Product Catalog

Direct Heating Heat Pump Water Heater
12 to 45kW – 50 & 60 Hz R410A Refrigerant

BETTER CHOICE FOR CENTRAL HOT WATER SYSTEM

Withair Group (China) Limited
Withair (Nanjing) Industries Co., Ltd

Table of Contents

W F Y RS – 42 E 2 P M A

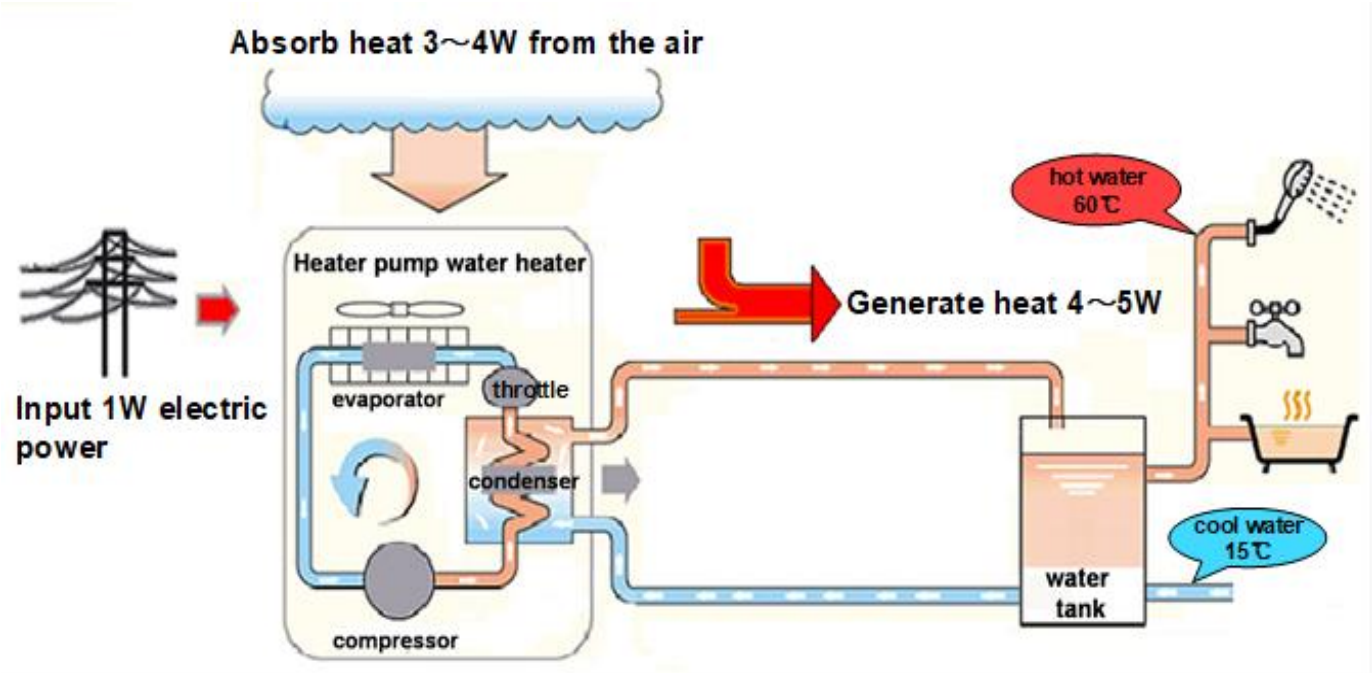
- A: Design serial number：A, B, C ……
- M: Modular function
- P: EVI，Y: For swimming pool
- 2：220V 1Ph 50Hz，2：380V 3Ph 50Hz
- E: Refrigerant: R410A –E, R22-F, R134a-K
- 42: Heating capacity
- RS: Hot water unit
- Y: Water heating type: Y-Direct heating(one time heating)；cyclic heating: default
- F：Unit without tank；
Z：Unit with tank
- W：Withair® brand

NOTE: For illustration purposes only. Not all options available with all models. Please consult your local Withair® Representative for specific availability.

