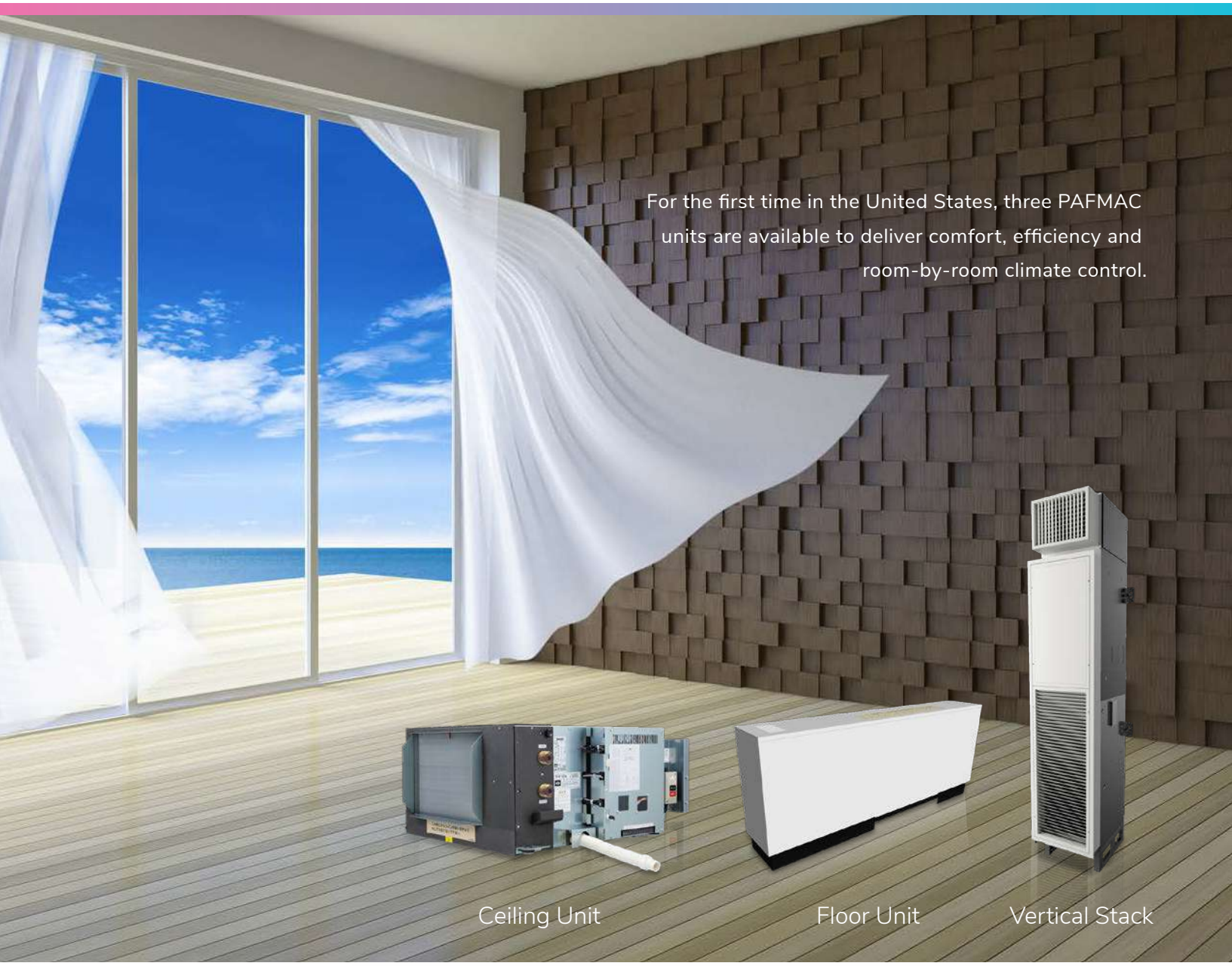
PAFMAC

Four Season HVAC Systems



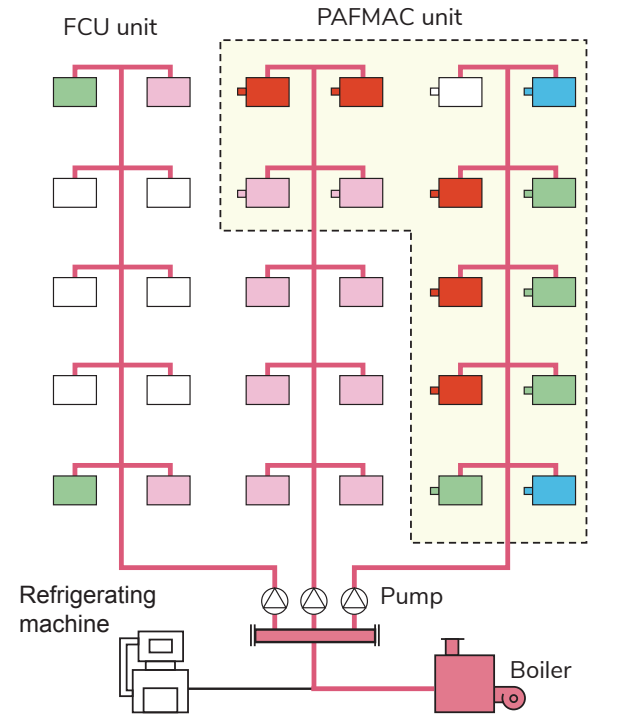
PAFMAC

PMAC and Fancoil Module Air-conditioner Cassette

PRODUCT	PERFORMANCE	PROFIT
Easy Installation and Maintenance	Cooling and / or Heating Any Time	No Operation Shutdown During Installation
High Efficiency by INV Compressor	Individual Climate Control in Each Room	Retro-fit Existing System at Lowest Cost
New Unit While Keeping Existing System	Perfect Comfort Setting for Every Guest	Customer Complaint Decrease
Low Noise		Energy Savings

