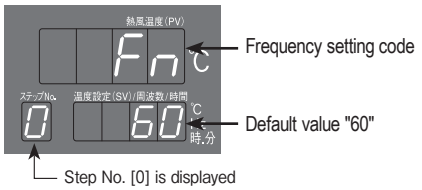


Operating status setting code
Default value "1"
Step No. [0] is displayed

① From the state where "PtM " is displayed, press the "mode switching key" once.
➡ " Con" is displayed on the process value display.

② From the state where " Con" is displayed, press the "▲ key" to set. (In this program pattern example, no changes are required since the default value [1: Stop operation] is used.)
➡ The changed value is displayed on the set value display and blinks. After about 3 seconds, the set value display lights up and the setting is confirmed. The operating status setting (Con) in step 0 has been set.

(3) Set the frequency (Fr) of step 0.



Frequency setting code
Default value "60"
Step No. [0] is displayed

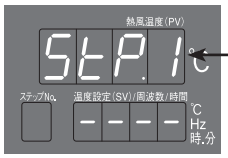
① From the state where " Con" is displayed, press the "mode switching key" once.
➡ " Fr " is displayed on the process value display.

② From the state where " Fr " is displayed, press the " ▲▼ key" to set. (In this program pattern example, no changes are required since the default value [60 Hz] is used.)
➡ The changed value is displayed on the set value display and it blinks. After about 3 seconds, the set value display lights up and the setting is confirmed. The frequency setting (Fr) for step 0 has been set.

Notes Step 0 settings are for the step that connects the last step to the first steps when repeating a program pattern. While in step 0, individual temperature error does not occur. If this function is not required, set the step 0 time setting (PtM) to [00.00].

5. Configure the STP. 1 Step 1 settings

(1) Set the time settings for step 1(PtM).



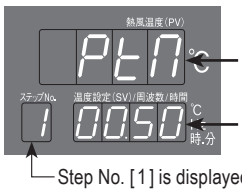
Top screen of SET.1 (step 1 setting)

① From the state where the frequency setting (Fr) of step 0 is displayed, press the "mode switching key" once.

➡ The process value display switches to "StP0".

② From the state where "StP0" is displayed, press the "▲ key" once.

➡ The process value display will switch to "StP. 1".



Step time setting code

Default value: “00.00” Set to "00.50"

Step No. [1] is displayed

③ From the state where "StP. 1" is displayed, press the "mode switching key" once.

➡ "PtM" is displayed on the process value display, and "1" is displayed on the step display.

④ From the state where "PtM" is displayed, press the "▲ key" to set. (In this program pattern example, the time setting of step 1 is set to 00.50.)

➡ The changed value is displayed on the set value display and it blinks. After about 3 seconds, the set value display lights up and the setting is confirmed. The time setting (PtM) for step 1 has been set.

(2) Set the operation status (Con) in step 1.

Operating status settings code

Default value "0"

Step No. [1] is displayed

① From the state where the time setting (PtM) of step 1 is displayed, press the "mode switching key" once.

➡ "Con" is displayed on the process value display.

② From the state where "Con" is displayed, press the "▲ key" to set. (In this program pattern example, no changes are required since the default value [0: hot air operation] is used.)

➡ The changed value is displayed on the set value display and it blinks. After about 3 seconds, the set value display lights up and the setting is confirmed. The operating status setting (Con) for step 1 has been set.

(3) Set the temperature (SV) of step 1.

Temperature setting code

Set to "100"

Step No. [1] is displayed

① From the state where the time setting (Con) of step 1 is displayed, press the "mode switching key" once.

➡ "Su" is displayed on the process value display.

② From the state where "Su" is displayed, press the "▲▼ key" to set. (In this program pattern example, the temperature setting of step 1: is set to 100℃.)

➡ The changed value is displayed on the set value display and it blinks. After about 3 seconds, the set value display lights up and the setting is confirmed. The temperature setting (SV) for step 1 has been set.

(4) Set the frequency (Fr) of step 1.

Frequency setting code

Default value "60"

Step No. [1] is displayed

① From the state where the temperature setting (SV) of step 1 is displayed, press the "mode switching key" once.

➡ "Fr" is displayed on the process value display.

② From the state where "Fr" is displayed, press the "▲▼ key" to set. (In this program pattern example, no changes are required since the

default value [60 Hz] is used.)

➡ The changed value is displayed on set value display and it blinks. After about 3 seconds, the set value display lights up and the setting is confirmed. The frequency setting (Fr) of step 1 has been set.

6. Follow the same procedure to set STP. 2 Step 2 to STP. 6 Step 6.

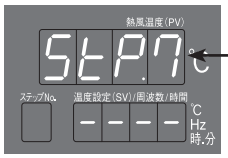
In steps 1 to 8, you can set various event functions in addition to temperature settings and operating status settings. For details, refer to the HAP Controller Detailed Instructions Manual.

7. Configure the STP. 7 Step 7 settings.

(1) Set the operation status (Con) in step 7.

① With "StP7" displayed on the process value display, press the "mode switching key" twice.

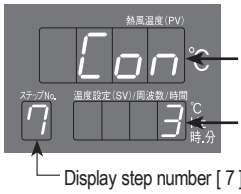
➡ "Con" is displayed on the process value display, and "7" is displayed on the step display.



Top screen of SET.7 (step 7 setting)

② With "Con" displayed, press the "▲ key" three times.

➡ The set value display switches to "3" and blinks. After about 3 seconds, the set value display lights up and the setting is confirmed. The operation status setting (Con) in step 7 is set to "3: Final step".



Operation status setting code

Set to final step with "3"

Display step number [7]

Notes If [3: Program end] is set in the operation status setting, the previous step will be the final step. In this program pattern example, to set step 6 as the final step, [3: Program end] is set in step 7.

● Start programmed operation

- **Press and hold the "hot air key" for 2 seconds on the operation screen to start programmed operation.**
  During programmed operation, the process value(PV) display shows the measured temperature of the control sensor, the set value(SV) display shows target temperature of the current step, and the step display shows the step number being executed.

- **End of programmed operation**
  The action at the end of programmed operation can be set in SET.P [Operation mode setting at the end of the programmed operation (PGMd)]. The settings are as follows.
  0 : Stop the operation after the programmed operation has ended
  1 : Continue the operation in the final step

- **Stopping programmed operation**
  If you press the "stop key" once during programmed operation, the running program will be reset and programmed operation will stop. If the operating state at this time is [hot air operation], the delay timer will run and the operation will stop after the countdown.

  (Notice) This is not a temporary stop, the programmed operation cannot be restarted from the point of stop.

For details on driving operations, refer to the HAP Controller Detailed Instructions Manual.

Example 9

Key lock settings

Settings to enable or disable parameter settings from the operation screen. The parameter name is [Key lock settings: LoC].

The settings can be done as follows.