AIR SOURCE HEAT PUMP WORKING PRINCIPLE

Withair® Air source heat pump unit is according to the Reverse Carnot Cycle principle, drive by a little bit of electricity, the low temperature and low-pressure refrigerant absorb a large amount of heat from air, and be vaporized, then be compressed to high temperature and high-pressure gas by compressor, enter into the water heating exchanger transferring heat into water to make hot water, then throttled by electric expansion valve and continue new cycle, a steady stream of making hot water.

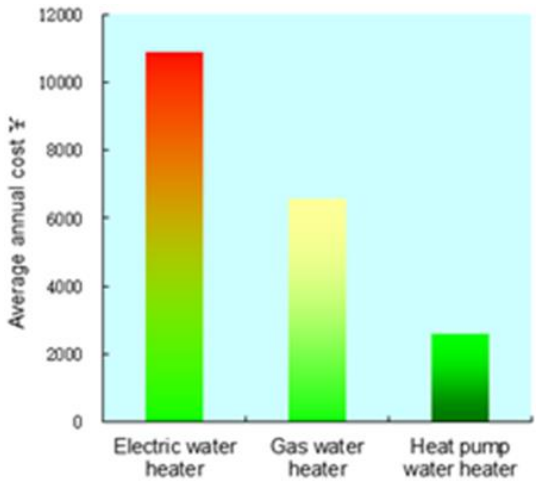
The heat pump water heater is a new type of water heater product with high efficiency, energy saving, environmental protection, safety.



OPERATING COST SAVING

The heat generated by Withair® air source heat pump water heater is several times that of electric energy consumption. Compared with traditional electric water heater, gas water heater, the operation cost can be saved by **60% ~ 70%,** and the investment cost is easy to recover.

	Electric water heater	Gas water heater	Heat pump water heater
Energy supply	Electricity	Natural gas	Electricity
Energy calorific value	860kcal/kwh	9000kcal/m³	860kcal/kwh
average efficiency	95%	85%	400%
Average daily energy consumption	49kwh	5.23m³	11.6kwh
Energy prices	￥0.61	￥3.45	￥0.61
Average daily cost	￥29.9	￥18.0	￥7.1
Average annual cost	￥10901	￥6584	￥2589



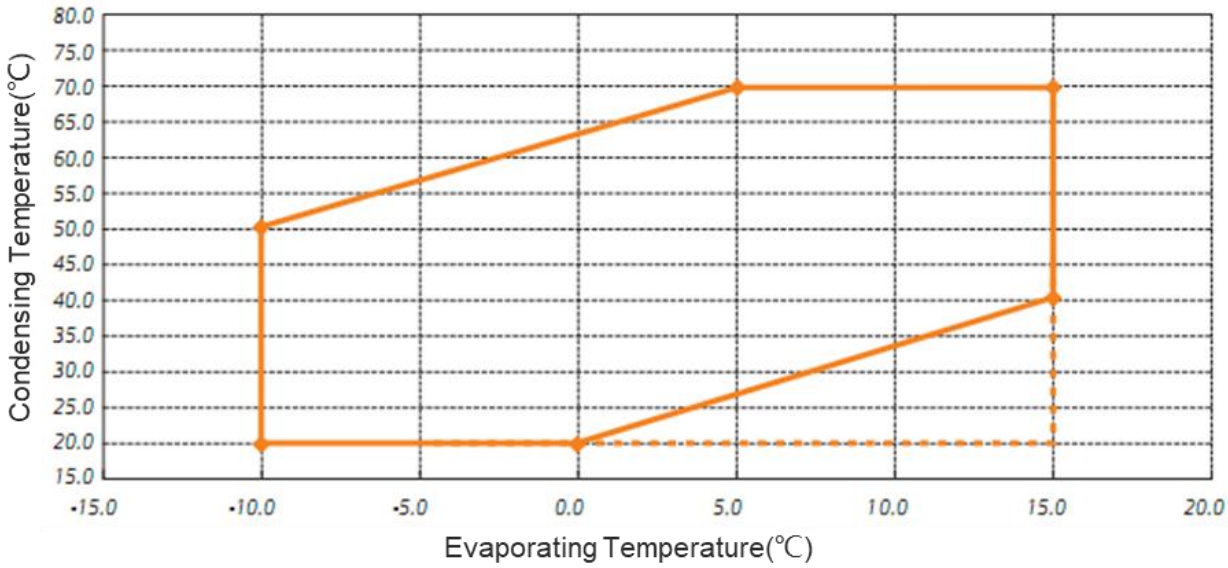
Calculation of water is 1000 kg, heating water from 15 ℃ to 55 ℃.

