



## **PAFMAC** PMAC and Fancoil Module

Air-conditioner Cassette

### PRODUCT

### PERFORMANCE

### PROFIT

Easy Installation and Maintenance High Efficiency by INV Compressor New Unit While Keeping Existing System Low Noise

Cooling and / or Heating Any Time ndividual Climate Control in Each Room Perfect Comfort Setting for Every Guest No Operation Shutdown During Installatior Retro-fit Existing System at Lowest Cost Customer Complaint Decrease Energy Savings

## **PAFMAC System Diagram**



### Hot Water in Winter





## **System Comparison**

### 4-Pipe Chilled / Hot Water System

The 4-pipe chilled water system is a full featured air conditioning system that was popular in the past, but the equipments cost and running costs are rather high because chilled and hot water are supplied year round.



### PAFMAC

Equivalent to the 4-pipe year round air conditioning system by utilizing the same 2-pipe system and the heat source. Regular Fan Coil can co-exist with the Fan Coil with heat pump.



Achieve energy savings by maintaining high-grade air conditioning.

ltem	4-Pip	e Chilled / Hot Water System	2-Pip	e Chilled / Hot Water System		PAFMAC
Comfort	3	Cooling / heating freely by unit	0	Cooling / heating equals the operation mode of heat source	3	Cooling / heating freely by unit
Heat source operation	1	Chilled / hot water supplied all year round	1	Chilled or hot water is supplied by changing	1	Chilled or hot water is supplied by changing
Space for the pipes	1	Large pipe space required because of 4-pipe system	2	Minimal pipe space required because of 2-pipe system	2	Minimal pipe space required because of 2-pipe system
Heat recovery	0	None	0	None	2	Heat recovery is possible by reverse operation

### **Renewal Effect Example**

Air conditioning complaints from hotel guests decrease sharply when replacing the current system with the PAFMAC unit in renewal projects.

<Table1>

The number of air conditioning complaints from hotel guests for one year.

	Rooms	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Tota
FCU	672	31	38	47	22	34	15	38	56	60	49	46	63	499
PAFMAC	231	2	-	-	-	1	-	-	1	3	2	-	-	9



## **Example of Hotel Guestroom Retrofit**

Upgrade the HVAC unit of hotel gestrooms through simple installation of the 2pipe chilled/hot water system.



Existing FCU



Install the PAFMAC



Remove existing FCU



Installation completed.



**GUEST ROOM After instllation** 

The drawing shows Left Hand piping design. The Right Hand piping design is also available.



#### Note

1. Fix the main unit within the dimensions shown in the main unit fixation figure.

2.The installer is responsible for connecting drain piping for the main unit and power cable/instrumentation cable as well as installing components that are separately delivered. Please see the installation figure.

3.Make sure that the drainage hose does not form a trap.

4.Ensure that the inclination of the drainage pipes is 1/100 or greater.

5.Connect chilled/hot water pipes in the correct orientation. If incorrectly connected, the unit cannot operate at the normal performance level.

6.Be sure to apply thermal insulation to the chilled/hot water pipes and drainage pipe.

7.Because the electronic three-way valve is built into the main body, clean the inside of the chilled/hot water pipe well by flushing water before use. Because the entry of dust, etc. inside the main body may prevent the electric

three-way valve from working normally, it is recommended that an accompanying strainer (Arranged on site). Should be placed at the chilled/hot water inlet of each main body.

In order to prevent the generation of red rust, for piping from cold/hot water inlet pipe tapping to strainer, please use flexible hose or stainless steel piping (to be arranged by the installer ). When using stainless steel piping, for connection with the main spout (brass), please use fittings considering corrosion etc.

8.Ensure that chilled water should be flowing after turning on the electricity for the unit. If chilled water has been flowing for a long time before turning on the electricity, this may cause dew condensation or water leakage.9.Make sure to release air in the water piping of unit after energization. Incorrect work may lead to issues.