- Set value "0" : All parameters can be changed (key lock OFF)
- Set value "1" : Only temperature setting can be changed
- Set value "2" : Only parameters of Operation Mode Screen can be changed.
- Set value "3" : All parameters cannot be changed

Top screen of SET.1 (general settings)

○ Setting procedure

① Press and hold the "mode switching key" for 2 seconds on the operation screen.

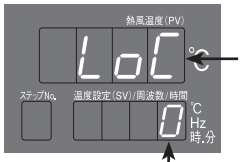
➡ The process value display switches to "SEt. 1" and the screen shifts to the parameter setting screen.

② With "SEt. 1" is displayed on screen, press the "mode switching key" 4 times.

➡ The process value display will switch to "LoC".

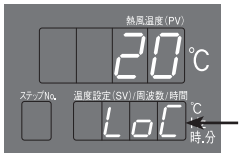
③ With "LoC" displayed on screen, press the "▲▼ key" to set the key lock.

➡ The changed value is displayed on the set value display and it blinks. After about 3 seconds, the set value display lights up and the setting is confirmed.



key lock settings code

"0" : All parameters can be changed (Key lock OFF)
"1" : Only temperature settings can be changed
"2" : Only parameters of Operation Mode Screen can be changed.
"3" : All parameters cannot be changed



"LoC" is displayed if the "▲▼ key" is pushed for parameters that are locked in the key lock settings.

Notes [Key lock settings: Loc] settings can be change when "3: All parameters cannot be changed" is set.

⚠CAUTION **Key lock does not applies to show/hide settings and settings done remotely with the communication function.**

Example 10

Reset parameters

Resets the parameter settings to its default values. The parameter name is [Parameter reset: rESE].

1. Enable the display of [Parameter reset: rESE] from the show/hide setting screen.

① Press and hold the "mode switching key" for 5 seconds on the operation screen, the process value display will blink once. After blinking, press the "▲ key" once within 1 second.

➡ Operation screen switches to show/hide settings screen, and the "Frequency setting" will be displayed as the top screen.

② From the show/hide settings screen of "Frequency setting", press and hold the "mode switching key" for 3 seconds.

➡ Switches to show/hide setting screen for parameter setting screen, and selection screen of "SET.1 selection screen" is displayed as the top screen.

Parameter reset show/hide settings screen

Parameter reset settings code

Default value "off" Set to "on"

③ From the selection screen of "SET.1 selection screen", press the "▲ key" 4 times.

➡ The selection screen of "SET.5 selection screen" is displayed.

④ From the selection screen of "SET.5 selection screen", press the "mode switching key" 34 times.

➡ The show/hide setting screen of "Parameter reset: rESE" is displayed.

⑤ With "Parameter reset: rESE" displayed on screen, press the "▲ key" once.

➡ The set value display switches to "on" and blinks. After about 3 seconds, the "on" display lights up and the setting is confirmed.
Parameter reset: "rESE" show/hide setting is "on" and is now displayed in SET.5.

⑥ Press and hold the "mode switching key" for 5 seconds to return to the operation screen.

Notes For details on the show/hide settings, refer to P.35 (Example 7) and the HAP Controller Detailed Instructions Manual.

2. Reset all parameters to default values

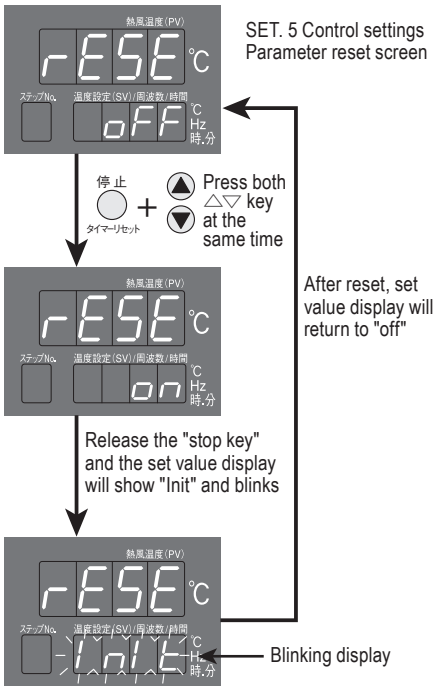
① Press and hold the "mode switching key" for 2 seconds on the operation screen.
➡ The process value display switches to "SEt. 1" and the screen shifts to the parameter setting screen.

② With "SEt. 1" displayed, press the "▲ key" 4 times.
➡ The process value display will switch to " SEt.5 ".

③ From the state where " SEt.5 " is displayed, press the "mode switching key" 8 times.
➡ The process value display switches to "rESE".

④ With "rESE" displayed, pressing the "▲ key" and "▲ key" at the same time and then press and hold the "Stop key".
➡ The set value display switches to "on".

⑤ With the set value display showing "on", release the pressed "stop key".
➡ Reset will be executed. During execution, "InIt" blinks on the set value display. After blinking, "oFF" is displayed and reset is completed.



⚠CAUTION
- **The settings before reset is not recorded. Before resetting, record the current settings if necessary.**
- **Show/hide settings will not reset.**
- **Reset can be executed only when the hot air generator is stopped.**
- **The hot air generator HAP2000T series and custom-made products may be shipped with the set values of the HAP controller changed.**

When resetting the parameters for HAP2000T series, refer to the table below to set the correct parameters.

Model name	Parameter				Set value after parameter reset (default value)	Shipping set value
	Parameter block	Display code	Label	Show/hide settings		
HAP2053T	SET.4	SV-H	SV upper limit setting	Hide	350	300
HAP2103T	SET.4	SV-H	SV upper limit setting	Hide	350	300