EVI（ENHANCED VAPOR INJECTION）TECHNOLOGY

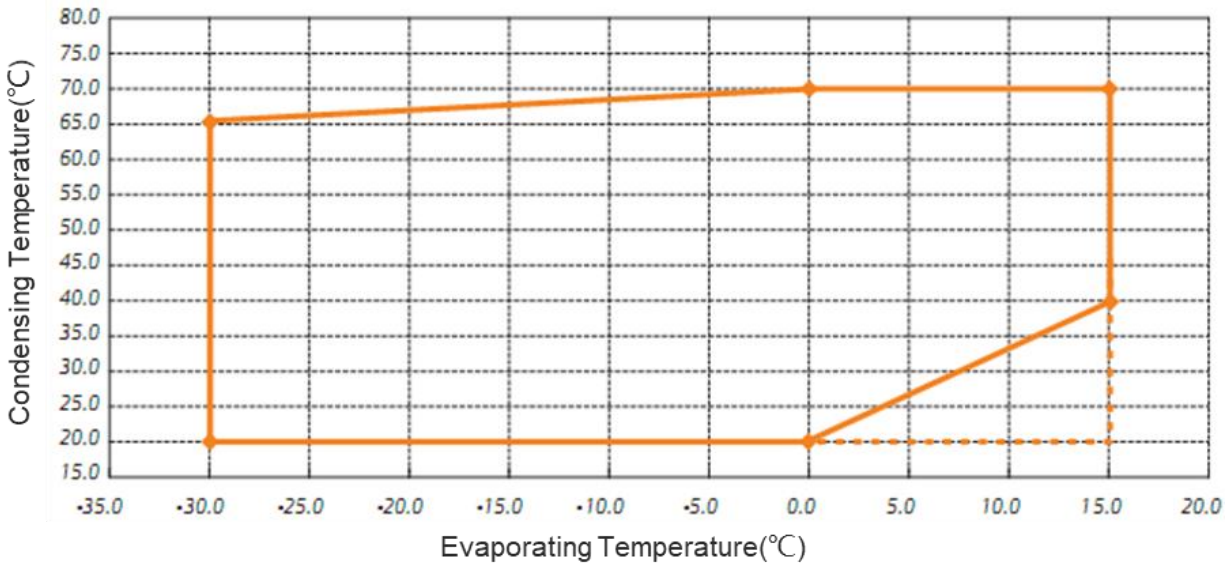
Withair® EVI heat pumps adopt EVI compressor and refrigerant injection system, as well as Withair® unique EVI digital control technology, effectively realize two-stage compression, obtain stronger cooling capacity, heating capacity and higher efficiency, it still has strong heating capacity at low ambient temperature.

The maximum water temperature of Withair® EVI direct heat pump water heater up to 60 ℃.

