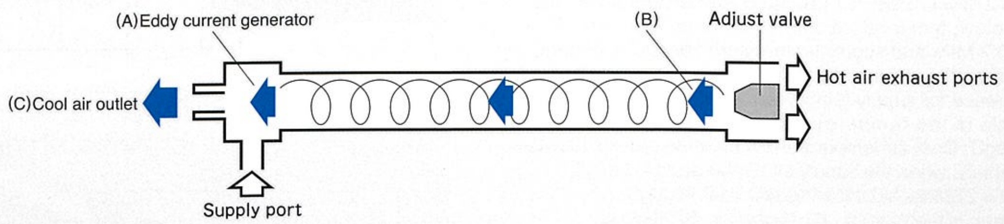
Simply supply compressed air and the unit generates cool air max.65 degC lower than the inlet temperature. No refrigerants (chlorofluorocarbons, etc.) are used.

In the production of various types of equipment, you may have encountered problems of erroneous product accuracy due to inadequate temperature control, fusion and deformation due to heat, short life of cutting tools, and defective functioning of equipment controllers. The TOHIN air coolers solve these problems to enhance productivity and reduce cost.



Cooling Mechanism

High pressure air supplied from a compressor is discharged at sonic speed by the eddy current generator in the tangential direction. The air expands and turns at high speed to become eddy current and moves in the direction from (A) to (B) in the figure. The adjust valve determines air quantity (cool air ratio) discharged from the hot air exhaust ports. The residual air flows, as it is chilled and turns in the same direction as the outer eddy current, in the direction of cool air outlet (C) through the inner tunnel that is formed by the centrifugal force of the eddy current.

Cooling Principle

A large centrifugal force acts on the eddy current generated in the unit. Pressure and density rise sharply and resistance increases to increase temperature. Turning speed increases and temperature rises the more on the outside than on the inside, generating a large pressure difference between the periphery and the center of the eddy current. The air flowing through the center of the eddy current in the direction from (B) to cool air outlet (C) does work on the outer eddy current as it expands and loses its speed (braking action). Temperature rises on the outer side and a low temperature air is generated at the center. Since quantity of heat supplied to hot air is always equal to quantity of heat deprived of from cool air, increasing quantity of heat taken away from the outside through the adjust valve reduces cool air quantity inside, resulting in a greater temperature drop.

Features

- No refrigerants and electricity required.
- Super low temperature air is generated as soon as you supply compressed air.
- Jet cool air is at the atmospheric pressure.
- Quantity and tempereture of cool air are easily adjusted with the adjust valve screw on the unit. The user can set the required air quantity and temperature.
- The small and light unit is easy to set.
- Specially useful for local small-capacity cooling needs.
- No mechanical breakdown. Only compressor air is used; no moving parts are used in the unit.
- Provided with a silencer on each of cool air and hot air discharge sides.
- Safe for use in areas where use of electricity is prohibited(explosion-proof areas, etc.).
- No possibility of failure because no sliding parts are used.

Typical Applications of TOHIN Air Coolers

(1)For dry and semi-dry metal processing and elongation of life of cutting tips

- Most suitable for low temperature cool processing that does not use coolant oil to protect environment.
- For elongation of life of and prevention of fracture of metal cutting tips.
  Tip life is shortened by premature wear if the temperature is abnormally high during cutting. Life of tips is extended by applying cool air of super low temperature generated by the air cooler. Tips are often abnormally fractured due to engagement of cutting chips. Cool jet air from the air cooler will blow off chips to considerably extend fracture events of tips. The large air quantity type AC-70 is particularly suitable.
- For improving the life of drills in drilling.

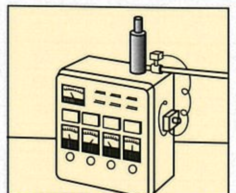
(2)For cooling electric and electronic devices

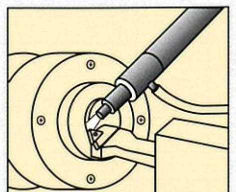
- For prevention of malfunctioning of electric control equipment caused by overheating.
  The TOHIN air cooler is more hygienic and trouble-and-maintenance-free allowing safe operation compared with other units using air blowers,Freon gases, etc.
- For cooling sensors and electric control systems on furnaces, welding machines, etc.
- For cooling industrial TV cameras.
- For use in cooling tests of ICs and other electronic parts.
- For cooling thermostats in the precision test.