● List of controller parameters

Parameter		Display code	Label		Default value	Unit	Show/ hide
Operation Mode Screen	Operation screen		Operation screen		50	℃	—
	Fr	Fr	Frequency setting		60	Hz	Show
	tM	tM	Timer setting		0.00.01	D.H.M	Show
	tM-M	tM-M	Timer remaining time display		—	D.H.M	Show
	ALPu	ALPV	Alarm sensor monitor		—	℃	Show
	CJC1	CjC1	Temperature input 1 Cold junction compensation temperature		—	℃	Hide
	CJC2	CjC2	Temperature input 2 Cold junction compensation temperature		—	℃	Hide
	Mu	MV	Control output value display		—	%	Show
SET.1 General settings	tMd	tMd	Delay timer enable setting		on	—	Hide
	tMdY	tMdY	Delay timer setting		00.01	H.M	Show
	dIC	dIC	External control enable setting		off	—	Show
	dICt	dICT	External temperature control enable setting		off	—	Show
	dIoP	dIoP	Self-holding setting for external overheating error		on	—	Hide
	tSoF	tSoF	Output setting for Temperature Reached Signal error		0	—	Hide
	Loc	Loc	Key lock settings		0	—	Show
SET.2 Sensor 1 settings	ALM1	ALM1	Temperature Control Error 1	Alarm type*1	5	—	Show
	AL 1	AL1		Trigger value setting	20	℃	Show
	A1HY	A1HY		Hysteresis	3	℃	Hide
	A1oP	A1oP		Self-holding setting	on	—	Show
	AL1L	AL1L		Alarm display	on	—	Show
	AL1S	AL1S		Temperature control error output setting	on	—	Hide
	TAS1	TAS1	Temperature Reached Signal 1	Output type*2	0	—	Show
	TS1L	TS1L		Lower limit setting	50	℃	Show
	TS1H	TS1H		Upper limit setting	100	℃	Show
	T1Hy	T1Hy		Hysteresis	3	℃	Hide
SET.3 Sensor 2 settings	ALM2	ALM2	Temperature Control Error 2	Alarm type*1	0	—	Show
	AL2	AL2		Trigger value setting	20	℃	Show
	A2HY	A2HY		Hysteresis	3	℃	Hide
	A2oP	A2oP		Self-holding setting	on	—	Show
	AL2L	AL2L		Alarm display	on	—	Show
	AL2S	AL2S		Temperature control error output setting	on	—	Hide
	TAS2	TAS2	Temperature Reached Signal 1	Output type*2	0	—	Show
	TS2L	TS2L		Lower limit setting	50	℃	Show
	TS2H	TS2H		Upper limit setting	100	℃	Show
	T2HY	T2Hy		Hysteresis	3	℃	Hide
SET.4 Sensor range settings	ISEL	ISEL	Input sensor selection		1	—	Show
	InP1	InP1	Sensor 1 type selection		0	—	Hide
	InP2	InP2	Sensor 2 type selection		0	—	Hide
	SU-L	SV-L	SV lower limit setting		0	℃	Hide
	SU-H	SV-H	SV upper limit setting		350	℃	Hide
	Fr-L	Fr-L	Frequency lower limit setting		30	Hz	Hide
	Fr-H	Fr-H	Frequency upper limit setting		60	Hz	Hide
	dP	dP	Decimal point position setting		0	—	Hide

Parameter		Display code	Label	Default value	Unit	Show/ hide
SET.5 Control settings	ZonE	ZonE	3-zone PID enable setting	off	—	Show
	tyP	tyP	PID control type setting	0	—	Show
	bMd	bMd	Overshoot suppression auto-tuning setting	1	—	Show
	PM1	PM1	3-zone PID midpoint 1 setting	100	℃	Show*3
	PM2	PM2	3-zone PID midpoint 2 setting	250	℃	Show*3
	AtG	AtG	Auto-tuning coefficient setting	1.0	Multiples	Hide
	AtC	AtC	Auto-tuning sensitivity setting	2	℃	Hide
	At1	At1	Low temperature zone auto tuning	50	℃	Show
	At2	At2	Medium temperature zone auto-tuning	200	℃	Show*3
	At3	At3	High temperature zone autotuning	300	℃	Show*3
	AtAL	AtAL	Auto-tuning for all	off	—	Show*3
	P1	P1	Low temperature zone proportional gain setting	5.0	%	Show
	I1	I1	Low temperature zone integration time setting	120	Second	Show
	d1	d1	Low temperature zone differential time setting	30	Second	Show
	P2	P2	Medium temperature zone proportional gain setting	5.0	%	Show*3
	I2	I2	Medium temperature zone integration time setting	120	Second	Show*3
	d2	d2	Medium temperature zone differential time setting	30	Second	Show*3
	P3	P3	High temperature zone proportional gain setting	5.0	%	Show*3
	I3	I3	High temperature zone integration time setting	120	Second	Show*3
	d3	d3	High temperature zone differential time setting	30	Second	Show*3
	HYS	HYS	Hysteresis setting for on-off control	2	℃	Hide
	Pbb	Pbb	Manual reset	0.0	%	Hide
	Ar	Ar	Anti-reset windup	110.0	%	Hide
	tC	tC	Control output proportional period	2.0	Second	Hide
	dIr1	dIr1	Sensor 1 control direction setting	0	—	Hide
	dIr2	dIr2	Sensor 2 control direction setting	0	—	Hide
	MvG	MvG	Output gain setting	100.0	%	Hide
	PvG	PvG	PV compensation gain setting	1.000	Multiples	Hide
	PvS	PVS	PV compensation zero setting	0	℃	Hide
	SvS	SvS	SV compensation setting	0	℃	Hide
	PdF	PdF	PV filter settings	5.0	Second	Hide
	PrG	PrG	Programmed operation enable setting	off	—	Hide
	rESE	rESE	Parameter reset	off	—	Hide
SET.6 Communication settings	Prt	Prt	Protocol settings	0	—	Show
	Adr	Adr	Slave address settings	1	Channel	Show
	bPS	bPS	Baudrate	96	bps	Show
	dAt	dAt	Data bits	8	Bit	Show
	Pry	Pry	Parity	nonE	—	Show
	Stb	Stb	Stop bits	2	Bit	Show
	Awt	Awt	Read Timeout	0	ms	Show

● List of parameters when programmed operation is enabled

Parameter		Display code	Label		Default value	Unit	Show/ hide
Programmed operation's Operation Mode Screen	Operation screen		Operation screen		50	℃	—
	Fr	Fr	Frequency setting		60	Hz	Show
	PtM	PtM	Current step setting time display		—	H.M	Show
	PtMM	PtMM	Current step remaining time display		—	H.M	Show
	rUnM	rUnM	Repeat count display		—	Counts	Show
	ALPu	ALPV	Alarm sensor monitor		—	℃	Hide
	CJC1	CjC1	Temperature input 1 Cold junction compensation temperature		—	℃	Hide
	CJC2	CjC2	Temperature input 2 Cold junction compensation temperature		—	℃	Show
	nu	MV	Control output value display		—	%	Show
Parameters for SET.1 to 6 are identical (see page 47)							
SET.P Program basic settings	Su	SV	First SV setting		50	℃	—
	rUn	rUn	Repeat count setting		0	—	—
	PGMd	PGMd	Operation mode setting at the end of programmed operation		0	—	—
	WAIt	Wait	Wait function setting		off	—	—
	WAW	WAW	Wait zone setting		0	℃	—
	Wt	Wt	Wait time setting		00.00	H.M	—
Step0 settings	PtM	PtM	Step time setting		0	H.M	—
	Con	Con	Operating status setting		1	—	—
	Fr	Fr	Frequency setting		60	Hz	—
STP.1~8 Steps 1~8 Settings	PtM	PtM	Step time setting		00.00	H.M	—
	Con	Con	Operating status setting		0	—	—
	Su	SV	Temperature setting		50	℃	—
	Fr	Fr	Frequency setting		60	Hz	—
	ALM1	ALM1	Temperature Control Error 1	Alarm type*1	5	—	—
	AL1	AL1		Trigger value setting	20	℃	—
	A1HY	A1HY		Hysteresis	3	℃	—
	A1oP	A1oP		Self-holding setting	on	—	—
	AL1L	AL1L		Alarm display setting	on	—	—
	AL1S	AL1S		Temperature control error output setting	on	—	—
	TAS1	TAS1	Temperature Reached Signal 1	Output type*2	0	—	—
	TS1L	TS1L		Lower limit setting	50	℃	—
	TS1H	TS1H		Upper limit setting	100	℃	—
	T1Hy	T1Hy		Hysteresis setting	3	℃	—
	ALM2	ALM2	Temperature Control Error 2	Alarm type*1	0	—	—
	AL2	AL2		Trigger value setting	20	℃	—
	A2HY	A2HY		Hysteresis	3	℃	—
	A2oP	A2oP		Self-holding setting	on	—	—
	AL2L	AL2L		Alarm display	on	—	—
	AL2S	AL2S		Temperature control error output setting	on	—	—
	TAS2	TAS2	Temperature Reached Signal 2	Output type*2	0	—	—
	TS2L	TS2L		Lower limit setting	50	℃	—
	TS2H	TS2H		Upper limit setting	100	℃	—
	T2HY	T2Hy		Hysteresis	3	℃	—