# **Specification Floor Mounted Cabinet FFP17/27AA K**

Item			Unit	FFP17AA K	FFP27AA K	
		FCU	Btu/h	3,800	6,500	
	Cooling Capacity	FCU and HP	Btu/h	8,600(5,900~8,600)	13,700(8,900~13,700)	
	Cooling Ca	pacity with Hot Water	Btu/h	3,500(1,100~3,500)	5,500(1,500~5,500)	
		FCU	Btu/h	4,500	7,600	
	Heating Capacity	FCU and HP	Btu/h	9,600(6,900~9,600)	16,100(11,000~16,100)	
Heating Capa		acity with Chilled Water	Btu/h	3,800(1,800~3,800)	5,500(1,900~5,500)	
Performance *1		Cooling FCU	Btu/(W.hour)	95.00	118.20	
		Cooling FCU and HP	Btu/(W.hour)	95.00	48.90	
		Cooling (with Hot Water)	Btu/(W.hour)	8.50	8.50	
TPIR*2	TPIR*2	Heating FCU	Btu/(W.hour)	112.50	138.20	
		Heating FCU and HP	Btu/(W hour)	25.30	25.60	
		Heating (with Chilled Water)	Btu/(W hour)	11 70	13.40	
	Power Sou	rce	Dear	208\/ ( 180\/~22	0V) 1 Phase-60	
	1 0 0001 300	Power Consumption	kW/	0.155(0.065~0.155)	0.280(0.080~0.280)	
	Cooling FCU and HP	Operating Current + Power Factor *3	Δ.%	1 1(0 5~1 1) • 68	1.8(0.5~1.8) • 77	
		Power Consumption		0.410(0.195~0.410)	0.650/0.200~0.650)	
	Cooling (with Hot Water)	Operating Current • Power Factor *3	A • %	2.6(1.3~2.6) • 76	4.0(1.4~4.0) • 81	
Electrical		Power Consumption		0.380/0.13~0.380)	0.630/0.160~0.630)	
Characteristics *1	Heating FCU and HP	Operating Current + Bower Factor *2	A + 04	2.4(0.0.2.4) + 76	20(11.20)+92	
Characteristics I		Power Consumption	A - 70	0.225(0.140-0.225)	0.410(0.145-0.410)	
	Heating (with Chilled Water)	Operating Current + Power Easter *2	Λ • 06	2 1/1 0-2 1) • 74	2.6(1.02.6) • 79	
		Dever Consumption	A * %	2.1(1.0~2.1) • 74	2.0(1.0~2.0) * 79	
	FCU	Power Consumption	KVV	0.040	0.055	
Operating Current • Power Factor *3			A•%	0.3 • 64	0.4 • / 1	
	Minimum circuit amp	bacity(MCA)	A	8.9	8.4	
Мах	mum rating of overcurrent		A	10.0	10.0	
Compressor	Compressor Type • Rated Output X Quantity					
	Fan	Type x Quantity	CEM	Single Suction Centrifugal Fan X 1	List 200 Middle 227 E. Law 175 0	
Fan System			CFM	High: 175.0, Middle: 157.5, Low: 140.0	High: 280.0, Middle: 227.5, Low: 175.0	
	Ex-unit	Static Pressure *4	psi(G)	0.0009	0.0021	
	Fan Mo	otor Rated Output	W or	26	30	
	Inlet Temp.(Annual option)	For Cooling	~F	44.6 (41.	J~122.0)	
Chilled / Hot		For Heating	~F	1.22		
Water		Water Vol.	GPM us	1.32	2.11	
	Wa	ter Press. Loss	psi(G)	1.67	3.70	
	Wa	iter Contained	U.S.gallon	0.24 0.37		
	Air Heat Exch	anger		Plate Fin Type		
	Water Heat Exc	hanger		Plate	lype	
	Refrigerant • Q	uantity	lbs	R410A	• 1.12	
	(	Compressor		Thermostat, Current Transformer		
		Fan Motor		DC Over Current, Thermal Cut-Off		
Protection Device	Rei	rigerant Cycle		High-Pressure Switch		
	(			Fu	se	
Others				Drains	bensor	
Piping Connection	n Chilled / Hot Water Inlet • Outlet			NP13/4	(Male)	
Part	Dr Dr	ainage Outlet	in.	Φ		
	Power Supply Conr	ection Part			DIOCK (M5)	
Outer Dimensions	Height	× vviatri × Depth	in.	24-1/64 • 35-15/64 • 9-29/64	24-1/64 • 42-1/8 • 9-29/64	
	Height × Width	n × Deptn(With decorative)	in.	24-51/64 • 50-63/64 • 10-15/64	24-51/64 • 60-5/8 • 10-15/64	
	Unit vveignt (Main u	nit • Cover)	IDS	1//.1 (140.8 • 36.3 )	198.0 ( 154.0 * 44.0 )	
	PIMAC S Thermostat (Remo	DECONTROL SWITCH)		Stan		
	Accessorie			Brush		
Accessories for construction (Other packing)				Decorative case,	Basepored Plate	

