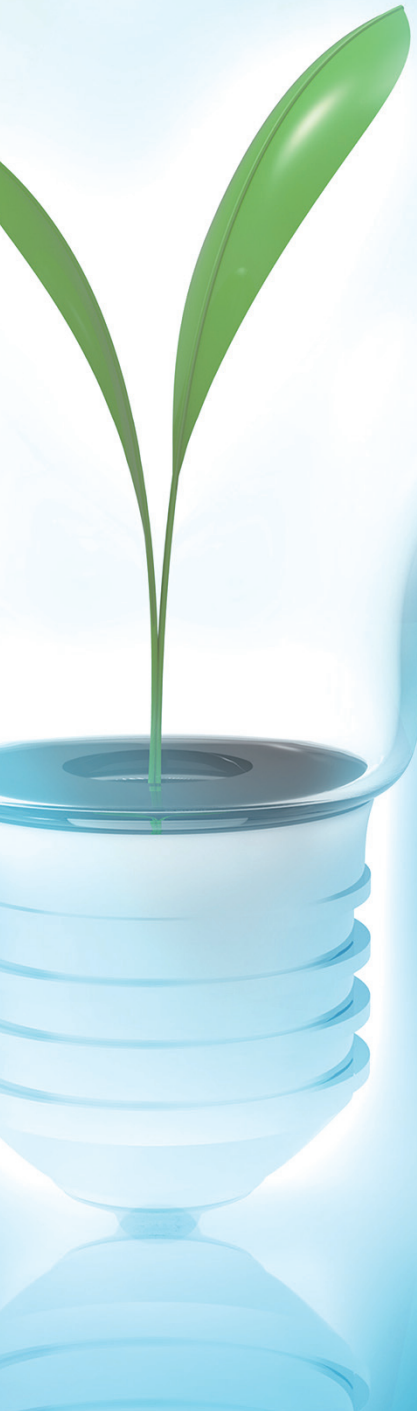
New Generation
Cooling System

Company Business Proposal Guide Catalogue
Cutting edge equipment with pinpoint accuracy and patented technology are the specification of our products.

AIRMAJOR
TOTAL SOLUTION OF COOLING SYSTEM

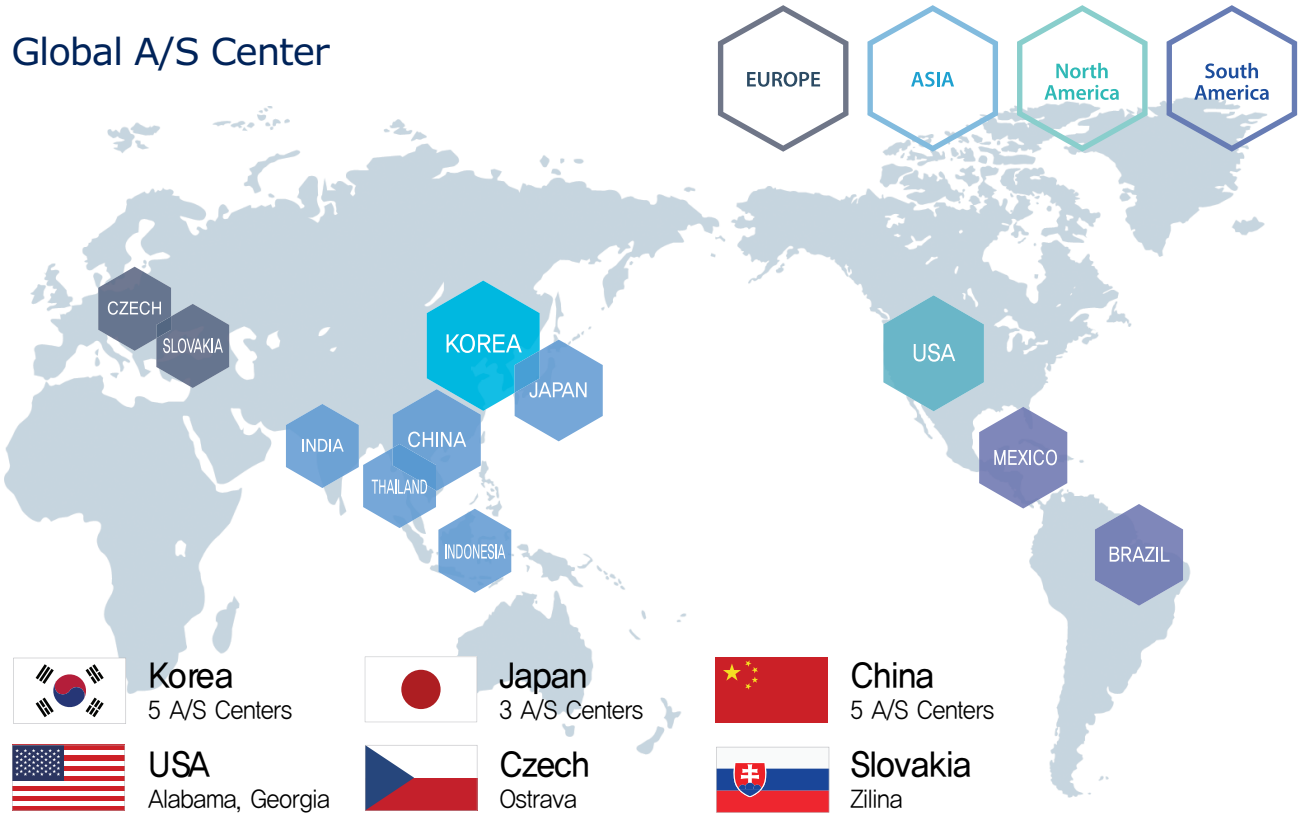
New Generation
Cooling System

Contents



New Generation Cooling System

Global A/S Center



Korea
5 A/S Centers

Japan
3 A/S Centers

China
5 A/S Centers

USA
Alabama, Georgia

Czech
Ostrava

Slovakia
Zilina

India
Chennai

Indonesia
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Thailand
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Mexico
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AirMajor Partners