*1 : The alarm types are as follows.
(For more information on the alarm operation, please refer to "HAP Controller Detailed Instructions Manual".)

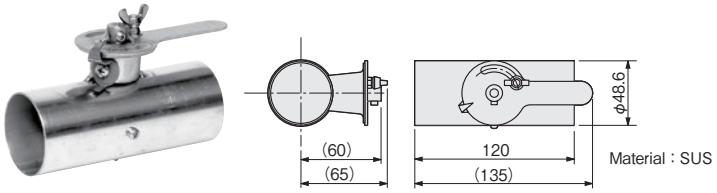
0 : No alarm
1 : Absolute upper limit
2 : Absolute lower limit
3 : Absolute upper limit with standby sequence
4 : Absolute lower limit with standby sequence
5 : Upper deviation limit
6 : Lower deviation limit
7 : Upper and lower deviation limit
8 : Upper deviation limit with standby sequence
9 : Lower deviation limit with standby sequence
10 : Upper and lower deviation limit with standby sequence

*2 : The output types are as follows.
(For more information on the output operation, please refer to "HAP Controller Detailed Instructions Manual".)

0 : No output
1 : Absolute output
2 : Absolute output with standby sequence
3 : Deviation output
4 : Deviation output with standby sequence

*3 : Even if the show/hide setting is set to "on", it will not be displayed if "3-zone PID enable setting: ZonE" is "Disabled: off".

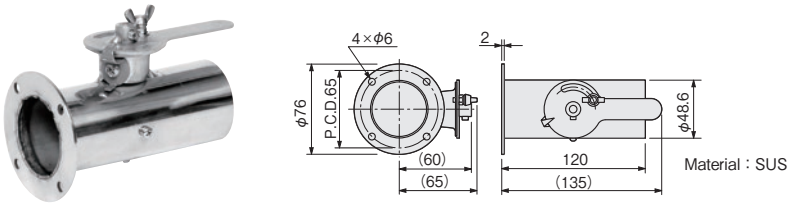
■ Damper For air volume adjustment of exhaustion



Material : SUS

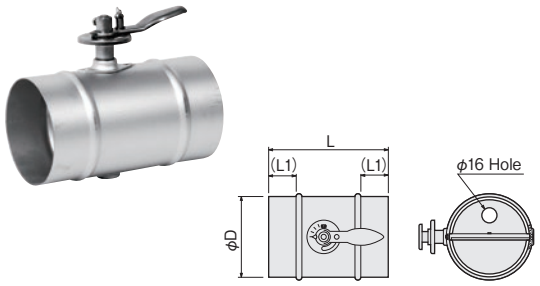
In Stock	Model No.	Product Code
◎	PSD1050	00950295

Single flange damper



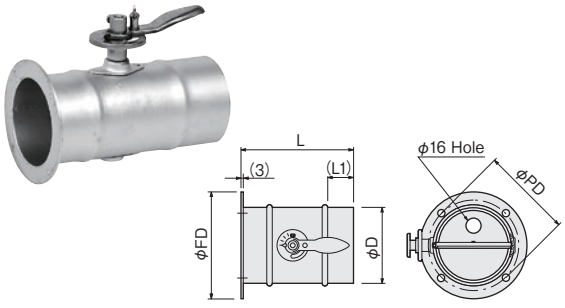
Material : SUS

In Stock	Model No.	Product Code
◎	PSD0050	00950205



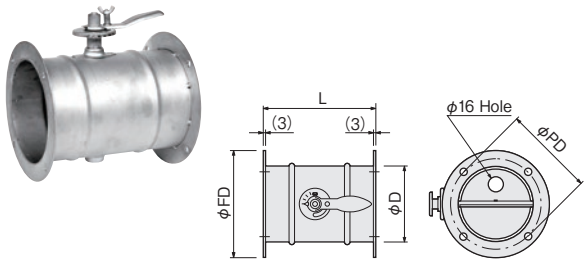
In Stock	Model No.	Product Code	Dimensions (mm)			Material
			ϕD	L	L 1	
◎	PPD1075	00950250	73	150	25	Steel + Coating
◎	PPD1100	00950260	98	220	50	
	PPD1125	00950270	123			
	PPD1150	00950280	148			
	PPD1200	00952020	198			
	PSD1075	00950255	73	150	25	SUS
	PSD1100	00950265	98	220	50	
	PSD1125	00950275	123			
	PSD1150	00950285	148			
	PSD1200	00952025	198			

Single flange damper



In Stock	Model No.	Product Code	Dimensions (mm)						Material
			ϕD	L	L 1	ϕFD	ϕPD	Mounting holes	
◎	PPD0075	00950210	73	150	25	108	96	4×ϕ6	Steel + Coating
◎	PPD0100	00950220	98	220	50	135	120		
◎	PPD0125	00950230	123			154	140		
	PPD0150	00950240	148			200	180	4×ϕ9	
	PPD0200	00952030	198			260	240		
	PSD0075	00950215	73	150	25	108	96	4×ϕ6	SUS
	PSD0100	00950225	98	220	50	135	120		
	PSD0125	00950235	123			154	140		
	PSD0150	00950245	148			200	180	4×ϕ9	
	PSD0200	00952035	198			260	240		

Double flange damper



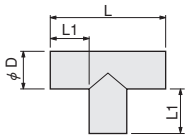
In Stock	Model No.	Product Code	Dimensions (mm)				Material
			ϕD	L	ϕFD	ϕPD	Mounting holes	
	PPD2075	00950113	73	185	108	96	2×4×ϕ6	Steel + Coating
	PPD2100	00950123	98	220	135	120		
	PPD2125	00950133	123		154	140		
	PPD2150	00950143	148		200	180	2×4×ϕ9	
	PPD2200	00952040	198		260	240		
	PSD2075	00950115	73	185	108	96	2×4×ϕ6	SUS
	PSD2100	00950125	98	220	135	120		
	PSD2125	00950135	123		154	140		
	PSD2150	00950145	148		200	180	2×4×ϕ9	
	PSD2200	00952045	198		260	240		

"In Stock" sign description ◎ : **Stocked items** Shipped on the day or the next working day of purchase (Out of stock may occur).
No sign : **Not stocked** Please inquire for details on delivery dates.