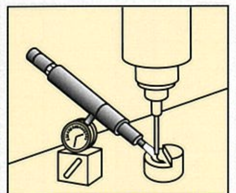
(3)For prevention of overheating in operation

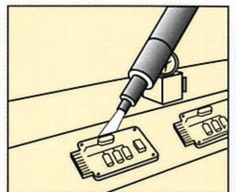
- For prevention of thread break by cooling the needle in sewing.
- For prevention of softening of plastic containers in mechanical operations.
- For prevention of softening of vinyl sheets in printing.
- For rapid cooling of electronic parts in soldering.
- For cooling vinyl sheets after weiding.
- For cooling cut knives on NC cutting machines.
- For prevention of temperature rise of blower bearings.
- For rapid cooling of various parts after shrinkage fit.
- For prevention of fusion of chemical textiles after cutting due to the heated cutter in textile cutting.
- For cooling resin parts in punching.
- For prevention of sewing thread break in bookbinding.
- For cooling dies in rib processing.
- For cooling tires when grinding their sides.
- For cooling water in water tanks in experiments.
- For cooling noble metals in cutting.
- For cooling in dental engineering.
- For cooling paper packs for milk, sake and other spirits and drinks in cap mounting.
- Many other applications.

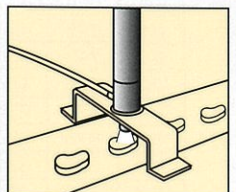
Examples

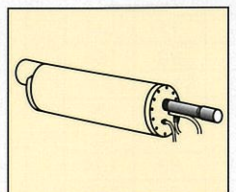

Temperature in the control board is maintained at a constant level by controlling solenoid valves


Cutting tips are cooled in metal cutting


Tips are cooled in milling, tapping and reaming


Rapid cooling of electronic parts in soldering


Cooling of plastic moldings


Cooling of industrial cameras

TOHIN

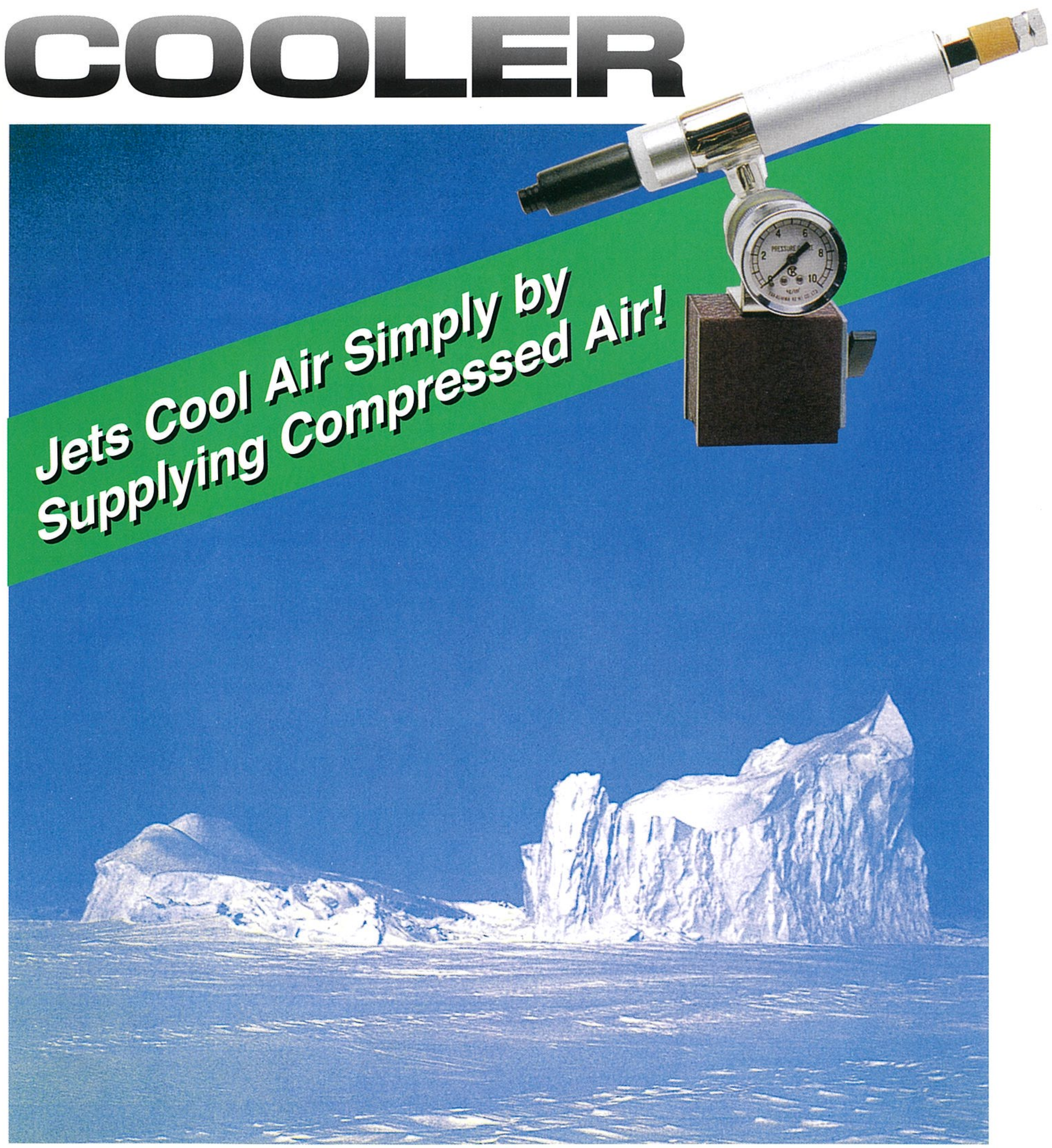
TOHIN SHOJI CO.,LTD.
Head office: 2-20-7 Misaki-cho, Chiyoda-ku, Tokyo 101-0061 Japan
TEL: 03-3230-3426 FAX: 03-3230-3420