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TOWA

Panel Cooler
Structure & Features 1

Introduction Effect of Control Box Air Conditioner

Among electronic components, aluminum electrolytic capacitors are parts with the shortest life span. By calculating the estimated lifetime of aluminum electrolytic capacitors, it is possible to estimate the life of electronic components. The relation between life and ambient temperature is adapted to Arrhenius's temperature twice the speed.

1) Aluminium Electrolytic Capacitor Actual Service Life

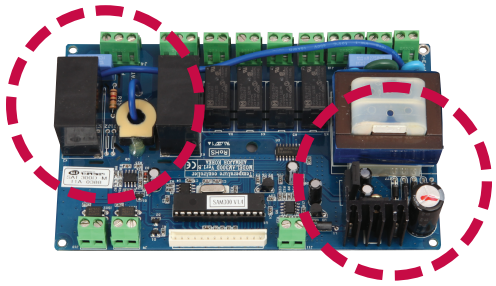
Aluminium electrolytic capacitors have a half lifetime when the temperature rises by 10℃.
The factor of determining lifetime is about twice as fast as the speed (dry up) at which the electrolytic solution diffuses into the sealing rubber increases by 10℃.

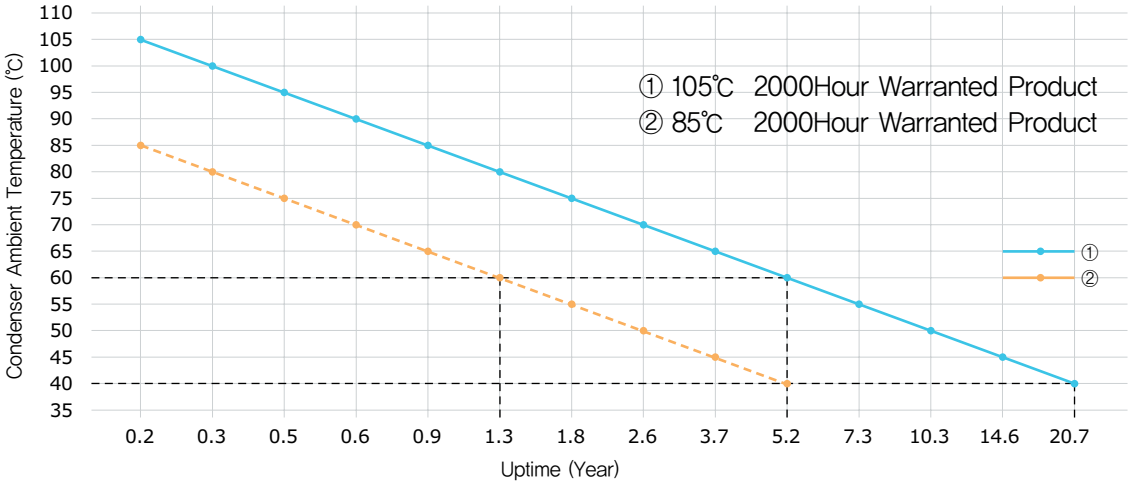
Point 1 When the temperature in the board drops from 60℃ to 40℃, the life of the capacitor is quadrupled.

Lifetime Formula L $L = L_0 \times 2^{(Tmax - Ta)/10}$

- L : Lifetime in actual use (Hour)
- L_0 : Lifetime of rated temperature (Hour)
- Tmax : Rated Temperature (℃)
- Ta : Actual Use Temperature (℃)

※This formula holds in the range of 35℃ to the maximum operating temperature.





2) Relation between Ambient Temperature of Semiconductor and Failure Rate by Arrhenius's Law

FIT Rate of Condition of Calculation

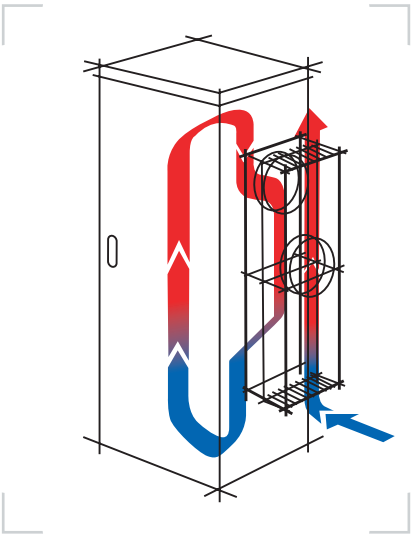
- Test Temperature : 125℃
- Test Time : 1,000h
- Number of Tested Products : 300pcs
- Number of Reject Product : 0pcs
- Total Testing Time : 300,000h
- Ea(Ev) : 0.7
- Confidence Level : 60%

[Temperature of Control box = if 40℃]
kT1(eV) : 0.027 kT(eV) : 0.034 Accelerating Factor : 251.469
Failure Rate(FIT) : 12.15

[Tempurature of Control box = if 60℃]
kT1(eV) : 0.029 kT(eV) : 0.034 Accelerating Factor : 53.146
Faliure Rate(FIT) : 57.47

Point 2 For the above reasons, the failure rate becomes 4.73 times as the control box temperature rises from 40℃ to 60℃.