#### Note

1. The capacity and electrical characteristics indicate the values at 208V.

2. Performance \*1

	Inle	t air	Inlet water		
	D.B. Temp.	W.B. Temp.	Temp.	water volume	
Cooling Capacity	80.0°F	67.0°F	44.6°F	standard water volume	
Cooling Capacity with Hot Water	80.0°F	67.0°F	113.0°F	standard water volume	
Heating Capacity	70.0°F		113.0°F	standard water volume	
Heating Capacity with Chilled Water	70.0°F		44.6°F	standard water volume	

3. TPIR stands for Total performance per Power Input Ratio, and it is shown as follows: (Refer to \*2)

TPIR = (FCU capacity + HP capacity) / Power consumption

4. The values of power factor is "overall power factor value". (Refer to \*3)

5. Please be sure to install the ELB. Please see the installation manual for details. 6. FCU" and "HP" in the table represent the fan coil and heat pump, respectively.

8. The sum of the duct flow resistance and the air flow resistance of the filter should not exceed the rated external static pressure. (Refer to \*4)

9. Specifications are subject to change for purposes of improvement

<sup>7.</sup> Please consider the compressor's heat equivalent of work (power consumption W) for heat source capacity.

# **Outer Dimension Ceiling Unit FBP37BA K**

The drawing shows Right Hand piping design. The Left Hand piping design is also available.





#### Left Hand piping design











#### Note

Fix the main unit within the dimensions shown in the main unit fixation figure.

2.The installer is responsible for connecting drain piping for the main unit and power cable/instrumentation cable as well as installing components that are separately delivered. Please see the installation figure. 3.Make sure that the drainage hose does not form a trap.

- 5.Connect child dhat water pipes in the correct orientation. If incorrectly connected, the unit cannot operate at the normal performance level. 6.Be sure to apply thermal insulation to the childed/hot water pipes and drainage pipe.
- 7.Because the electronic three-way valve is built into the main body, clean the inside of the chilled/hot water pipe well by flushing water before use. Because the entry of dust, etc. inside the main body may prevent the electric three-way valve from working normally, it is recommended that an accompanying strainer (Arranged on site).
- Should be placed at the chilled/hot water inlet of each main body. In order to prevent the generation of red rust, for piping from cold/hot water inlet pipe tapping to strainer, please use flexible hose or stainless steel piping (to be arranged by the installer ). When using stainless steel
- piping, for connection with the main spout (brass), please use fittings considering corrosion etc. 8.Ensure that chilled water should be flowing after turning on the electricity for the unit. If chilled water has been flowing for a long time before turning on the electricity, this may cause dew condensation or wate leakage.
- 9. Make sure to release air in the water piping of unit after energization. Incorrect work may lead to issues.
  10. For replacement purposes, place an inspection access opening on the celling just below the main unit body.
  When an inspection access opening cannot be placed, the celling finish work should be carried out in a way that ensures the replacement of the main body is possible. Secure normal maintenance space in accordance with the dimensi ns indicated in the figure, and do not place any obstacles in the immediate surroundings or below the unit.