Please take consideration of the space for ducting and select the appropriate fittings.

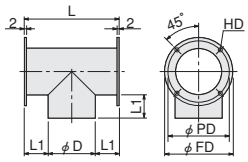
■ Duct fittings

● T-shaped duct fitting



In Stock	Model No.	Product Code	Dimensions (mm)				Material
			φD	L	L1	Thickness	
◎	PST0050	00951005	48.6	120	35	1.0	SUS
◎	PST1075	00951050	73	145			
◎	PST1100	00951055	98	190	46	1.2	
◎	PST1125	00951060	123	215			
◎	PST1150	00951065	148	240			
	PST1200	00951000	198	320	61	1.5	

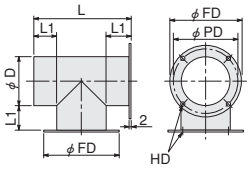
● Flange T-shaped duct fitting Type-A



In Stock	Model No.	Product Code	Dimensions (mm)							Material
			φD	φFD	φPD	L	L1	HD	Thickness	
◎	PST6075	00951070	73	108	96	145	35	4×φ6 ×2sides	1.0	SUS
◎	PST6100	00951075	98	135	120	190	46			
◎	PST6125	00951080	123	154	140	215			1.2	
◎	PST6150	00951085	148	200	180	240		4×φ9 ×2sides		
	PST6200	00951090	198	260	240	320	61		1.5	

Thickness of PST6200 flange: 3mm

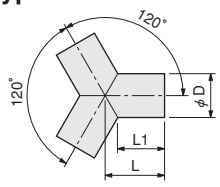
● Flange T-shaped duct fitting Type-B



In Stock	Model No.	Product Code	Dimensions (mm)							Material
			φD	φFD	φPD	L	L1	HD	Thickness	
◎	PST7075	00951071	73	108	96	145	35	4×φ6 ×2sides	1.0	SUS
◎	PST7100	00951076	98	135	120	190	46			
◎	PST7125	00951081	123	154	140	215			1.2	
◎	PST7150	00951086	148	200	180	240		4×φ9 ×2sides		
	PST7200	00951095	198	260	240	320	61		1.5	

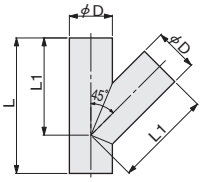
Thickness of PST7200 flange: 3mm
Please refer to the flanged connector for the welding angle and the flange dimensions.

● Wye duct fitting Type-A



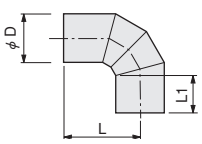
In Stock	Model No.	Product Code	Dimensions (mm)				Material
			φD	L	L1	Thickness	
◎	PSY0050	00951105	48.6	55	40	1.0	SUS
◎	PSY1075	00951150	73	65	44		
◎	PSY1100	00951155	98	75	47		
◎	PSY1125	00951160	123	80	44	1.2	
◎	PSY1150	00951165	148	90	47		
	PSY1200	00951170	198	120	62	1.5	

● Wye duct fitting Type-B



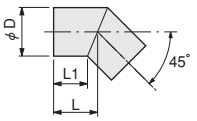
In Stock	Model No.	Product Code	Dimensions (mm)				Material
			φD	L	L1	Thickness	
	PST4075	00951750	73	230	165	1.0	SUS
	PST4100	00951755	98	280	205		
	PST4125	00951760	123	325	240	1.2	
	PST4150	00951765	148	390	290		
	PST4200	00951770	198	500	375	1.5	

● 90 degrees elbow duct fitting



In Stock	Model No.	Product Code	Dimensions (mm)				Material
			φD	L	L1	Thickness	
◎	PSL9050	00951205	48.6	80	38	1.0	SUS
◎	PSL0075	00951250	73	92	35		
◎	PSL0100	00951255	98	120	47		
◎	PSL0125	00951260	123	136	45	1.2	
◎	PSL0150	00951265	148	145			
	PSL0200	00951270	198	195	58	1.5	

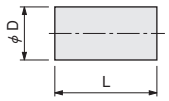
● 45 degrees elbow duct fitting



In Stock	Model No.	Product Code	Dimensions (mm)				Material
			φD	L	L1	Thickness	
◎	PSL4050	00951305	48.6	40	30	1.0	SUS
◎	PSL5075	00951350	73	50	35		
◎	PSL5100	00951355	98	65	45	1.2	
◎	PSL5125	00951360	123	70			
◎	PSL5150	00951365	148	80	50		
	PSL5200	00951370	198	105	63	1.5	

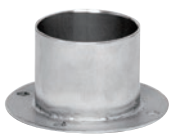
OPTION PARTS

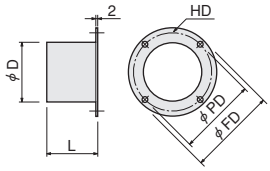
● Duct connector



In Stock	Model No.	Product Code	Dimensions (mm)			Material
			φD	L	Thickness	
◎	PSZ0050	00950655	48.6	80	1.5	SUS
◎	PSZ5075	00950660	73	70	1.0	
◎	PSZ5100	00950665	98	90		
◎	PSZ5125	00950670	123		1.2	
◎	PSZ5150	00950675	148	100		
	PSZ5200	00950678	198	120	1.5	

● Flange duct connector

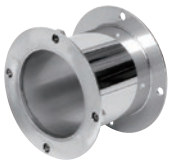


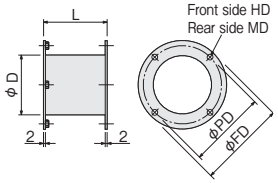


thickness of PSZ6200 flange: 3mm

In Stock	Model No.	Product Code	Dimensions (mm)						Material
			φD	φFD	φPD	L	HD	Thickness	
◎	PSZ1050	00950755	48.6	76	65	40	4×φ6	1.5	SUS
◎	PSZ6075	00950760	73	108	96			1.0	
◎	PSZ6100	00950765	98	135	120	45			
◎	PSZ6125	00950770	123	154	140			1.2	
◎	PSZ6150	00950775	148	200	180	50	4×φ9		
	PSZ6200	00950778	198	260	240	65		1.5	

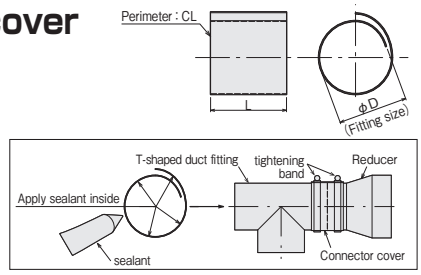
● Double flange duct connector





In Stock	Model No.	Product Code	Dimensions (mm)						Material
			φD	φFD	φPD	L	HD	MD	
◎	PSZ8075	00950680	76.3	108	96	77	4×φ6	4×M5	SUS
◎	PSZ8100	00950685	101.6	135	120				
◎	PSZ8125	00950690	125	154	140	97			
◎	PSZ8150	00950695	150	200	180	160	4×φ9	4×M8	
	PSZ8200	00950705	200	260	240	248			