TOHIN INDUSTRY CO.,LTD.
Head Factory: 13 Kawarai-cho, Saitama 346-0028 Japan

TOHIN VIETNAM INDUSTRY CO.,LTD.
Lot I-10-3, I-10-4, I-10-5, D6 Street,
Saigon Hi-Tech Park, Long Thanh My Ward,District 9, HCMC.
Tel: (84) 28 7106 88 66
Web: www.tohin.vn

TOHIN AIR COOLER

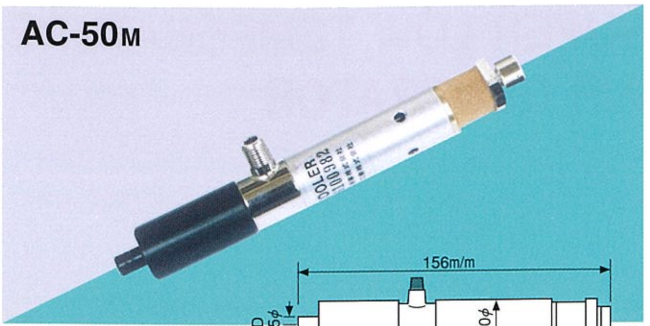
SUPER LOW TEMPERATURE AIR GENERATOR

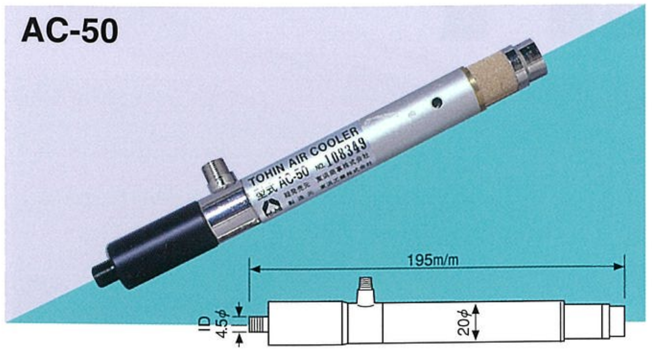


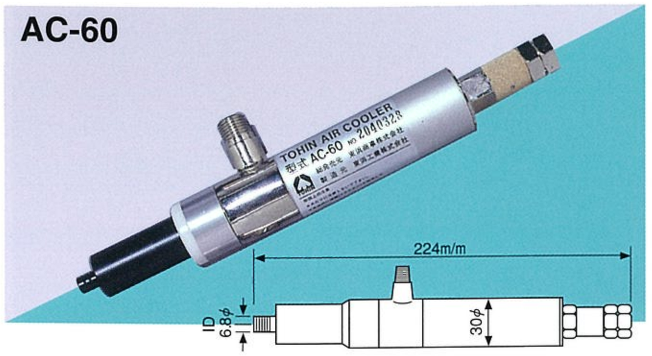
★ISO9001:2000 Certified

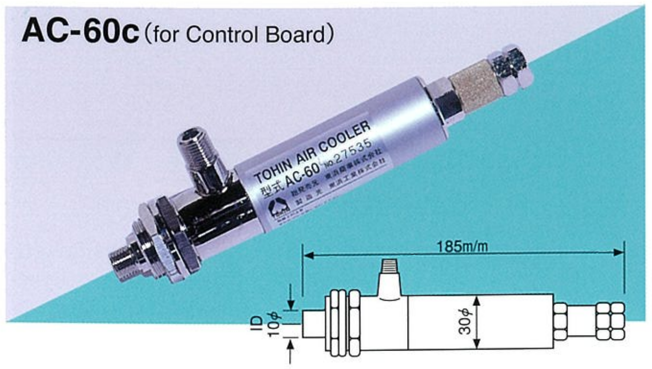
TOHIN

TOHIN VIETNAM INDUSTRY CO., LTD.









Select a model according to your application

AC-50M

For use with a compressor of a very small air quantity, Most suitable for work sites requiring a small amount of cool air.

AC-50

The small air quantity type is recommended for applications generating a small quantity of heat and for spot cooling. Low air consumption. The small and light unit is easy to use.

AC-60

The medium air quantity type with air consumption of 300 liters/min or less is the most frequently selected unit.

AC-70

The large air quantity type features dramatically increased cooling effect. The application range is also extended substantially. Life of cutting tips on machine tools, in particular, is increased several times longer. It is also possible to significantly enhance accuracy of work.

AC-60c,AC-70c

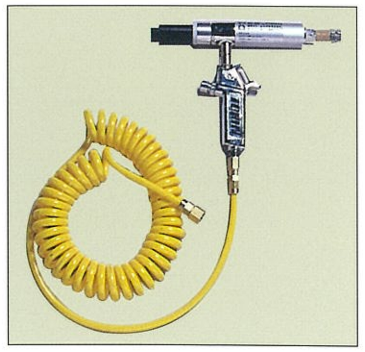
When installed on control boards, in particular, these two models play an important role in preventing malfunctioning of control board due to overheating.

AC-80,AC-80c

Extra-large air quantity type with further increased cool air quantity has a cooling capacity 2 to 3 times greater than conventional air coolers.

Handheld Air Cooler

Handheld type is convenient for manually cooling items in IC cooling tests, etc. Provided with a local switch and an air hose of 2 meters long.