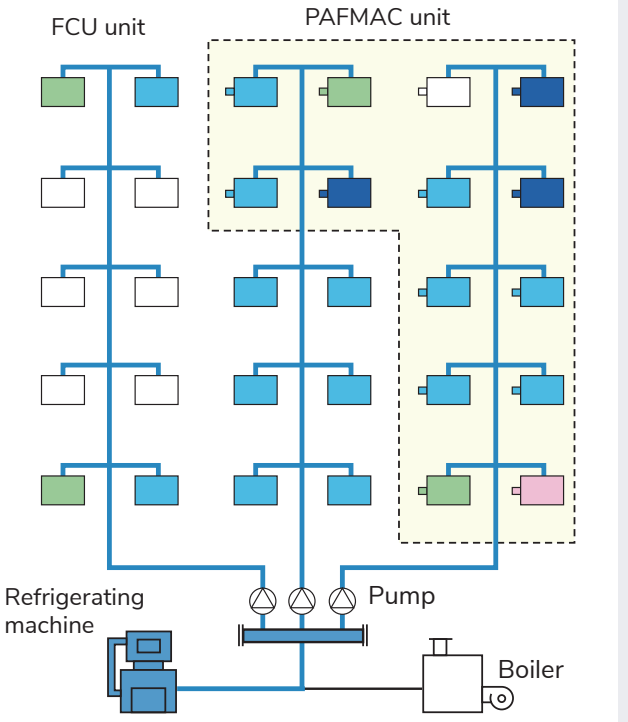
PAFMAC System Diagram

Hot Water in Winter



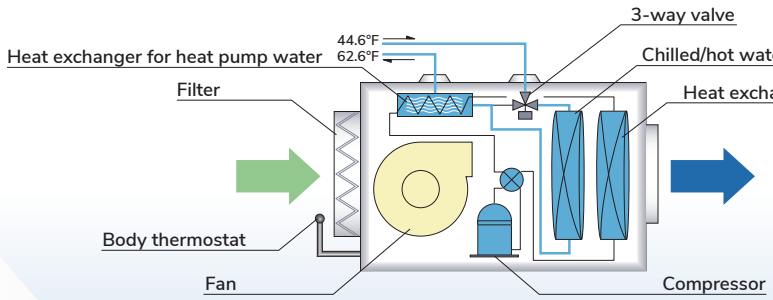
FCU + HP | FCU | Ventilation | Stop | Reverse mode HP (Cooling)

Chilled Water in Summer



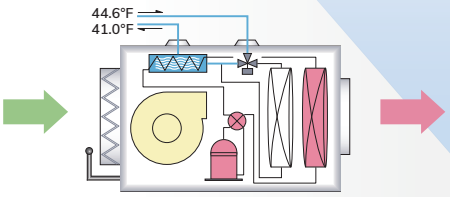
FCU + HP | FCU | Ventilation | Stop | Reverse mode HP (Heating)