# **Specification Ceiling Unit FBP37BA K**

Item			Unit	FBP37BA K		
	Cooling Consoits	FCU	Btu/h	7,200		
	Cooling Capacity	FCU and HP	Btu/h	13,700 (9,600~16,800)		
	Cooling Ca	pacity with Hot Water	Btu/h	4,500 (1,100~6,500)		
		FCU	Btu/h	8,900		
	Heating Capacity	FCU and HP	Btu/h	16,800 (12,700~18,500)		
D ( *1	Heating Capacity with Chilled Water			5,500 (1,800~7,900)		
Performance ^1		Cooling FCU	Btu/(W.hour)	100.00		
		Cooling FCU and HP	Btu/(W.hour)	68.50		
	TRIDYO	Cooling (with Hot Water)	Btu/(W.hour)	9.00		
	TPIR*2	Heating FCU	Btu/(W.hour)	123.00		
		Heating FCU and HP	Btu/(W.hour)	45.40		
		Heating (with Chilled Water)	Btu/(W.hour)	14.40		
	Power Source	ce		208V (180V~220V) 1 Phase-60 Hz		
		Power Consumption	kW	0.200 (0.080~0.490)		
	Cooling FCU and HP	Operating Current • Power Factor *3	A•%	1.3 (0.6~2.8) • 76		
		Power Consumption	kW	0.500(0.220~0.850)		
	Cooling (with Hot Water)	Operating Current • Power Factor *3	A•%	3.1 (1.4~4.8) • 80		
Electrical		Power Consumption	kW	0.370 (0.170~0.620)		
Characteristics *1	Heating FCU and HP	Operating Current • Power Factor *3	A•%	2.5 (1.1~4.1) • 73		
		Power Consumption	kW	0.380 (0.160~0.610)		
	Heating (with Chilled Water)	Operating Current • Power Factor *3	A•%	2.4 (1.1~3.8) • 79		
-		Power Consumption	kW	0.072		
	FCU	Operating Current • Power Factor *3	A•%	0.5 • 73		
Minimum circuit ampacity(MCA)			A	7.6		
N	Aaximum rating of overcurrent p	rotective device (MOP)	A	10.0		
Compressor	Type • Rat	ted Output x Quantity	W	Full Hermetic Rotary Type • 700 x 1		
	Fan	Type x Quantity		Double Suction Centrifugal Fan x 1		
		Air Vol.	CFM	High : 350, Middle : 280, Low : 210		
Fan System	Ex-unit	Static Pressure *4	psi(G)	0.0068		
	Fan M	otor Rated Output	W	50		
		For Cooling	°F	44.6(41.0~122.0)		
	Inlet Temp.(Annual option)	For Heating	°F	113.0(41.0~122.0)		
Chilled / Hot Water		Water Vol.	GPM us	2.11		
	Wa	iter Press. Loss	psi(G)	3.63		
	Wa	ater Contained	U.S.gallon	0.37		
	Air Heat Excha	nger		Plate Fin Type		
	Water Heat Exch	anger		Plate Type		
	Refrigerant • Qu	antity	lbs	R410A • 1.41		
		Compressor		Thermostat, Current Transformer		
		Fan Motor		DC Over Current, Thermal Cut-off		
Protection Device	Re	frigerant Cycle		High-Pressure Switch		
	C	ontrol Circuit		Fuse		
		Others		Drain Sensor		
	Chilled / H	ot Water Inlet • Outlet	in.	NPT3/4 Male		
Piping Connection Part	Dr	rainage Outlet	in.	Φ1		
	Power Supply Conne	ection Part		Terminal block(M5)		
	Outer Dimensions Height ×	Width × Depth	in.	14-13/16×25-5/8×22-1/2		
	Unit Weigh	t	lbs	154.0		
	PMAC's Thermostat (Remot	e Control Switch)		Standard		
	Accessories	5	Drainage Up Pump			
	Option			Filter Box, Flange		

#### Note

The capacity and electrical characteristics indicate the values at 208V.
 Performance \*1

	Inle	t air	Inlet water			
	D.B. Temp.	W.B. Temp.	Temp.	water volume		
Cooling Capacity	80.0°F	67.0°F	44.6°F	standard water volume		
Cooling Capacity with Hot Water	80.0°F	67.0°F	113.0°F	standard water volume		
Heating Capacity	70.0°F		113.0°F	standard water volume		
Heating Capacity with Chilled Water	70.0°F		44.6°F	standard water volume		