Change due to Inlet Air Temperature

Cool air temperature changes with the temperature of compressor air supplied. Cool air temperature can be calculated from the actual measurement data shown in the table below even when the inlet temperature is not shown in the table. Change in temperature is proportional to the absolute temperature of supply air (absolute temperature:0degC=273K).

For example, with the Model AC-70,assume cool air ratio 25%, supply pressure 0.7MPa, and supply temperature 16degC (temperature when measurements were taken as shown in the table), and the temperature rises from 16 to 40degC. Cool air temperature is given by (40+273)/(16+273)=313/289≒1.083 (absolute temperature ratio). From the table below, temperature difference for cool air ratio 25%, supply pressure 0.7 MPa and supply temperature 16degC is 65degC. This is multiplied by the above absolute temperature ratio to find temperature difference for supply temperature 40degC:65degCx1.083 ≒70.4degC. This is the temperature differrence for supply air temperature 40degC. Cool air temperature is therefore 40-70.4degC= -30.4degC.Conversely, when the supply air temperature is 5degC:
(5+273)/(16+273) = 278/289≒0.961x65degC = 62.46degC
Cool air temperature is therefore 5 - 62.46degC = -57.46degC.

Cool Air Ratio

Cool air ratio is the ratio of supply air quantity from compressor and quantity of cool air. It is adjustable using the cool air adjust screw located on the hot air dicharge side of the unit. The cool air ratio is known from the following equation without measuring the quantity of cool air. CF = [(Th-Ti+Jt)/(Th-Tc)]x100
CF = Cool air ratio (%); Ti = Supply air temperature (degC); Tc = Cool air temperature (degC); Th = Hot air temperature (degC); Jt = Joule Thomson correction temperature = 2.2degC.