Operation Mode of Heat Pump and Fan Coil

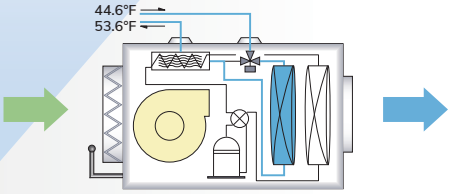


Chilled Water

■ Powerful cooling when extremely hot



■ Heating using chilled water when chilly in the morning and evening

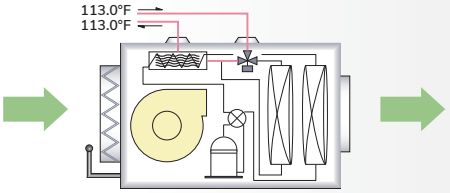


■ Fan Coil cooling

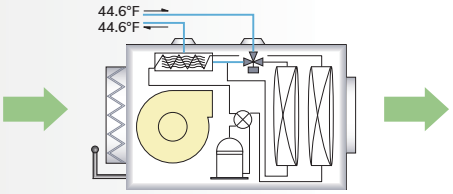
SUMMER

SPRING FALL

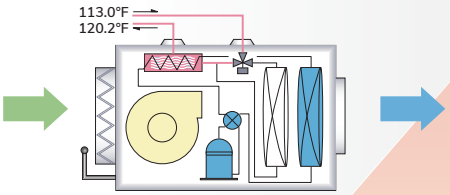
WINTER



■ Ventilation mode upon reaching proper temperature

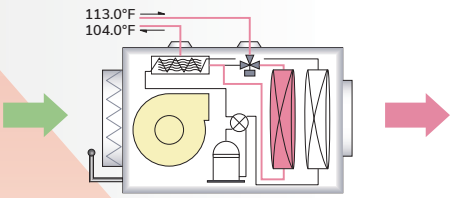


■ Ventilation mode upon reaching proper temperature



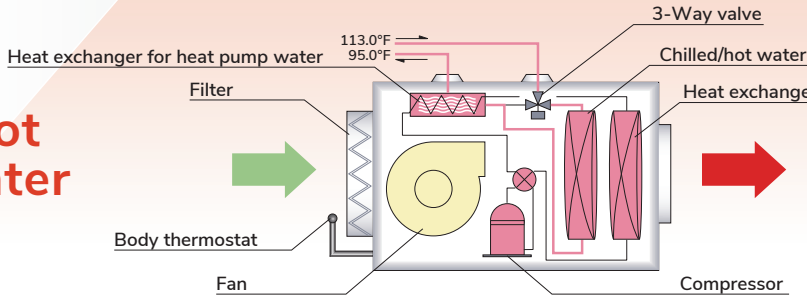
■ Cooling using hot water in rooms exposed to sunlight

■ Powerful heating when extremely cold



■ Fan Coil heating

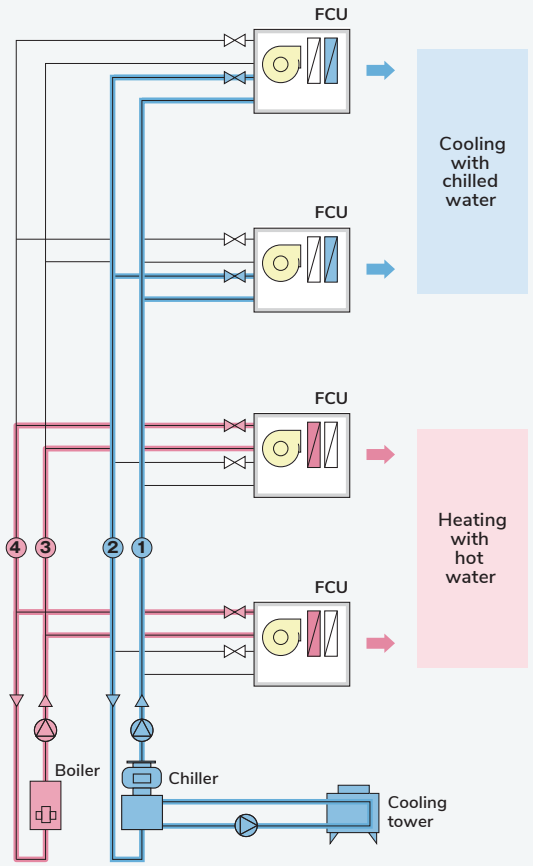
Hot Water



System Comparison

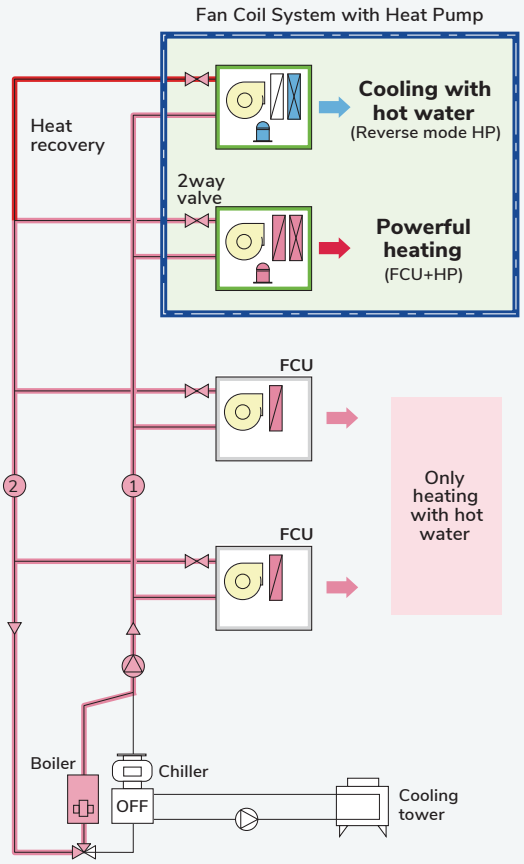
4-Pipe Chilled / Hot Water System

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.

Item	4-Pipe Chilled / Hot Water System		2-Pipe 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

Rating: 3=very good 2=good 1=average 0=uncountable

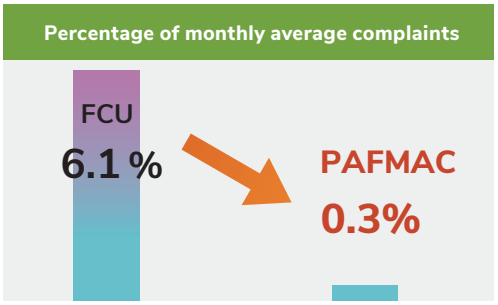
Sharp Decrease in Guest Complaints

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.	Total
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

Remove existing FCU

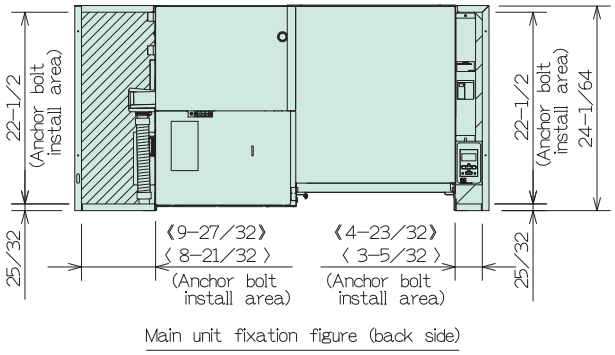
Install the PAFMAC

Installation completed.