Panel Cooler
Structure & Features 2



Cooling Principle of this Product

This product cools and dehumidifies the hot air transferred from the outside of the panel or electric heat generated inside by circulating the air through the air-conditioner's evaporator.
While circulating, any water and fine dust gather into the evaporator coil and then flow out together into the water tank and then are heated and evaporated by the heater.

The outer circulation air is completely blocked from the polluted air outside, so that any dust and/or alien matter cannot get into the inside.
Then, circulation air cools the outer comp that has been purified through filter and condensates the coolant inside the condenser by heat exchange.

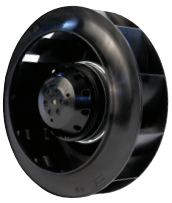
The coolant condensed inside the condenser is evaporated while passing through the capillary tube. The coolant evaporated from the evaporator absorbs the ambient heat and the heat-absorbed coolant flows into the condenser.

Panel Cooler Structure & Features

Merit 1

Superior Quality ebmpapst Motor Applied

Every part applied to this product is verified for extreme condition, including high-temperature compressor, centrifugal fan motor, semiconductor PTC heater, etc.



ebmpapst Made in Germany

e-GREEN Energy Saving System

By adopting ebmpapst's EC motor(External Rotor Motor) onto which the BLDC technology is grafted, in particular, our e-Green products realize an average energy saving effect of 30percent or more in the field of refrigeration and airconditioning, as well as maintain thebest temperature, with optimized variable speed control that adjust the speed of fan, when an air conditioner is operated. In addition, the e-Green products have a nano-coated heat exchanger and adopt a filter for preventing dust(especially dust contaminated with oil mist, etc.) from coming into the product, to prepare for malfunctions and life of the product.

Merit 2

Auto Evaporation Device for Condensate Water

Cooling condensate is evaporated using a heater, and the vapor is released with the releasing fan.

Merit 3

Compressor Protection

If forced cooling with a clogged filter or broken fan creates too much pressure, the sensor stops running to protect the compressor and improvedurability.

Merit 4

Convenient Temperature Control

Every model has a digital temperature controller that makes it possible to control the temperature accurately as you want.

Merit 5

Block of Dusts Penetration

Indoor part and outdoor part are completely separated, so any dust to be penetrated in the panel is blocked efficiently.

Merit 6

Coolant R-134a/R-410A

Environment friendly coolant used. Every model is applied with R-134a/R-410A of which ODP is zero.

Option : Filter Mist
1Set = 10Pcs

Merit 7

Option : Filter Mist

1Set = 10Pcs

Panel Cooler ES-Series

» Projection or Partial Internal Mounting

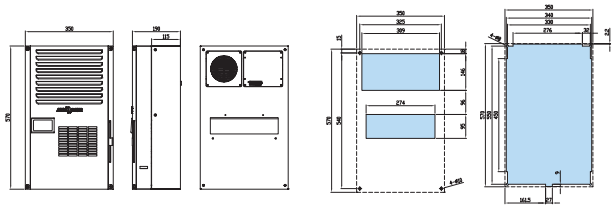
※Panel Cooler ES-Series Specifications by Model

Items	AP-ES050	AP-ES140	AP-ES230	AP-ES340	AP-ES400
Cooling Capacity	500/580W/h	1,250/1,480W/h	1,900/2,230W/h	2,950/3,400W/h	3,480/4,000W/h
Power Supply	Choose between 1Ph 220V, 50/60Hz			1Ph 220V, 3Ph 380V/440V, 50/60Hz(Use Transformer)	
Circuit Breaker/Rate Current	5A/1.97A	10A/3.21A	10A/5.13A	20A/8.69A	20A/8.69A
Power Consumption(Heater Off)	430W	713W	935W	1,930W	2,000W
Heater Capacity	500W(PTC Evaporaton-Type)		1,000W(PTC Evaporaton-Type)		
Dimension(W×H×D)	350X570X190㎜	400X950X230㎜	400X1,330X255㎜	450X1,580X310㎜	500X1,580X340㎜
Weight	25㎏	43㎏	56㎏	85㎏	100㎏
Refrigerant	R-134a		R-410A		
Operation Range/Circuit Protection	20~55℃ 40%RH/High Pressure Switch(Compressor)				

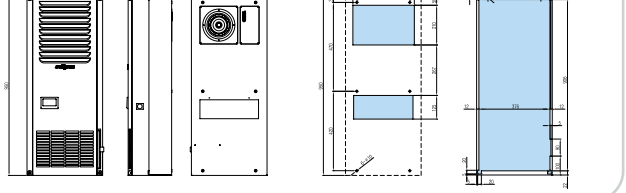
The specification and design of the product above are subject to change for the performance improvement without notice.