■ Connector cover



In Stock	Model No.	Product Code	Dimensions (mm)				Material
			φD	L	CL	Thickness	
◎	PSB0050	00950391	48.6	50	210	0.5	SUS
◎	PSB0065	00950392	63		260		
◎	PSB0075	00950393	73		310		
◎	PSB0100	00950394	98	70	410		
◎	PSB0125	00950395	123	80	510		
◎	PSB0150	00950396	148		610		
	PSB0200	00950398	198	100	810		

■ Tightening band

Hi-torque tightening band

For fastening flexible tube. Please select according to the size of flexible tube. Hi-torque tightening band enables all threads on the screw to engage with the band, resulting in strong tightening force. Please use thermal insulated flexible tube or flexible tube PLS/PGS types.

Material : Stainless steel

● Tightening band

In Stock	Model No.	Product Code	Min～Max (mm)	Suitable Diameter (mm)
◎	PFB0044	00950400	40～ 82	φ50・75
◎	PFB0064	00950410	64～114	φ75・100
◎	PFB0080	00950420	89～140	φ100・125
◎	PFB0096	00950430	114～165	φ125・150
◎	PFB0175	00950432	170～200	φ175
◎	PFB0200	00950434	190～220	φ200
	PFB0250	00950435	230～260	φ250

● Hi-torque tightening band

In Stock	Model No.	Product Code	Min～Max (mm)	Suitable Diameter (mm)
◎	PFB5060	00950470	40～60	φ50
◎	PFB5070	00950478	50～70	φ65
◎	PFB5090	00950471	70～90	φ75
◎	PFB5120	00950472	90～120	φ100
◎	PFB5140	00950473	110～140	φ125
◎	PFB5180	00950474	150～180	φ150
	PFB5200	00950475	170～200	φ175
	PFB5220	00950476	190～220	φ200
	PFB5280	00950477	250～280	φ250

■ Aluminum tape

For jointing ducts or fixing thermal insulating materials. Temperature rating of 120℃ and 300℃ are available. Please choose according to the temperature of use.

In Stock	Model No.	Product Code	Temperature Rating	Adhesive	Width × Length
◎	PFZ4001	00950440	120℃	Acrylic type	50㎜×50m
◎	PFZ4011	00950445	300℃	Silicone type	50㎜×20m

■ Fiberglass tape

Please use it for thermal insulation of ducts or fittings.

Temperature rating : 250℃

Thickness : 3㎜ × Length : 10m

In Stock	Model No.	Product Code	Width
◎	PFZ4102	00950450	25㎜
◎	PFZ4104	00950455	40㎜

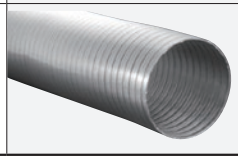
"In Stock" sign description

◎ : **Stocked items** Shipped on the day or the next working day of purchase (Out of stock may occur).

No sign : **Not stocked** Please inquire for details on delivery dates.

■ Flexible ducts

Please select by referring to the specifications such as temperature or pressure rating.

Type	Shape	Material	Length
PAL		Aluminum foil with galvanized steel sheet	5 m
PAG		Aluminum foil with fiberglass cloth	5 m
PLS		Aluminum sheet	4 m

Type	Shape	Material	Length
PFA		Fiberglass cloth and stainless steel sheet	5 m
PSU		Stainless steel sheet	2 m
PGS		Silicone rubber and fiberglass cloth	2 m

PLS type can be bent easily without shape deformation. PLS type is compressed when shipped. Please stretch to use. Also, the length mentioned in this table is the stretched length.

If longer duct length is required, please join ducts to extend by using duct connector.

Type	In Stock	Model No.	Product Code	Size	Temperature Rating	Int. Diameter (mm)	Ext. Diameter (mm)	Pitch (mm)	Min. Bend Radius (mm)	Weight (g/m)	Withstand Pressure (kPa)	Withstand Decompression Pressure (kPa)
PAL	◎	PAL0050	00950314	φ50	130℃	50.8	54.3	19	60	358	32	17
	◎	PAL0075	00950310	φ75		75.5	79.5		80	533	25	15
	◎	PAL0100	00950311	φ100		101.0	105	23	105	591	20	13
	◎	PAL0125	00950312	φ125		126	130		125	736	18	
	◎	PAL0150	00950313	φ150		152	156		150	886	15	9
		PAL0200	00950315	φ200		202	206	24	200	1114	10	6
PAG	◎	PAG0050	00950324	φ50	180℃	50.8	55.3	20	60	400	32	17
	◎	PAG0075	00950320	φ75		75.5	80.5		80	595	25	15
	◎	PAG0100	00950321	φ100		101.5	106	24	105	670	20	13
	◎	PAG0125	00950322	φ125		126	131		125	835	18	
	◎	PAG0150	00950323	φ150		152	157		150	1010	15	9
		PAG0200	00950325	φ200		202	207		200	1260	10	6
PLS	◎	PLS0050	00951401	φ50	200℃	50.9	56.5	—	75	100	18	18
	◎	PLS0075	00951402	φ75		75.9	81.5		113	130	12	12
	◎	PLS0100	00951403	φ100		101.5	107		200	170	9	9
	◎	PLS0125	00951404	φ125		126.4	132		250	210	7.2	7.2
	◎	PLS0150	00951405	φ150		151.4	157		300	250	6	6
		PLS0200	00951406	φ200		201.9	209.1		400	340	4.5	4.5
PFA	◎	PFA0050	00950334	φ50	250℃	50.8	55.3	20	60	370	18	17
	◎	PFA0075	00950330	φ75		75.5	80.5		80	555	13	15
	◎	PFA0100	00950331	φ100		101.0	106	24	105	645	10	13
	◎	PFA0125	00950332	φ125		126	131		125	795		
	◎	PFA0150	00950333	φ150		152	157		150	990	8	9
		PFA0200	00950335	φ200		202	207		200	1300	5	6
PSU	◎	PSU0050	00950344	φ50	400℃	50.8	53.8	20	60	350	18	21
	◎	PSU0075	00950340	φ75		75.5	79		80	520	13	
	◎	PSU0100	00950341	φ100		101.5	105	24	105	610	10	15
	◎	PSU0125	00950342	φ125		126	129.5		125	760		
	◎	PSU0150	00950343	φ150		152	155.5		150	910	8	13
		PSU0200	00950345	φ200		202	205.5		200	1210	5	9
PGS		PGS0050	00953500	φ50	200℃	50	53	10	30	250	170	170
		PGS0065	00953510	φ65		65	68		40	350	150	150
	◎	PGS0075	00953520	φ75		75	79		50	450	145	145
	◎	PGS0100	00953530	φ100		100	104	12	70	650	120	120
		PGS0125	00953540	φ125		126.5	131	13	90	800	110	110
		PGS0150	00953550	φ150		150	155	13	100	1000	90	90

※ Flexible ducts can be cut for use. Flexible duct lengths for air outlet should be as short as possible to reduce air and heat loss.
When connecting ducts to option parts with sizes of φ150 or φ200, it may be loosen and fall out due to air pressure even though it is fasten with tightening band. If the duct falls out, please use hi-torque tightening band (p.51), or use connector cover of suitable size and fasten it with tightening band.