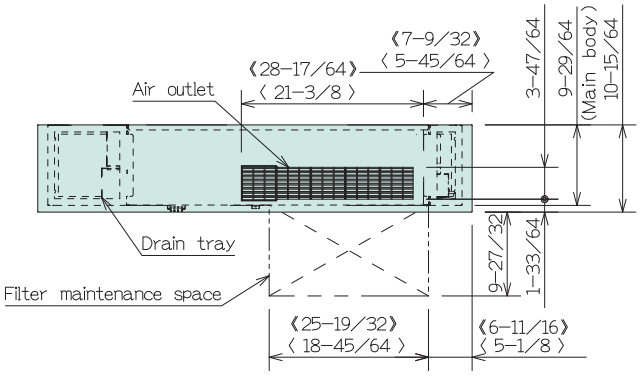
GUEST ROOM After instllation

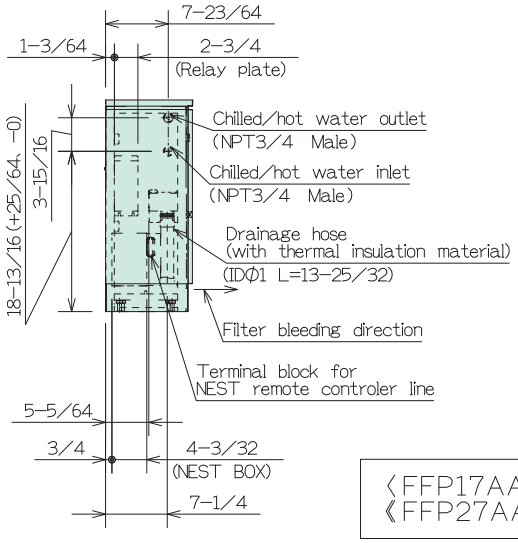
Outer Dimension Floor Mounted Cabinet FFP17/27AA K

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

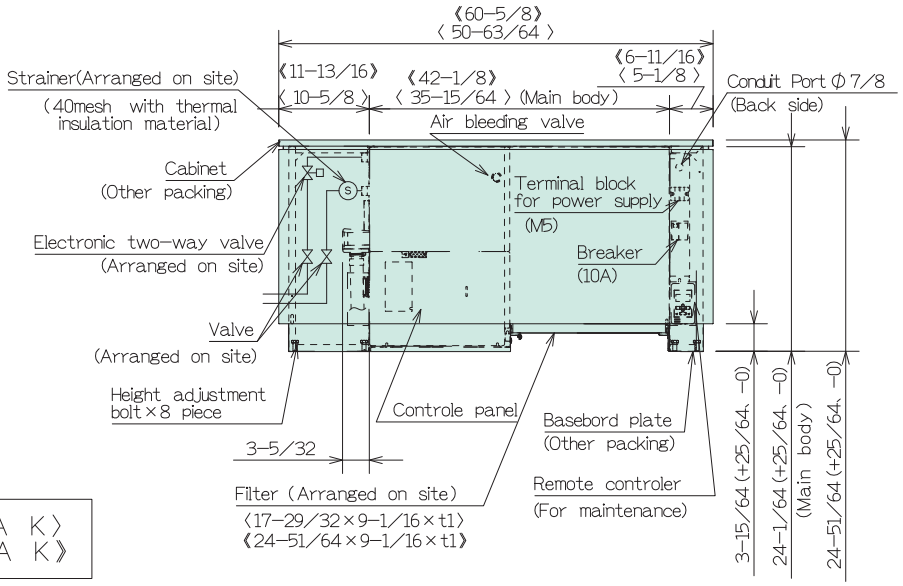


Main unit fixation figure (back side)