※ES-Series Mounting Cutout (Unit: mm)

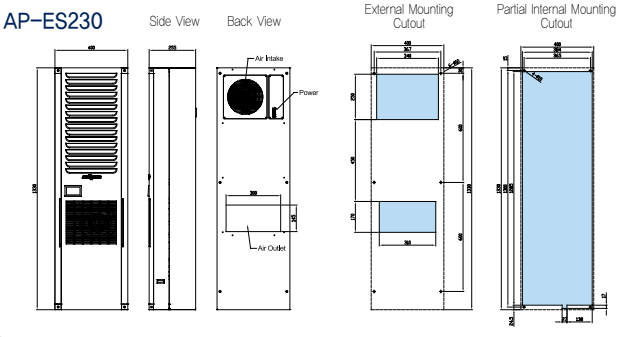
AP-ES050



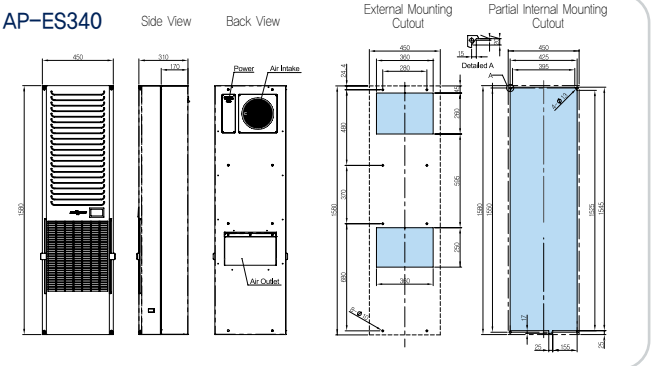
AP-ES140



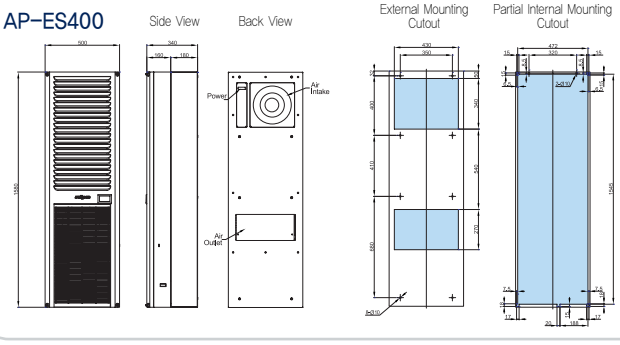
AP-ES230



AP-ES340



AP-ES400



e-GREEN Energy Saving System

Panel Cooler S-Series

» Side/Front External Mounting

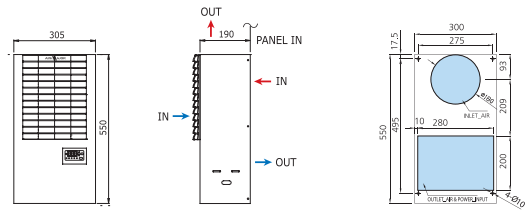
※Panel Cooler S-Series Specifications by Model

Items	AMPS-300F	AMPS-500F	AMPS-750F	AMPS-1000F	AMPS-1500F	AMPS-2000F
Cooling Capacity	240/300kcal/h	400/500kcal/h	600/750kcal/h	800/1,000kcal/h	1,200/1,500kcal/h	1,600/2,000kcal/h
Power Supply	Choose between 1Ph 220V, 50/60Hz					
Circuit Breaker	10A	10A	15A	15A	20A	25A
Rate Current	2.7A	3.1A	3.6A	4.5A	6.1A	7.5A
Power Consumption	600W	700W	800W	980W	1,350W	1,650W
Dimension(W×H×D)	300X550X190㎜	350X570X190㎜	400X670X190㎜	400X950X190㎜	400X1,050X230㎜	400X1,300X260㎜
Weight	22kg	25kg	34kg	38kg	46kg	58kg
Refrigerant	R-134a					R-410A
Operation Range	20~50℃ 40%RH					

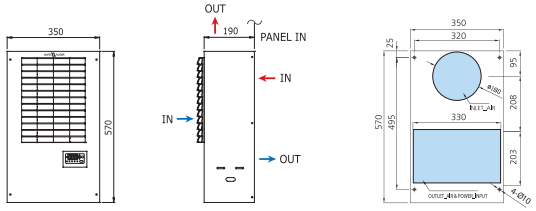
The specification and design of the product above are subject to change for the performance improvement without notice.

※S-Series Mounting Cutout (Unit: mm)