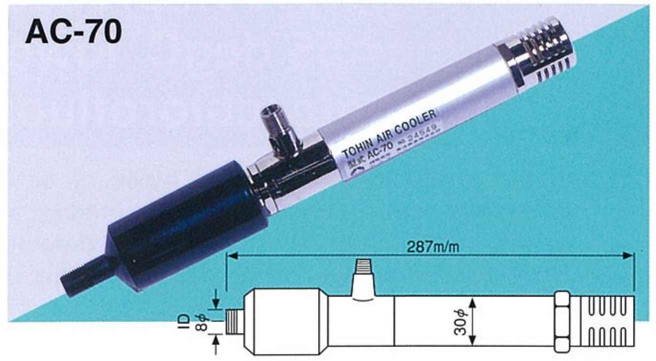
Model Selection Based on Calculated Quantity of Heat

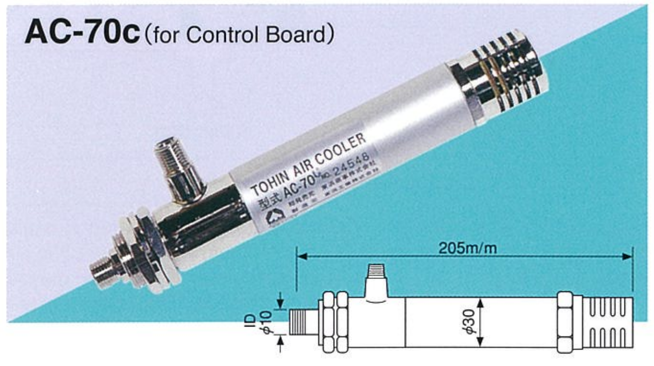
Quantity of heat is calculated by the equation below. It is possible to select air cooler model and the required cool air ratio when the quantity of heat of the subject to be cooled is known.
Q = (Fc x g x c x △T x 60)/1000
Q = Quantity of heat (kcal/h); FC = Cool air quantity (ℓ/min); g = Weight of air (1.293g/ℓ); C = Isobaric specific heat of air (0.24cal/g-degC); △T =Temperature difference between cool air and the subject to cool (degC). From the adove, a simplified equation is derived: Q(kcal/h) =(18.6192xFCx. △T)/1000
Example of calculation: With the Model AC-70, for cool air ratio 25%, pressure 0.7MPa, quantity of cool air 205liters/min, assume you want to stabilize the subject at 20degC with cool air temperature -49degC:
[18.6192x205x(20+49)]/1000≒263kcal/h
Quatity of heat of the subject to be cooled should therfore be 263kcal/h or below.

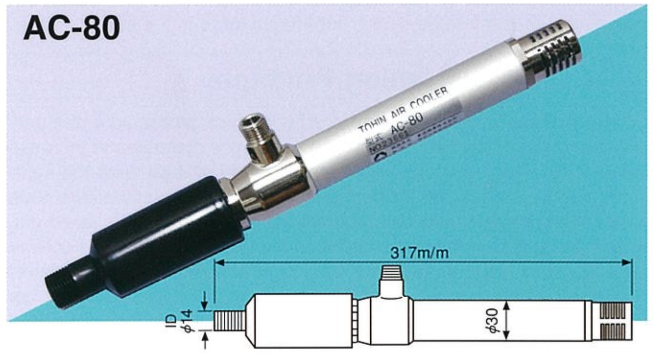
Specifications

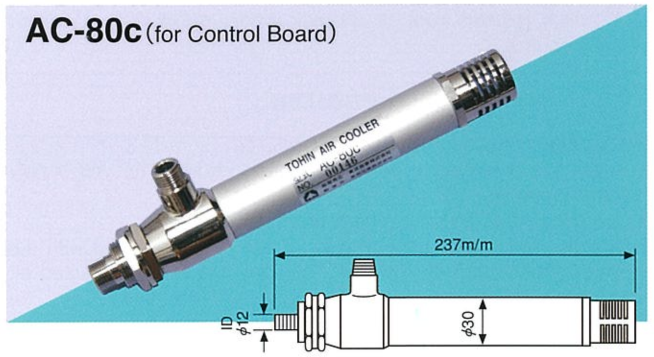
	AC-50M	AC-50	AC-60,60c	AC-70,70c	AC-80,80c
Compressed air pressure	0.2~0.4MPa	0.3~0.7MPa	0.3~0.7MPa	0.3~0.7MPa	0.3~0.7MPa
Compressed air consumption	36~63ℓ/min	70~172ℓ/min	165~390ℓ/min	366~820ℓ/min	460~1043ℓ/min
High pressure hose connection	R1/8″	R1/8″	R1/4″	R1/4″	R3/8″
Cool air discharge port(I.D.)	Φ4.5	Φ4.5	Φ6.8/Φ12	Φ8/Φ12	Φ12/Φ12
Weight	125g	145g	340g/380g	480g	800g

*Specifications and design are subject to change without notice.