〈FFP17AA K〉
《FFP27AA K》



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
Performance *1	Cooling Capacity	FCU	Btu/h	3,800	6,500
		FCU and HP	Btu/h	8,600(5,900~8,600)	13,700(8,900~13,700)
	Cooling Capacity with Hot Water		Btu/h	3,500(1,100~3,500)	5,500(1,500~5,500)
	Heating Capacity	FCU	Btu/h	4,500	7,600
		FCU and HP	Btu/h	9,600(6,900~9,600)	16,100(11,000~16,100)
	Heating Capacity with Chilled Water		Btu/h	3,800(1,800~3,800)	5,500(1,900~5,500)
	TPIR*2	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
		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 Source				208V (180V~220V) 1 Phase-60	
Electrical Characteristics *1	Cooling FCU and HP	Power Consumption	kW	0.155(0.065~0.155)	0.280(0.080~0.280)
		Operating Current • Power Factor *3	A • %	1.1(0.5~1.1) • 68	1.8(0.5~1.8) • 77
	Cooling (with Hot Water)	Power Consumption	kW	0.410(0.195~0.410)	0.650(0.200~0.650)
		Operating Current • Power Factor *3	A • %	2.6(1.3~2.6) • 76	4.0(1.4~4.0) • 81
	Heating FCU and HP	Power Consumption	kW	0.380(0.13~0.380)	0.630(0.160~0.630)
		Operating Current • Power Factor *3	A • %	2.4(0.9~2.4) • 76	3.9(1.1~3.9) • 82
	Heating (with Chilled Water)	Power Consumption	kW	0.325(0.140~0.325)	0.410(0.145~0.410)
		Operating Current • Power Factor *3	A • %	2.1(1.0~2.1) • 74	2.6(1.0~2.6) • 79
	FCU	Power Consumption	kW	0.040	0.055
		Operating Current • Power Factor *3	A • %	0.3 • 64	0.4 • 71
Minimum circuit ampacity(MCA)			A	8.9	8.4
Maximum rating of overcurrent protective device (MOP)			A	10.0	10.0
Compressor	Type • Rated Output x Quantity		W	Full Hermetic Rotary Type • 700 x 1	
Fan System	Fan Type x Quantity			Single Suction Centrifugal Fan x 1	Double Suction Centrifugal Fan x 2
	Air Vol.		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 Motor Rated Output		W	26	30
Chilled / Hot Water	Inlet Temp.(Annual option)	For Cooling	°F	44.6 (41.0~122.0)	
		For Heating	°F	113 (41.0~122.0)	
	Water Vol.		GPM us	1.32	2.11
	Water Press. Loss		psi(G)	1.67	3.70
	Water Contained		U.S.gallon	0.24	0.37
Air Heat Exchanger				Plate Fin Type	
Water Heat Exchanger				Plate Type	
Refrigerant • Quantity			lbs	R410A • 1.12	
Protection Device	Compressor			Thermostat, Current Transformer	
	Fan Motor			DC Over Current, Thermal Cut-Off	
	Refrigerant Cycle			High-Pressure Switch	
	Control Circuit			Fuse	
	Others			Drain Sensor	
Piping Connection Part	Chilled / Hot Water Inlet • Outlet		in.	NPT3/4 (Male)	
	Drainage Outlet		in.	Φ 1	
Power Supply Connection Part				Terminal block (M5)	
Outer Dimensions	Height × Width × Depth		in.	24-1/64 • 35-15/64 • 9-29/64	24-1/64 • 42-1/8 • 9-29/64
	Height × Width × Depth(with decorative)		in.	24-51/64 • 50-63/64 • 10-15/64	24-51/64 • 60-5/8 • 10-15/64
Unit Weight (Main unit • Cover)			lbs	177.1 (140.8 • 36.3)	198.0 (154.0 • 44.0)
PMAC's Thermostat (Remote Control Switch)				Standard	
Accessories				Brush Clip	
Accessories for construction (Other packing)				Decorative case, Basebored Plate	

Note

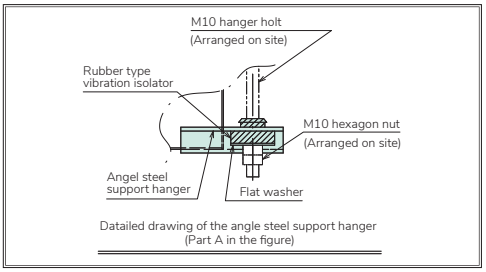
1. The capacity and electrical characteristics indicate the values at 208V.
2. Performance *1

	Inlet 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

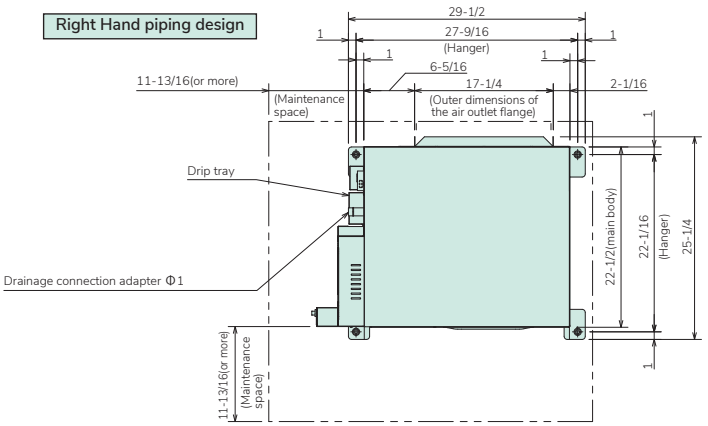
3. TPIR stands for Total performance per Power Input Ratio, and it is shown as follows: (Refer to *2)
   TPIR = (FCU capacity + HP capacity) / Power consumption
4. The values of power factor is "overall power factor value". (Refer to *3)
5. Please be sure to install the ELB. Please see the installation 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