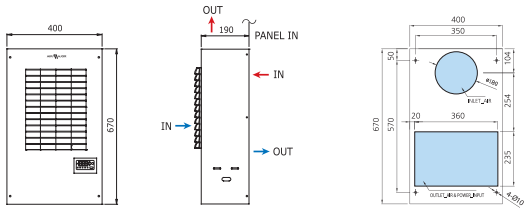
AMPS-300F



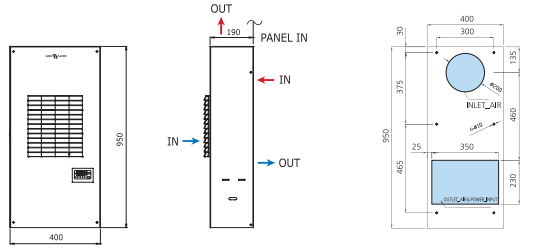
AMPS-500F



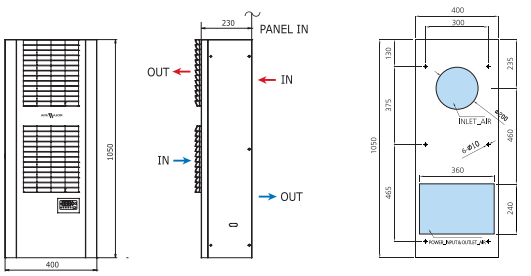
AMPS-750F



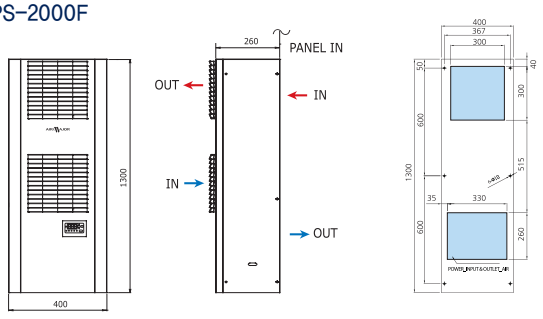
AMPS-1000F



AMPS-1500F



AMPS-2000F



Panel Cooler R-Series

» Roof Mounting

※Removing the condensate drying device due to the risk of leakage inside panel.

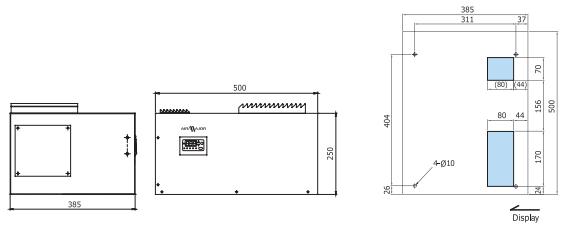
※Panel Cooler R-Series Specifications by Model

Items	AMPR-500F	AMPR-1000F
Cooling Capacity(W)	400/500kcal/h	800/1,000kcal/h
Power Supply	Choose between 1Ph 220V, 50/60Hz	
Circuit Breaker	10A	15A
Rate Current	3.1A	4.5A
Power Consumption	700W	980W
Dimension(W×H×D)	500X250X385㎜	600X300X450㎜
Weight	25㎏	35㎏
Refrigerant	R-134a	
Operation Range	20~50℃ 40%RH	

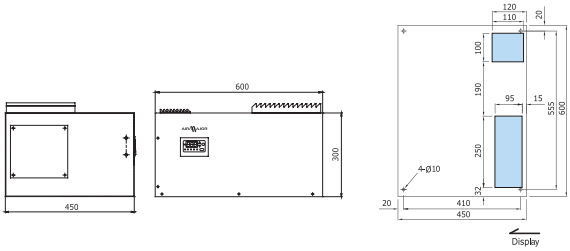
The specification and design of the product above are subject to change for the performance improvement without notice.

※R-Series Mounting Cutout (Unit: mm)

AMPR-500F



AMPR-1000F



How to select the type of control panel air conditioner.

When calculating the cooling capacity of panel air conditioner,
the value shall be decided following the condition and formula below in the order of 1~10.

1.What is the maximum temperature around the panel to be installed? **(Te)**

2.What is the target temperature to be maintained inside the panel? **(Ti)**

3.Calculate the difference in temperature between the inside and outside of panel. **(⊿T)**

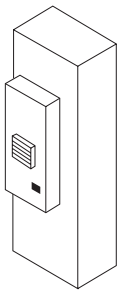
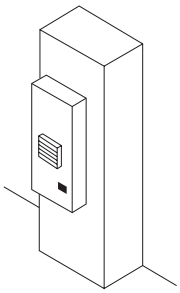
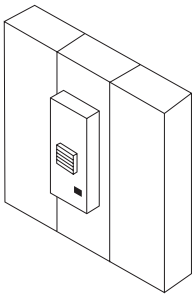
4.Calculate the heat transfer coefficient(K) of the panel's raw materia(Steel Plate). **(K)**

※Choose one of the followings.

- K=5.5W/m (Painted Metal)
- K=3.5W/m (Polyester)
- K=3.7W/m (Stainless Still)
- K=12W/m (Aluminum)

5.Calculate the outside surface area(volume) of the control panel. **(Sr)**

※Select the picture that corresponds to the following examples, and calculate based on the relevant equation.

①When influenced by all sides	②When leaning on the wall	③When positioned on the center
		
Sr=2×H×(W+D)+W×D	Sr=H×(W+2×D)+W×D	Sr=2×H×W+W×D

Ex) In case the panel size is 800(W)×2000(H)×500(D)㎜
When substituting the size for Sr=2×H×(W+D)+W×D (Equation ①),
Sr=2×2×(0.8+0.5)+0.8×0.5 ▶Sr=4×1.3+0.4 ▶Sr=5.2+0.4=5.6
▶Sr=5.6 (W=Width, H=Height, D=Depth, unit:m)

6.Calculate the quantity of heat that infiltrates from the outside of the panel to the inside of the panel. **(Pr) Pr=⊿T×Sr×K**

7.Calculate the quantity of heat generated from the parts inside the panel. **(Pd)**