OPTION PARTS

■ Insulated flexible ducts

Aluminum type

Stainless steel type

Heat insulation material : Glass wool

Length : 4 m

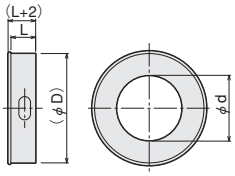
If longer length is required, please connect and extend using duct connector.

Type	In Stock	Model No.	Product Code	Size	Temperature Rating	Material	Int. Diameter (mm)	Ext. Diameter (mm)	Min. Bend Radius (mm)	Weight (g/m)	Withstand Pressure (kPa)	Withstand Decompression Pressure (kPa)
Aluminum type		PDD0050	00950360	ϕ50	200℃	Aluminum alloy	50.9	107	200	470	9	9
		PDD0075	00950361	ϕ75			75.9	132	300	590	7.2	7.2
		PDD0100	00950362	ϕ100			101.4	157	400	720	6	6
		PDD0125	00950363	ϕ125			126.4	182	500	850	5.1	5.1
		PDD0150	00950364	ϕ150			151.4	209.1	600	990	4.5	4.5
		PDD0200	00950365	ϕ200			201.9	259.1	800	1260	3.6	3.6
Stainless steel type		PDS0050	00950370	ϕ50	450℃	SUS304	51.2	107.3	200	840	27	27
		PDS0075	00950371	ϕ75			76.2	132.3	300	1100	21.6	21.6
		PDS0100	00950372	ϕ100			101.7	157.3	400	1350	18	18
		PDS0125	00950373	ϕ125			126.7	182.3	500	1620	15.3	15.3
		PDS0150	00950374	ϕ150			151.7	209.4	600	1890	13.5	13.5
		PDS0200	00950375	ϕ200			201.9	259.4	800	2430	10.8	10.8

Caution The binder for the insulation will be burnt if use for temperatures above 150℃ , resulting in smoke and foul smell. Please ventilate for the first time of use.

■ End cap for insulated flexible duct

Cover for insulated flexible duct

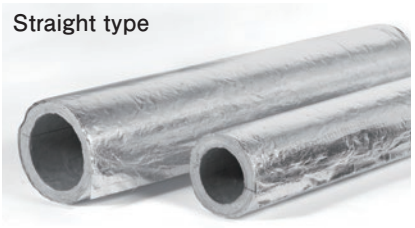


Material : Stainless steel

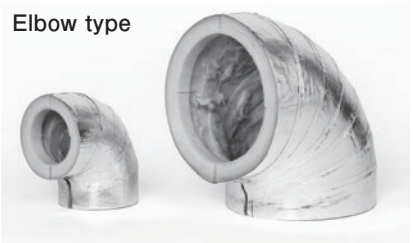
In Stock	Model No.	Product Code	Fitting size	Dimensions (mm)		
				ϕd	ϕD	L
	PDD5050	00950381	ϕ50	50	98	26
	PDD5075	00950382	ϕ75	75	123	
	PDD5100	00950383	ϕ100	100	148	
	PDD5125	00950384	ϕ125	125	173	28
	PDD5150	00950385	ϕ150	150	198	
	PDD5200	00950386	ϕ200	200	248	38

■ Insulation materials for duct

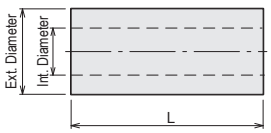
Straight type

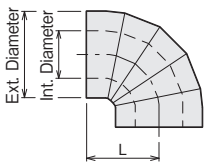


Elbow type



- Half split shape for easy installation.
- Aluminum glass cloth covered surface for easy installation using aluminum tape.
- Can be cut for use (Straight type)





Type	In Stock	Model No.	Product Code	Nominal Diameter	Dimensions (mm)			Material	Insulation Thickness	Temperature Rating
					Int. Diameter	Ext. Diameter	L			
Straight type	◎	PHJ0040	00952300	40A	49	99	1000	Rockwool with aluminum glass cloth JIS A 9504	25 mm	400℃
	◎	PHJ0050	00952310	50A	61	111				
	◎	PHJ0065	00952320	65A	76	126				
	◎	PHJ0080	00952330	80A	89	139				
	◎	PHJ0090	00952335	90A	102	152				
	◎	PHJ0100	00952340	100A	114	164				
	◎	PHJ0125	00952350	125A	140	190				
	◎	PHJ0150	00952360	150A	165	215				
		PHJ0200	00952370	200A	216	266				
90° Elbow type	◎	PHJ1040	00952301	40A	49	89	(85)	Glass wool with aluminum glass cloth	20 mm	250℃
	◎	PHJ1050	00952311	50A	61	101	(95)			
	◎	PHJ1065	00952321	65A	76	116	(105)			
	◎	PHJ1080	00952331	80A	89	129	(114)			
	◎	PHJ1100	00952341	100A	114	164	(133)		25 mm	
	◎	PHJ1125	00952351	125A	140	190	(149)			
	◎	PHJ1150	00952361	150A	165	215	(168)			

Caution

- The binder for the insulation will be burnt if use for temperatures above 150℃ , resulting in smoke and foul smell. Please ventilate for the first time of use.
- The aluminum glass cloth is attached with double-sided tape for temporary fixing. Please use aluminum tape (P.51) for proper installation.

"In Stock" sign description ◎ : Stocked items Shipped on the day or the next working day of purchase (Out of stock may occur).

No sign : Not stocked Please inquire for details on delivery dates.