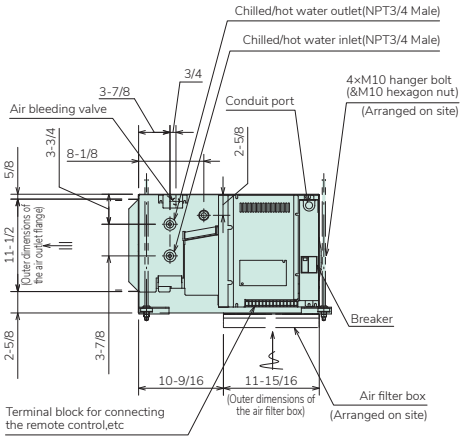
Outer Dimension Ceiling Unit FBP37BA K

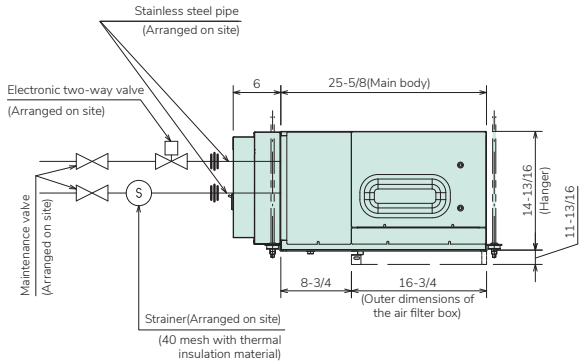
The drawing shows Right Hand piping design.
The Left Hand piping design is also available.