8.The capacity of the air conditioner which will be installed for the control panel is as follows. **(Pf) Pf=Pr+Pd**

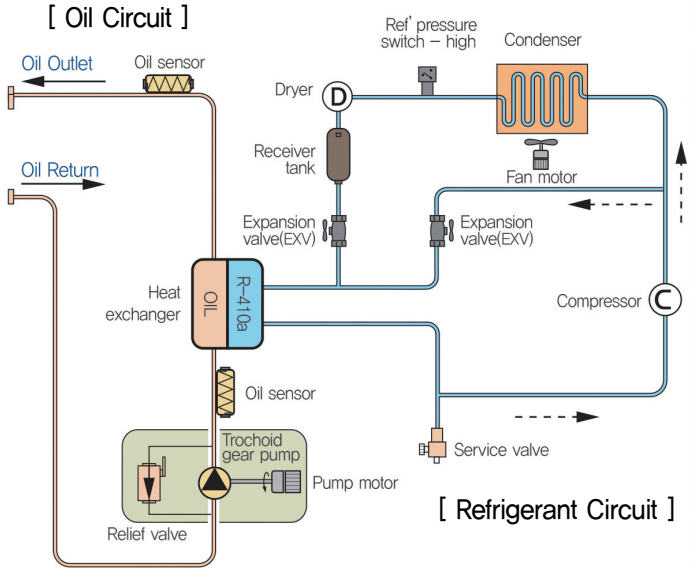
9.Now for the final step, multiply the calculated capacity of the air conditioner by the safety factor.
Pf×1.2 (20% is applied in general)

10.To change the unit of quantity of heat from W/h to Kcal, divide by 1.16.
To change from Kcal/h to Btu/h, multiply by 4.

High Accuracy
Oil Cooling System

±0.1℃ Temp.Indicator Controller | R-410A Coolant | CE | Intertek

[Oil Circuit]



[Refrigerant Circuit]

※High Accuracy Oil Cooler Specifications by Model

Items		AO-200P(T)	AO-350P(T)	AO-450P(T)	AO-600P(T)	AO-1000P(T)	AO-1500P
Cooling Capacity (50/60Hz)	W	1,530/1,800	2,940/3,460	3,870/4,560	5,100/6,000	8,500/10,000	12,700/15,000
	Kcal/h	1,320/1,550	2,530/2,980	3,330/3,920	4,390/5,160	7,310/8,600	10,920/12,900
Power Supply		3Ph 220V, 50/60Hz		Choose between 3Ph 220V/380V/440V, 50/60Hz			3Ph AC 380V/440V, 50/60Hz
Power Capacity		4A/1.5 KVA at 220V/60Hz	6.3A/2.4 KVA at 220V/60Hz	8.2A/3.3 KVA at 220V/60Hz	11A/4.24 KVA at 220V/60Hz	9.7A/7.5 KVA at 440V/60Hz	13A/10 KVA at 440V/60Hz
Compressor	W	3Ph/Rotary/800W	3Ph/Rotary/1,100W	3Ph/Rotary/1,800W	3Ph/Rotary/2,600W	3Ph/Scroll/3,500W	3Ph/Scroll/5,700W
Condenser		Air-Cooled, Fin Tube Type					
Fan Motor	W	Ø300/100W×1	Ø300/120W×1	Ø300/100W×2	Ø300/120W×2	Ø350/170W×2	Ø400/245W×2
Evaporator		Choose between Shell & Coil Type, Plate Type					
Oil Pump Displacement	LPM	12/14.4 LPM/0.5 Mpa	24/28.8 LPM/0.5 Mpa	24/28.8 LPM/0.5 Mpa	30/36 LPM/0.7 Mpa	39/46.8 LPM/0.7 Mpa	52/62.4 LPM/0.8 Mpa
Circuit Breaker Capacity	A	10	10	16	16	20	20
Temp. Control		±0.1℃(Temperature Indicator Controller)					
Refrigerant		R410A					
Usable Oil		ISO VG2 ~ VG32					
Room Temp.	℃	5 ~ 45℃					
Inlet Oil Temp.	℃	5 ~ 50℃					
Oil Max. Pressure	bar	5 bar				7~8 bar	
Protection Devices		• Overcurrent Current Relay • High/Low Protection Switch • Reverse Phase Detection Relay • Low High Temp Alarm • Relief Valve for Pump(except Open Type)					
External Dimension(W×D×H)㎜		375×450×661	367×450×889	382×478×1,000	515×556×1,090 (Casrer)	578×607×1,354 (Casrer)	745×740×1,528 (Casrer)
Tank Dimension(W×D×H)㎜		367×450×884	367×450×1,114	382×478×1,289	515×556×1,418 (Casrer)	578×607×1,745 (Casrer)	–

※The Cooling capacity using ISO VG10, standard temperature (Room temperature for 35℃, Inlet temperature for oil 35℃) indicated in the capacity.