3. TPIR stands for Total performance per Power Input Ratio, and it is shown as follows: (Refer to \*2)

TPIR = (FCU capacity + HP capacity) / Power consumption

4. The values of power factor is "overall power factor value". (Refer to \*3)

5. Please be sure to install the ELB. Please see the installation manual for details.

6. FCU" and "HP" in the table represent the fan coil and heat pump, respectively.

7. Please consider the compressor's heat equivalent of work (power consumption W) for heat source capacity.

8. The sum of the duct flow resistance and the air flow resistance of the filter should not exceed the rated external static pressure. (Refer to \*4)

9. Specifications are subject to change for purposes of improvement

## **Outer Dimension Vertical Stack FTP47AA K**





1. Fix the main unit within the dimensions shown in the main unit fixation figure. 2. The installer is responsible for connecting drain piping for the main unit and power The installer is responsible for connecting drain piping for the main unit and power cable/instrumentation cable as well as installing components that are separately delivered. Please see the installation figure.
 Make sure that the drainage hose does not form a trap.
 Ensure that the inclination of the drainage pips is 1/100 or greater.
 Connect chilled/hot water pipes in the correct orientation. If incorrectly connected, the unit cannot operate at the normal performance level.
 Be sure to apply thermal insulation to the chilled/hot water pipes and drainage pipe.
 Be cause the electronic three-way value is built into the main hody. Clean the inside of

7. Because the electronic three-way valve is built into the main body, clean the inside of the chilled/hot water pipe well by flushing water before use. Because the entry of dust, etc. inside the main body may prevent the electric three-way valve from working

etc. inside the main body may prevent the electric three-way valve from working normally, it is recommended that an accompanying strainer (Arranged on site). Should be placed at the chilled/hot water inlet of each main body. In order to prevent the generation of red rust, for piping from cold/hot water inlet pipe tapping to strainer, please use flexible hose or stainless steel piping (to be arranged by the installer). When using stainless steel piping, for connection with the main spout (brass), please use fittings considering corrosion etc. 8.Ensure that chilled water should be flowing after turning on the electricity for the unit. If child water has been flowing for a lower turning the destricity, this

If chilled water has been flowing for a long time before turning on the electricity, this may cause dew condensation or water leakage.
Make sure to release air in the water piping of unit after energization. Incorrect work

may lead to issues.