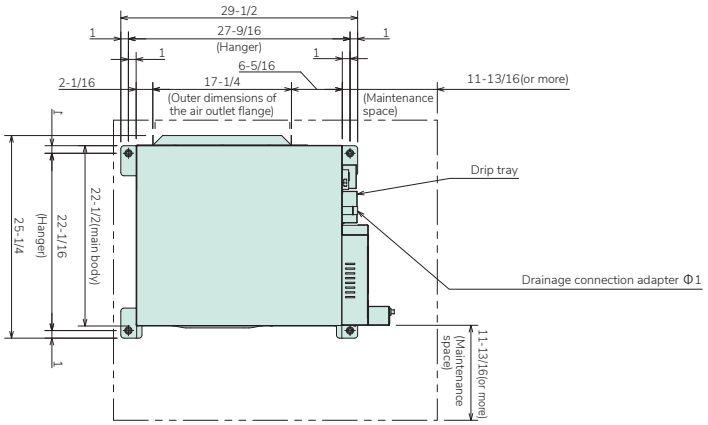
Right Hand piping design

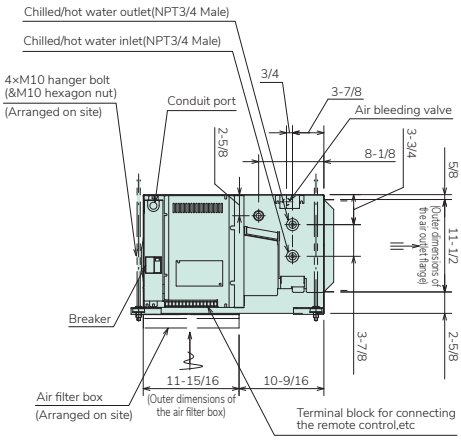


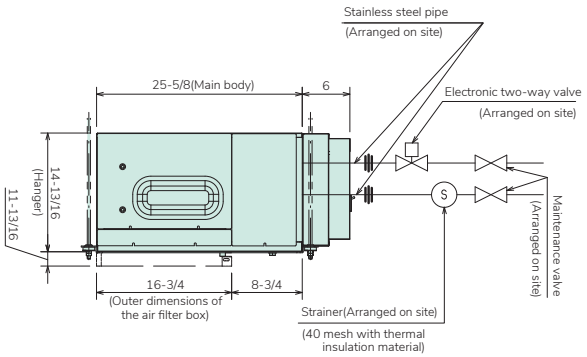




Left Hand piping design







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.
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 ceiling 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 dimensions 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
Performance *1	Cooling Capacity	FCU	Btu/h	7,200
		FCU and HP	Btu/h	13,700 (9,600~16,800)
	Cooling Capacity with Hot Water		Btu/h	4,500 (1,100~6,500)
	Heating Capacity	FCU	Btu/h	8,900
		FCU and HP	Btu/h	16,800 (12,700~18,500)
	Heating Capacity with Chilled Water		Btu/h	5,500 (1,800~7,900)
	TPIR*2	Cooling FCU	Btu/(W.hour)	100.00
		Cooling FCU and HP	Btu/(W.hour)	68.50
		Cooling (with Hot Water)	Btu/(W.hour)	9.00
		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				208V (180V~220V) 1 Phase-60 Hz
Electrical Characteristics *1	Cooling FCU and HP	Power Consumption	kW	0.200 (0.080~0.490)
		Operating Current • Power Factor *3	A • %	1.3 (0.6~2.8) • 76
	Cooling (with Hot Water)	Power Consumption	kW	0.500(0.220~0.850)
		Operating Current • Power Factor *3	A • %	3.1 (1.4~4.8) • 80
	Heating FCU and HP	Power Consumption	kW	0.370 (0.170~0.620)
		Operating Current • Power Factor *3	A • %	2.5 (1.1~4.1) • 73
	Heating (with Chilled Water)	Power Consumption	kW	0.380 (0.160~0.610)
		Operating Current • Power Factor *3	A • %	2.4 (1.1~3.8) • 79
	FCU	Power Consumption	kW	0.072
		Operating Current • Power Factor *3	A • %	0.5 • 73
Minimum circuit ampacity(MCA)			A	7.6
Maximum rating of overcurrent protective device (MOP)			A	10.0
Compressor	Type • Rated Output x Quantity		W	Full Hermetic Rotary Type • 700 x 1
Fan System	Fan Type x Quantity			Double Suction Centrifugal Fan x 1
	Air Vol.		CFM	High : 350, Middle : 280, Low : 210
	Ex-unit Static Pressure *4		psi(G)	0.0068
	Fan Motor Rated Output		W	50
Chilled / Hot Water	Inlet Temp.(Annual option)	For Cooling	°F	44.6(41.0~122.0)
		For Heating	°F	113.0(41.0~122.0)
	Water Vol.		GPM us	2.11
	Water Press. Loss		psi(G)	3.63
	Water Contained		U.S.gallon	0.37
Air Heat Exchanger				Plate Fin Type
Water Heat Exchanger				Plate Type
Refrigerant • Quantity			lbs	R410A • 1.41
Protection Device	Compressor			Thermostat, Current Transformer
	Fan Motor			DC Over Current, Thermal Cut-off
	Refrigerant Cycle			High-Pressure Switch
	Control Circuit			Fuse
	Others			Drain Sensor
Piping Connection Part	Chilled / Hot Water Inlet • Outlet		in.	NPT3/4 Male
	Drainage Outlet		in.	Φ 1
Power Supply Connection Part				Terminal block(M5)
Outer Dimensions Height × Width × Depth			in.	14-13/16×25-5/8×22-1/2
Unit Weight			lbs	154.0
PMAC's Thermostat (Remote Control Switch)				Standard
Accessories				Drainage Up Pump
Option				Filter Box, Flange