※High Accuracy Oil Cooler Nomenclature

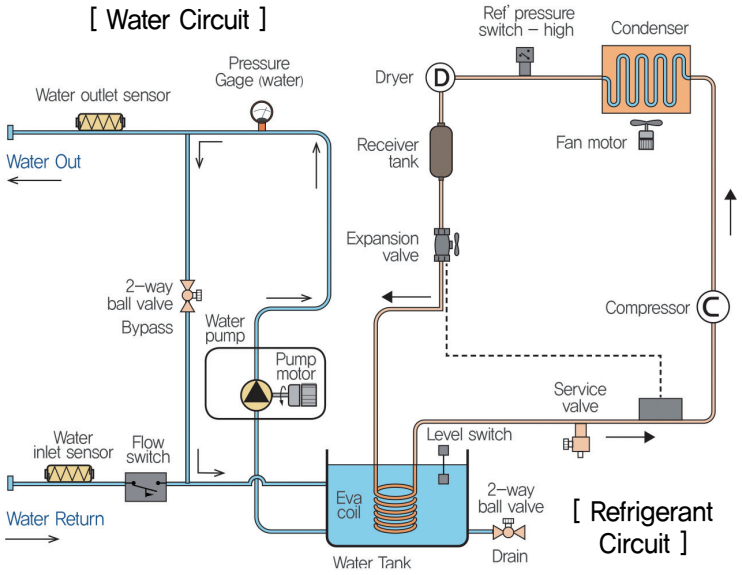
Series Name, AO : High Accuracy Airmajor Oil Cooler Series — Tank Type

AO	350	P	T	*	*
	Rated Cooling Capacity	High Accuracy Symbols		1st Option	2nd Option

High Accuracy
Water Chilling System

Special Heat Exchage System

R-410A Coolant



※High Accuracy Water Chiller Specifications by Model

Items		AW-200PT	AW-350PT	AW-600PT	AW-1000PT	AW-1500PT
Cooling Capacity (50/60Hz)	W	1,530/1,800	2,940/3,460	5,100/6,000	8,500/10,000	12,750/15,000
	Kcal/h	1,320/1,550	2,530/2,980	4,390/5,160	7,310/8,600	10,970/12,900
Power Supply		3Ph 220V, 50/60Hz		Choose between 3Ph 220V/380V/440V, 50/60Hz		
Power Capacity		6A/2.5 KVA at 220V/60Hz	6.3A/2.4 KVA at 220V/60Hz	5.0A/3.8 KVA at 440V/60Hz	9.7A/7.5 KVA at 440V/60Hz	12.3A/9.4 KVA at 440V/60Hz
Compressor	W	3Ph/Rotary/800W	3Ph/Rotary/1,100W	3Ph/Rotary/2,600W	3Ph/Scroll/3,620W	3Ph/Scroll/5,700W
Condenser		Air-Cooled, Fin Tube Type				
Fan Motor	W	Ø300/100W×1	Ø300/120W×1	Ø350/170W×1	Ø350/100W×2	Ø400/100W×2
Evaporator		Choose between Shell & Coil Type, Plate Type				
Circuit Breaker Capacity	A	10	10	15	20	30
Refrigerant		R-410A				
Room Temp.	℃	5~45℃				
Inlet Oil Temp.	℃	15~45℃				
Allowable Pressure	bar	8 bar				
External Dimension (W×D×H)	mm	400×570×655 (Casrer)	400×570×855 (Casrer)	540×750×1,230 (Casrer)	732×860×1,932 (Casrer)	1,340×650×1,547 (Casrer)
Remarks						

※The Cooling capacity using Water, standard temperature (Room temperature for 35℃, Inlet temperature for 35℃) indicated in the capacity.

※High Accuracy Water Chiller Nomenclature

Series Name, AW : High Accuracy Airmajor Water Chiller Series

Tank Type

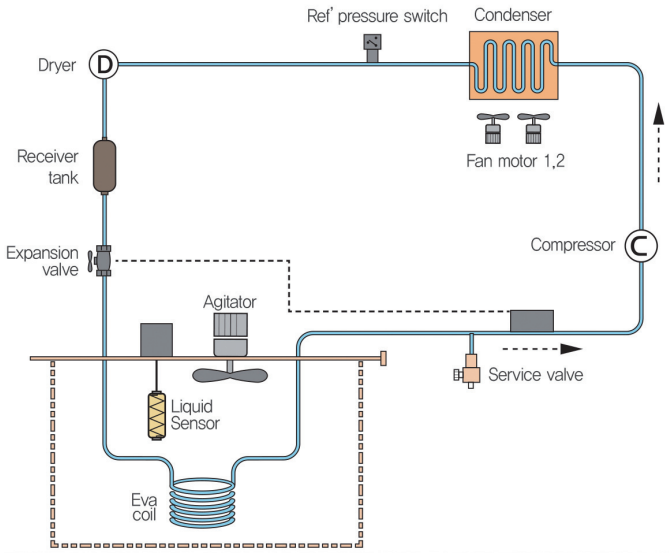
AW	600	P	T	*	*
	Rated Cooling Capacity	High Accuracy Symbols		1st Option	2nd Option

High Accuracy
Coolant Cooling System

Special Heat Exchage System

R-410A Coolant

[Refrigerant Circuit]