●AC-50M

Cool air ratio	Input air (at 16 degC)		Cool air discharge		Input/cool air	Quantity of heat
%	Pressure MPa	Air quantity ℓ/min	Air quantity ℓ/min	Temperature degC	Temperature difference degC	Kcal/H
75	0.2	36	27	−6	22	11
	0.3	50	38	−11	27	19
	0.4	63	47	−16	32	28
50	0.2	36	18	−11	27	9
	0.3	50	25	−18	34	16
	0.4	63	32	−24	40	23
25	0.2	36	9	−15	31	5
	0.3	50	13	−27	40	9
	0.4	63	16	−30	46	13

●AC-50

Cool air ratio	Input air (at 16 degC)		Cool air discharge		Input/cool air	Hot air	Quantity of heat
%	Pressure MPa	Air quantity ℓ/min	Air quantity ℓ/min	Temperature degC	Temperature difference degC	Temperature degC	Kcal/H
75	0.3	70	53	−12	28	60	28
	0.4	92	69	−14	30	65	39
	0.5	114	86	−16	32	67	51
	0.6	130	98	−18	34	68	62
	0.7	158	119	−20	36	69	80
50	0.3	74	37	−19	35	36	24
	0.4	97	49	−21	37	43	34
	0.5	120	60	−24	40	47	45
	0.6	144	72	−26	42	49	56
	0.7	167	84	−28	44	50	63
25	0.3	76	19	−20	36	25	13
	0.4	100	25	−24	40	31	19
	0.5	124	31	−27	43	35	25
	0.6	148	37	−30	47	39	32
	0.7	172	43	−33	50	41	40

●AC-60・60c

Cool air ratio	Input air (at 16 degC)		Cool air discharge		Input/cool air	Hot air	Quantity of heat
%	Pressure MPa	Air quantity ℓ/min	Air quantity ℓ/min	Temperature degC	Temperature difference degC	Temperature degC	Kcal/H
75	0.3	165	124	−7	23	63	52
	0.4	212	159	−12	28	67	83
	0.5	257	193	−13	29	72	111
	0.6	307	230	−17	33	77	141
	0.7	348	261	−18	34	83	165
50	0.3	176	88	−17	33	52	54
	0.4	226	113	−21	37	56	85
	0.5	270	135	−24	40	59	100
	0.6	310	155	−27	43	63	124
	0.7	368	184	−28	44	68	150
25	0.3	180	45	−23	39	31	33
	0.4	233	58	−30	46	33	50
	0.5	285	71	−36	52	36	69
	0.6	338	85	−40	56	40	89
	0.7	390	98	−42	58	44	105

●AC-70・70c

Cool air ratio	Input air (at 16 degC)		Cool air discharge		Input/cool air	Hot air	Quantity of heat
%	Pressure MPa	Air quantity ℓ/min	Air quantity ℓ/min	Temperature degC	Temperature difference degC	Temperature degC	Kcal/H
75	0.3	366	275	−15	31	66	162
	0.4	455	341	−18	34	73	215
	0.5	550	413	−20	36	80	276
	0.6	645	484	−21	37	85	333
	0.7	740	555	−24	40	90	413
50	0.3	376	188	−24	40	48	140
	0.4	475	238	−30	46	50	203
	0.5	575	288	−33	49	51	261
	0.6	680	340	−37	53	53	342
	0.7	780	390	−42	58	54	420
25	0.3	390	98	−25	41	31	75
	0.4	500	125	−32	48	31	112
	0.5	600	150	−38	54	32	150
	0.6	710	178	−44	60	33	200
	0.7	820	205	−49	65	34	248

●AC-80・80c

Cool air ratio	Input air (at 16 degC)		Cool air discharge		Input/cool air	Hot air	Quantity of heat
%	Pressure MPa	Air quantity ℓ/min	Air quantity ℓ/min	Temperature degC	Temperature difference degC	Temperature degC	Kcal/H
80	0.3	460	368	−12	28	68	192
	0.4	580	464	−15	31	73	268
	0.5	678	542	−16	32	74	323
	0.6	785	628	−17	33	77	386
	0.7	855	684	−25	41	82	522
50	0.3	480	240	−26	42	56	188
	0.4	615	308	−31	47	58	269
	0.5	731	366	−32	48	62	327
	0.6	841	421	−35	51	64	399
	0.7	938	469	−36	52	66	454
35	0.3	491	172	−35	51	39	163
	0.4	624	218	−38	54	42	220
	0.5	754	264	−39	55	46	270
	0.6	901	315	−39	55	51	323
	0.7	1043	365	−40	56	53	381