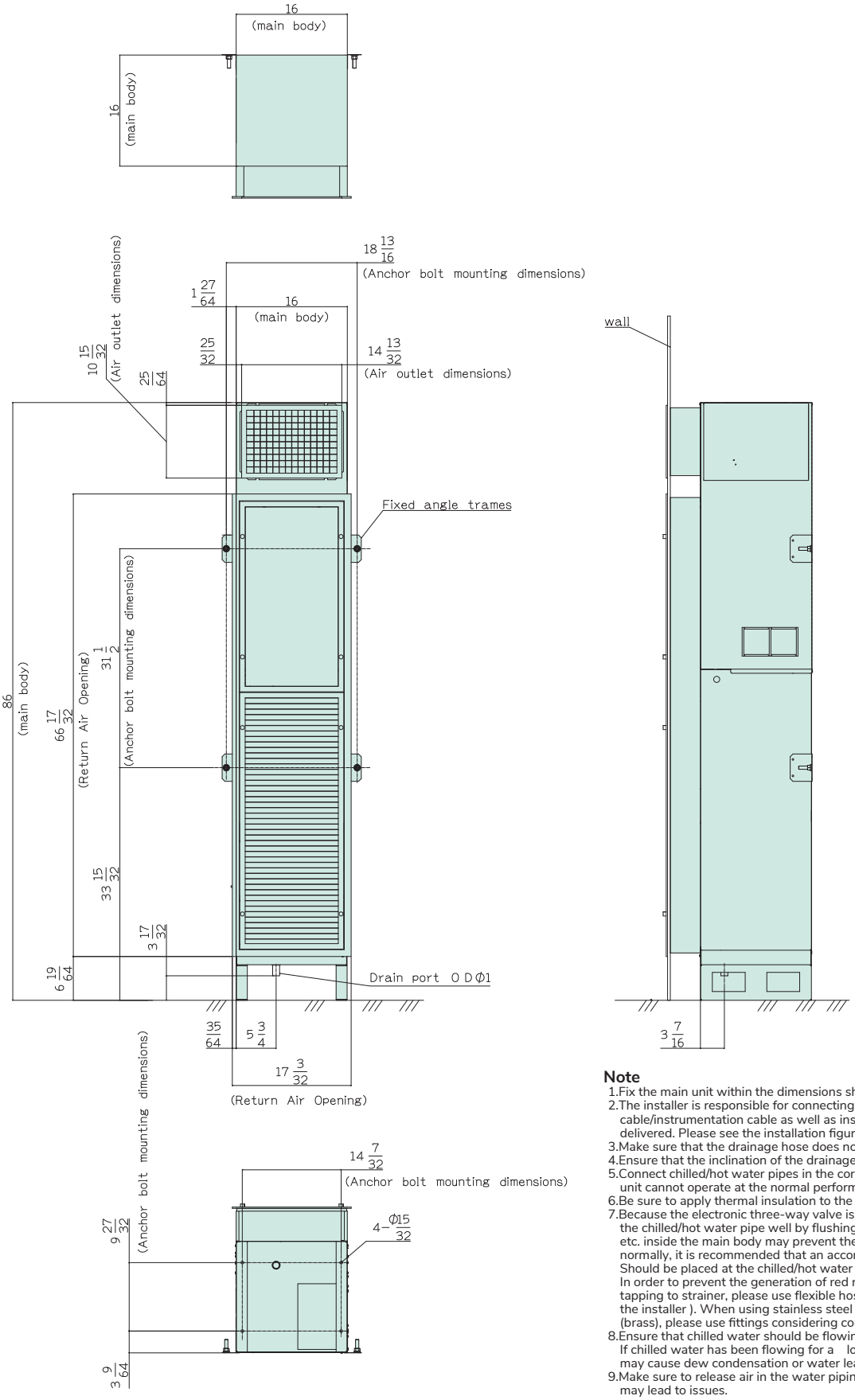
Note

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

	Inlet 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



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 Vertical Stack FTP47AA K

Item			Unit	FTP47AA K
Performance *1	Cooling Capacity	FCU	Btu/h	12,700
		FCU and HP	Btu/h	18,500 (15,100～18,500)
	Cooling Capacity with Hot Water		Btu/h	8,200 (1,200～8,200)
	Heating Capacity	FCU	Btu/h	14,400
		FCU and HP	Btu/h	20,500 (17,100～20,500)
	Heating Capacity with Chilled Water		Btu/h	7,900 (600～7,900)
	TPIR *2	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
		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				208V (198V～228V) 1 Phase-60
Electrical Characteristics *1	Cooling FCU and HP	Power Consumption	kW	0.200 (0.100～0.200)
		Operating Current・Power Factor *3	A・%	1.3 (0.7～1.3)・74
	Cooling (with Hot Water)	Power Consumption	kW	1.140 (0.230～1.140)
		Operating Current・Power Factor *3	A・%	6.8 (1.5～6.8)・81
	Heating FCU and HP	Power Consumption	kW	0.480 (0.210～0.480)
		Operating Current・Power Factor *3	A・%	3.8 (1.4～3.8)・61
	Heating (with Chilled Water)	Power Consumption	kW	0.830 (0.150～0.830)
		Operating Current・Power Factor *3	A・%	4.5 (1.1～4.5)・89
	FCU	Power Consumption	kW	0.080
		Operating Current・Power Factor *3	A・%	0.9 ・ 77
Minimum circuit ampacity(MCA)			A	7.3
Maximum rating of overcurrent protective device (MOP)			A	15.0
Compressor	Type・Rated Output x Quantity		W	Full Hermetic Rotary Type・700 x 1
Fan System	Fan Type x Quantity			Double Suction Centrifugal Fan x 1
	Air Vol.		CFM	High : 490, Middle : 420, Low : 350
	Ex-unit Static Pressure *4		psi(G)	0.0044
	Fan Motor Rated Output		W	110
Chilled / Hot Water	Inlet Temp.(Annual option)	For Cooling	°F	44.6 (41～122)
		For Heating	°F	113.0 (41～122)
	Water Vol.		GPM us	3.17
	Water Press. Loss		psi(G)	0.006
	Water Contained		U.S.gallon	0.71
Air Heat Exchanger				Plate Fin Type
Water Heat Exchanger				Plate Type
Refrigerant・Quantity			lbs	R410A ・ 1.06
Protection Device	Compressor			Thermostat, Current Transformer
	Fan Motor			DC Over Current, Thermal Cut-Off
	Refrigerant Cycle			High-Pressure Switch
	Control Circuit			Fuse
	Others			Drain Sensor
Piping Connection Part	Chilled / Hot Water Inlet・Outlet		in.	NPT3/4 (Male)
	Drainage Outlet		in.	ϕ 1
Power Supply Connection Part				Terminal block (M5)
Outer Dimensions	Height × Width × Depth		in.	49 ・ 16 ・ 16
	Height × Width × Depth (with Cabinet)		in.	86 ・ 16 ・ 16
Unit Weight (Main unit + Bracket ・ Cabinet)			lbs	157 (108 ・ 49)
PMAC's Thermostat (Remote Control Switch)				Standard
Accessories				Drainage hose, PI Short-Circuit Line
Accessories for construction (Other packing)				FAN UNIT
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

	Inlet 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
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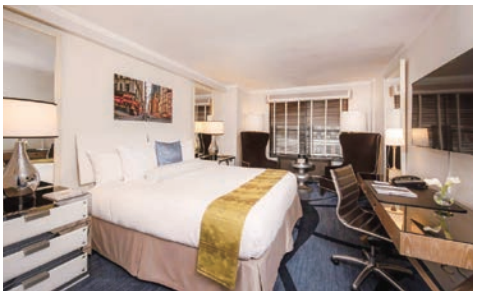
9. Specifications are subject to change for purposes of improvement

Reference

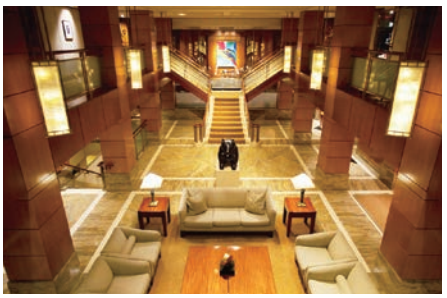
70 PARK AVENUE

70 PARK AVENUE ENTRANCE



70 PARK AVENUE GUEST ROOM

THE PRINCE KITANO NEW YORK



THE PRINCE KITANO NEW YORK
LOBBY

THE PRINCE KITANO NEW YORK
GUEST ROOM

ANA
INTERCONTINENTAL
TOKYO

HILTON TOKYO

HOTEL
NEW GRAND

THE WESTIN
MIYAKO KYOTO

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