※High Accuracy Coolant Cooler Specifications by Model

Items		AI-350PH	AI-450PH	AI-600PH	AI-1000PH	AI-1500PH
Cooling Capacity (50/60Hz)	W	2,940/3,460	3,870/4,560	5,100/6,000	8,500/10,000	12,700/15,000
	Kcal/h	2,530/2,980	3,330/3,920	4,390/5,160	7,310/8,600	10,920/12,900
Power Supply		3Ph 220V, 50/60Hz	Choose between 3Ph 220V/380V/440V, 50/60Hz			
Power Capacity		6.3A/2.4 KVA at 220V/60Hz	8.2A/3.3 KVA at 220V/60Hz	10.0A/3.8 KVA at 220V/60Hz	9.7A/7.5 KVA at 440V/60Hz	13A/10 KVA at 440V/60Hz
Compressor	W	3Ph/Rotary/1,100W	3Ph/Rotary/1,800W	3상/로터리/2,600W	3Ph/Scroll/3,500W	3Ph/Scroll/5,700W
Condenser		Air-Cooled, Fin Tube Type				
Fan Motor	W	Ø300/120W×1	Ø300/80W×1	Ø300/120W×2	Ø350/170W×2	Ø400/245W×2
Evaporator		Open Coil Type				
Agitator	W	25	25	25	25	40
Circuit Breaker Capacity	A	10	15	15	20	20
Temp. Control		±1~2℃(Temperature Indicator Controller)				
Refrigerant		R-410A				
Usable Liquid		ISO VG2~VG32				
Room Temp.	℃	5~45℃				
Liquid Temp.	℃	5~45℃				
Protection Devices		• Overcurrent Current Relay • High/Low Protection Switch • Reverse Phase Detection Relay • Low High Temp Alarm				
External Dimension (W×D×H)	mm	365×446×985	381×476×1,120	515×550×1,347	578×608×1,657	745×740×1,960

※The Cooling capacity using ISO VG10, standard temperature (Room temperature for 35℃, Inlet temperature for 35℃) indicated in the capacity.

※High Accuracy Coolant Cooler Nomenclature

Series Name, AI : High Accuracy Airmajor Coolant Cooler Series — Open Type

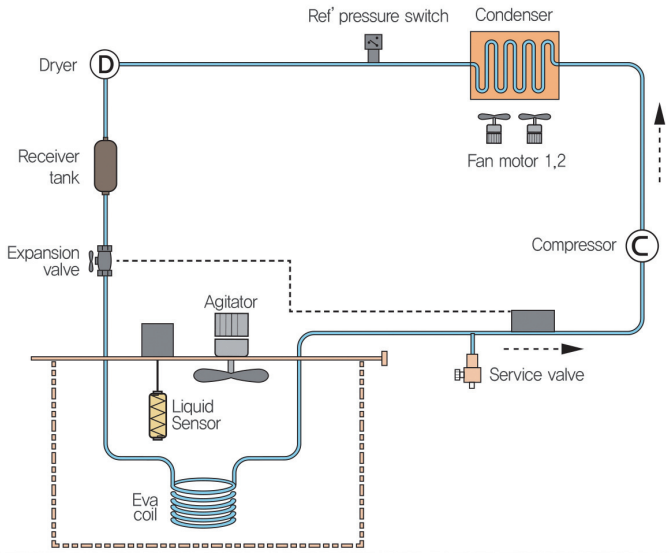
AI	350	P	H	*	*
	Rated Cooling Capacity	High Accuracy Symbols		1st Option	2nd Option

Open Type
Coolant Cooling System

Special Heat Exchage System

R-410A Coolant

[Refrigerant Circuit]



※Open Type Coolant Cooler Specifications by Model

Items		AMOC-10GH	AMOC-20GH	AMOC-30GH	AMOC-50GH
Cooling Capacity (50/60Hz)	W	2,940/3,460	5,100/6,000	8,500/10,000	12,700/15,000
	Kcal/h	2,530/2,980	4,390/5,160	7,310/8,600	10,920/12,900
Power Supply		3Ph 220V, 50/60Hz	Choose between 3Ph 220V/380V/440V, 50/60Hz		
Power Capacity		6.3A/2.4 KVA at 220V/60Hz	10.0A/3.8 KVA at 220V/60Hz	9.7A/7.5 KVA at 440V/60Hz	13A/10 KVA at 440V/60Hz
Compressor	W	3Ph/Rotary/1,100W	3Ph/Rotary/2,600W	3Ph/Scroll/3,500W	3Ph/Scroll/5,700W
Condenser		Air-Cooled, Fin Tube Type			
Fan Motor	W	Ø300/120W×1	Ø300/120W×2	Ø350/170W×2	Ø400/245W×2
Evaporator		Open Coil Type			
Agitator	W	25	25	25	40
Circuit Breaker Capacity	A	10	15	20	20
Temp. Control		±1~2℃(Temperature Indicator Controller)			
Refrigerant		R-410A			
Usable Liquid		ISO VG2~VG32			
Room Temp.	℃	5~45℃			
Liquid Temp.	℃	5~45℃			
Protection Devices		• Overcurrent Current Relay • High/Low Protection Switch • Reverse Phase Detection Relay • Low High Temp Alarm			
External Dimension (W×D×H)	mm	365×446×985	515×550×1,347	578×608×1,657	745×740×1,960

※The cooling capacity indicates the capacity in the standard temperature(35℃ room temperature, 35℃ liquid-absorbing liquid temperature) when a water-soluble coolant is used.

※Open Type Coolant Cooler Nomenclature

Series Name, AMOC : General Type Airmajor Coolant Cooler Series — Open Type

AMOC	20	G	H	*	*
	Rated Cooling Capacity	General Type Symbols		1st Option	2nd Option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