# **Specification Vertical Stack FTP47AA K**

Item			Unit	FTP47AA K		
	Cooling Consoity	FCU	Btu/h	12,700		
	Cooling Capacity	FCU and HP	Btu/h	18,500 (15,100~18,500)		
	Cooling Ca	apacity with Hot Water	Btu/h	8,200 (1,200~8,200)		
	Heating Canacity	FCU	Btu/h	14,400		
	Heating Capacity	FCU and HP	Btu/h	20,500 (17,100~20,500)		
	Heating Cap	acity with Chilled Water	Btu/h	7,900 (600~7,900)		
Performance ^1		Cooling FCU	Btu/(W.hour)	158.75		
		Cooling FCU and HP	Btu/(W.hour)	92.50		
		Cooling (with Hot Water)	Btu/(W.hour)	7.00		
	TPIR *2	Heating FCU	Btu/(W.hour)	180.00		
		Heating FCU and HP	Btu/(W.hour)	42.70		
		Heating (with Chilled Water)	Btu/(W.hour)	9.50		
	Power Source	ce		208V (198V~228V) 1 Phase-60		
		Power Consumption	kW	0.200 (0.100~0.200)		
	Cooling FCU and HP	Operating Current • Power Factor *3	A•%	1.3 (0.7~1.3) • 74		
		Power Consumption	kW	1.140 (0.230~1.140)		
	Cooling (with Hot Water)	Operating Current • Power Factor *3	A•%	6.8 (1.5~6.8) • 81		
Electrical		Power Consumption	kW	0.480 (0.210~0.480)		
Characteristics *1	Heating FCU and HP	Operating Current • Power Factor *3	A•%	3.8 (1.4~3.8) • 61		
		Power Consumption	kW	0.830 (0.150~0.830)		
	Heating (with Chilled Water)	Operating Current • Power Factor *3	A•%	4.5 (1.1~4.5) • 89		
		Power Consumption	kW	0.080		
	FCU	Operating Current • Power Factor *3	A • %	0.9 • 77		
Minimum circuit ampacity(MCA)			Α	7.3		
Maximum rating of overcurrent protective device (MOP)			A	15.0		
Compressor	sor Type • Rated Output x Quantity		W	Full Hermetic Rotary Type • 700 x 1		
	Ean Type Mateu Output X Quantity			Double Suction Centrifugal Fan x 1		
		Air Vol	CEM	High : 490. Middle : 420. Low : 350		
Fan System	Ex-unit	t Static Pressure *4	nsi(G)	0 0044		
	Fan M	otor Rated Output	W	110		
		For Cooling	°F	44 6 (41~122)		
	Inlet Temp.(Annual option)	For Heating	°F	1130(41~122)		
Chilled / Hot Water		Water Vol	GPM us	317		
	Wa	ater Press Loss	nsi(G)	0.006		
	W	ater Contained	U S gallon	0.71		
	Air Heat Excha	nger	oloiguiloit	Plate Fin Type		
	Water Heat Exch	anger		Plate Type		
	Refrigerant • Ou	antity	lbs	R410A • 1.06		
	Kenigerane Qu	Compressor		Thermostat Current Transformer		
		Fan Motor		DC Over Current Thermal Cut-Off		
Protection Device	Be	frigerant Cycle		High-Pressure Switch		
	(	Control Circuit		Filse		
		Others		Drain Sensor		
	Chilled / H	lot Water Inlet • Outlet	in	NPT3/4 (Male)		
Piping Connection Part Drainage Outlet		rainage Outlet	in	φ1		
Power Supply Connection Part			Terminal block (M5)			
	Heigh	t x Width x Depth	in	49 • 16 • 16		
Outer Dimensions	Height x Width x Depth			86 • 16 • 16		
	Lipit Weight (Main unit + Br	acket • Cabinet)	lbe	157 ( 108 + 49 )		
	PMAC's Thermostat (Remot	te Control Switch)	105	Standard		
	Accessorie	s		Drainage hose PI Short-Circuit Line		
	Accessories for construction	n (Other packing)		FAN I INIT		
Option			Suction panel, Blowing panel, Suction panel mounting duct, Blowing panel mounting duct			

#### Note

1. The capacity and electrical characteristics indicate the values at 208V.

2. Performance \*1

	Inle	t air	Inlet water					
	D.B. Temp. W.B. Te		Temp.	water volume				
Cooling Capacity	80.0°F	67.0°F	44.6°F	standard water volume				
Cooling Capacity with Hot Water	80.0°F	67.0°F	113.0°F	standard water volume				
Heating Capacity	70.0°F		113.0°F	standard water volume				
Heating Capacity with Chilled Water	70.0°F		44.6°F	standard water volume				

3. TPIR stands for Total performance per Power Input Ratio, and it is shown as follows: (Refer to \*2)

TPIR = (FCU capacity + HP capacity) / Power consumption

4. The values of power factor is "overall power factor value". (Refer to \*3)

5. Please be sure to install the ELB. Please see the installation manual for details.

6. FCU" and "HP" in the table represent the fan coil and heat pump, respectively.

8. The sum of the duct flow resistance and the air flow resistance of the filter should not exceed the rated external static pressure. (Refer to \*4)

9. Specifications are subject to change for purposes of improvement

<sup>7.</sup> Please consider the compressor's heat equivalent of work (power consumption W) for heat source capacity.

## Reference



**IBEROSTAR 70 PARK AVENUE** 



IBEROSTAR 70 PARK AVENUE ENTRANCE





IBEROSTAR 70 PARK AVENUE GUEST ROOM



THE KITANO HOTEL NEW YORK



THE KITANO HOTEL NEW YORK LOBBY



THE KITANO HOTEL NEW YORK GUEST ROOM



ANA INTERCONTINENTAL TOKYO



HILTON TOKYO



HOTEL NEW GRAND



THE WESTIN MIYAKO KYOTO