■ Cross pile heat exchanger

Features

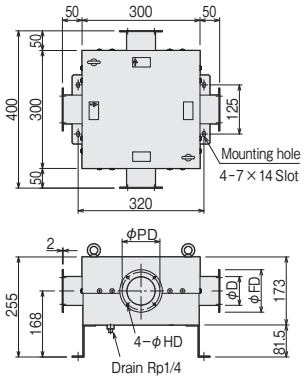
- Exhaust heat recovery for energy savings.
- The air for high and low temperature sides are not mixed, ensuring clean hot air.
- Small in size, can be used for ducting post-installation.
- By reducing the exhaust air temperature, room temperature rise can be suppressed.
- Can be used for high air volume.
- High durability because stainless steel alloy (SUS304) is used for body material.
- Contains heat insulating layer, thus reducing heat loss and safe for use.
- Max operating temperature: 300℃

In Stock						
Model No.		CEX2075	CEX2100	CEX2125	CEX2150	CEX2200
Product Code		00550010	00550020	00550030	00550040	00550050
Nominal Diameter		φ75	φ100	φ125	φ150	φ200
Dimensions (mm)	φD	73	98	123	148	200
	φFD	108	135	154	200	260
	φPD	96	120	140	180	240
	HD	6	6	6	9	9
Heat exchange efficiency*1		average 40%				
Heat exchanger type		Cross-flow plate type*2				
Fluid type		Air				
Max operating temperature		300℃				
Rated airflow*3		1.7 m³/min		4.1 m³/min		13.5 m³/min
Pressure loss (reference value)		440 Pa				450 Pa
Withstand pressure		100 kPa				
Body material		SUS304				
Weight		Approximately 20 kg		Approximately 40 kg		Approximately 95 kg

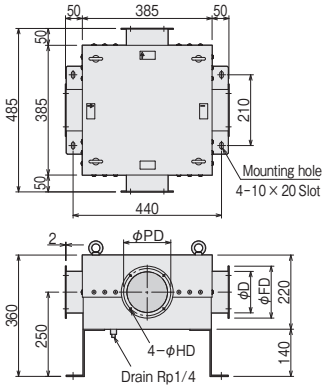
*1 : Heat exchange efficiency varies depending on airflow and temperature of suction.
*2 : Counter-flow type is available.
*3 : Rated airflow for conditions at 20℃ and 1 atm. May be used in conditions which exceeds these values. However, heat exchange efficiency will decrease.

Dimensions

■CEX2075／CEX2100



■CEX2125／CEX2150



■ High-efficiency heat exchanger

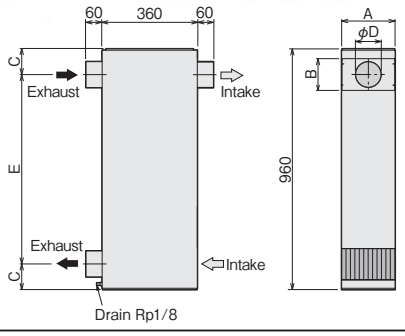
Features

- Exhaust heat recovery for energy savings.
- The air for high and low temperature sides are not mixed, ensuring clean hot air.
- Can be used for ducting post-installation.
- High efficiency heat exchanger with an average heat exchange efficiency of 70%
- Max operating temperature:150℃
- High efficiency heat recovery even for low temperature exhaust air.

In Stock				
Model No.		TEX1075	TEX1100	TEX1125
Product Code		00550110	00550120	00550130
Nominal Diameter		φ75	φ100	φ125
Dimensions (mm)	φD	73	98	123
	A	105	205	305
	B	120	120	135
	C	92	92	107
	E	776	776	746
Heat exchange efficiency*1		average 70%		
Heat exchanger type		Counter-flow plate type		
Fluid type		Air		
Max operating temperature		150℃		
Rated airflow*2		3 m³/min	6 m³/min	9 m³/min
Pressure loss (reference value)		100 Pa		
Body material		SUS304 (Aluminum heat exchange plate)		
Weight		Approximately 14 kg	Approximately 23kg	Approximately 33kg

*1 : Heat exchange efficiency varies depending on airflow and temperature of suction.
*2 : Rated airflow for conditions at 20℃ and 1 atm.

Dimensions



AFTER SERVICE

● For any inquiries and/or advice...

Hot Air Generator telephone service section

We have technical service center for Hot Air Genarators. For any inquiries and/or advice regarding product selection, do not hesitate to consult to our service center as follows.

TEL. 03-3464-8764

(Monday to Friday : 9 AM to 5:30 PM(JST))

We have maintenance service for Hot Air Genarators

For any inquiries and/or advice regarding maintenance, checking, repairing, do not hesitate to contact to Hakko's sales branch, sales office, distributors listed as follows:

List of all HAKKO ELECTRIC CO., LTD branches, sales offices, and distributors.

○HAKKO ELECTRIC CO., LTD. THERMAL DEVICE SALES DIVISION

HEAD OFFICE / TOKYO BRANCH
1-7-9 kamimeguro, Meguroku, Tokyo, 153-0051
Tel: 03(3464)8500 Fax: 03(3464)8539

SENDAI BRANCH
Sunline 66th Bldg 1F, 3-10-7 Tomeoka, Miyaginoku, Sendai City, 983-0852 Tel: 022(257)8501 Fax: 022(257)8503

UTSUNOMIYA BRANCH
1359-42, komanyu machi, Utsunomiya City, 320-0065
Tel: 028(652)8500 Fax: 028(652)5155

OOMIYA BRANCH
2-10-15 Fukasawa Bldg 1F, Toromachi, Kitaku, Saitama City, 331-0804
Tel: 048(667)8500 Fax: 048(667)0008

OSAKA BRANCH
MS Bldg, 8-16-20 Fukushima, Fukushimaku, Osaka City, 553-0003 Tel: 06(6453)9101 Fax: 06(6453)5650

FUKUOKA BRANCH
Avandant 94 Bldg 1F, 1-7-28 Hakataekiminami, Hakataku, Fukuoka City, 812-0016
Tel: 092(411)4045 Fax: 092(409)1662

SAPPORO SALES OFFICE
Kitahareodori Bldg 1F, 13-4-104, Odori Nishi , Chuoku, Sapporo City, 060-0042
Tel: 011(611)8580 Fax: 011(611)8541

KYOTO SALES OFFICE
Shinei Bldg 3F, 2-2 Kitijouin Nakajima-machi, Minamiku, Kyoto City, 601-8313
Tel: 075(682)8501 Fax: 075(682)8504

○OKAYAMA HAKKO SHOJI CO., LTD.

HEAD OFFICE
Okayama Sintoshi Bldg 404, 5-6 Nishimachi, Nishifurumatsu, kitaku, Okayama City, 700-0926
Tel. 086(243)3985 Fax: 086(243)8514

MATSUYAMA SALES OFFICE
Mitsune Bldg ,7-13-13 sannbann chou, Matsuyama City, 790-0003 Tel: 089(935)8517 Fax: 089(935)8507

○NAGANO HAKKO SHOJI CO., LTD.

HEAD OFFICE
1693 Ooaza Togura, Chikuma City, Nagano Pref, 389-0804 Tel: 026(276)3083 Fax: 026(276)5163

KANAZAWA SALES OFFICE
Kanazawa Shinoda Bldg, 3-2-1 Sainen, Kanazawa City, 920-0024 Tel: 076(225)8560 Fax: 076(225)8573

○NAGOYA HAKKO SHOJI CO., LTD.

HEAD OFFICE
3-4-2 kaneshiro, kita-ku, Nagoya City, 462-0847
Tel: 052(914)8500 Fax: 052(914)8570

SHIZUOKA SALES OFFICE
2-1-40 Arakawa, Surugaku, Shizuoka City, 422-8064
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○**Home page** www.hakko.co.jp/