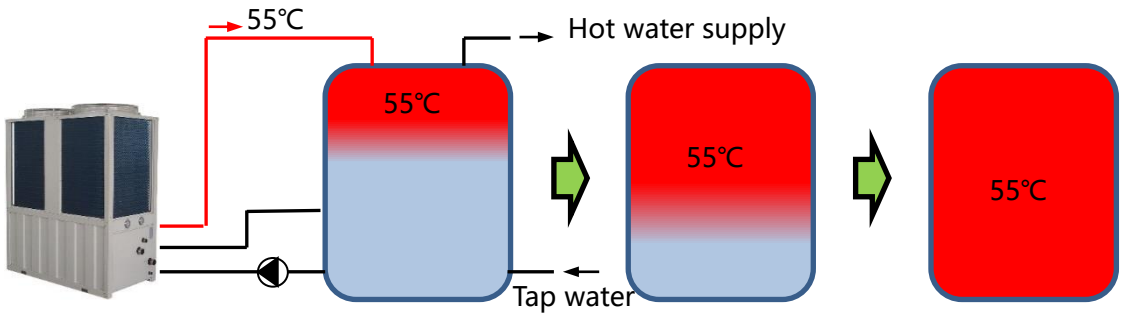
Operation range of conventional products:



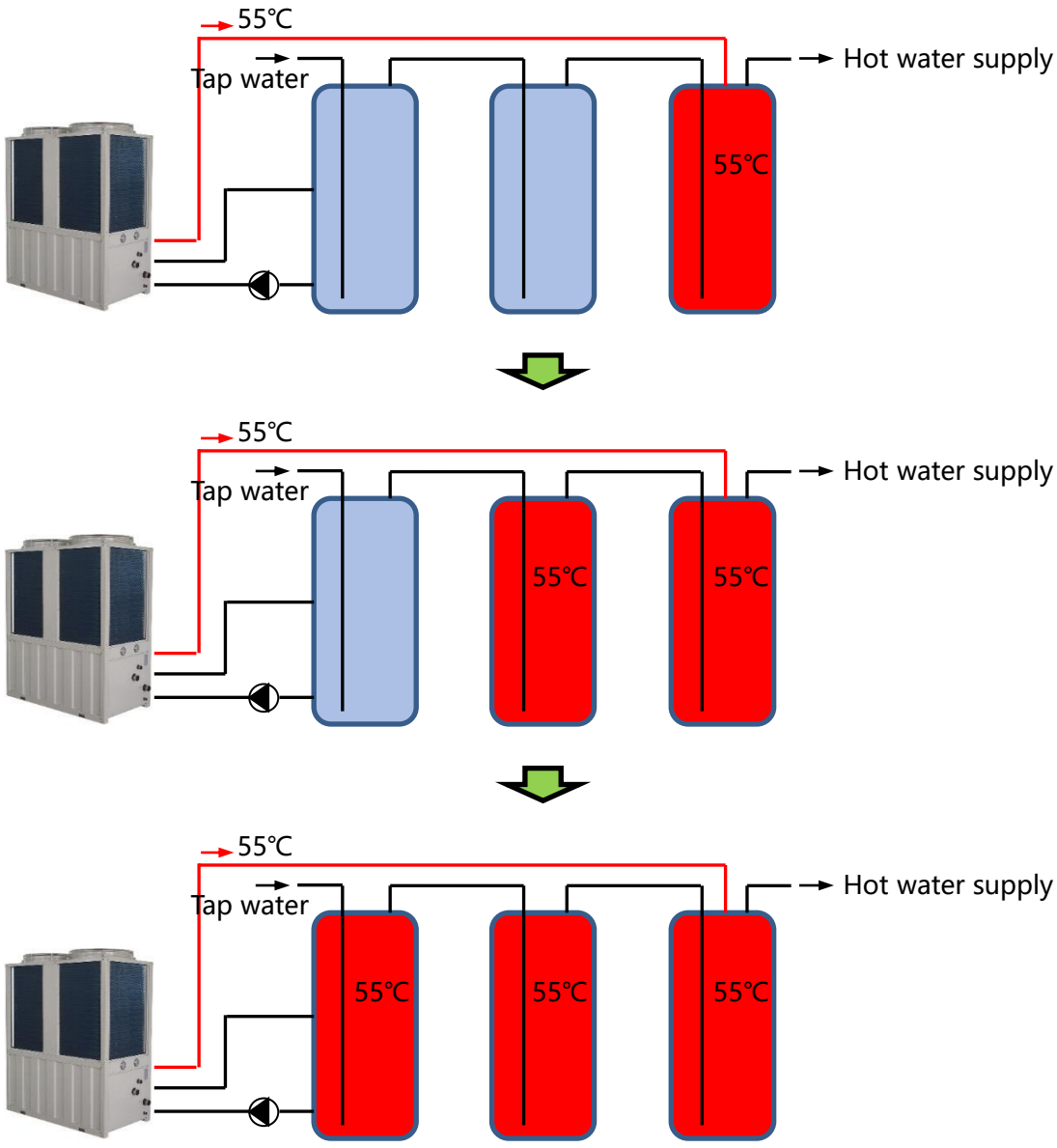
Operation range of EVI products:



Hot water production process (single tank)



Hot water production process (multiple water tanks in series)



ADVANTAGES OF WITHAIR® DIRECT HEATING HOT WATER SYSTEM

- 55 ℃ high temperature hot water directly enters the top of the water tank and can be used for heating water at any time.
- When using hot water, tap water is added into the bottom of the water tank and is not mechanically mixed with the original hot water in the water tank. Part of the cold water is heated into 55 ℃ hot water by the heat pump unit for direct water supply, and the other part of the cold water pushes out the hot water from bottom to top by its own pressure in the water tank. The water supply temperature and pressure of the hot water are stable and the user is comfortable with water.
- The hot water produced by the unit can always be used immediately and effectively, which is more energy-saving and less operating cost.
- Compared with other hot water systems, the volume of water tank can be reduced by more than 30%.
- The project does not need additional heating water tank, water supply pump, water level device, solenoid valve, controller, etc. the system is simpler and more reliable.
- When the water heater operates for defrosting in winter, the outlet water enters the lower part of the water tank, which not only has reliable defrosting operation and high efficiency, but also will not reduce the water temperature at the upper part of the water tank and affect the comfort of hot water use.
- It is better applicable to hotels, public bathrooms, school bathhouses, foot baths, beauty salons and bodies, hospital inpatients, student dormitories, military camps, villas, etc.
- It can be directly connected to the existing boiler system, and the original boiler system can be used as auxiliary heating.

CNC water flow regulating

The water flow regulating valve imported from Japan and digital control technology are adopted to accurately and quickly control the outlet water temperature, ensure stable hot water output and ensure the reliable operation of the unit.

Patented technology

Withair® patented direct heating technology effectively solves the defects of existing domestic hot water products, promotes the further development of heat pump hot water technology, and can be used reliably in the climate environment of -25℃ ~ 56℃.

Precise defrosting

Whether in high cold and low humidity climate or low cold and high humidity climate, ours digital control defrosting technology can always scientifically judge the thickness of frosting layer and the time required for defrosting. If there is no frost, it will not defrost. If there is frost, it will enter and exit defrosting in time, defrost thoroughly and do not defrost excessively, so as to improve the operation efficiency of the unit in winter.

High quality special compressor

It adopts the special compressor for heat pump of Panasonic, Hitachi and other international brands, which is suitable for high-temperature hot water and a wider ambient temperature range, with good reliability and long service life.

Tube in tube heat exchanger

The hot water side heat exchanger adopts coaxial tube in tube heat exchanger, and the inner copper pipe is of multi channel spiral design. Strong turbulence is generated when water passes through, forming flushing on the inner wall of the copper pipe, effectively improving the heat exchange efficiency, preventing scaling and avoiding the attenuation of heat exchange efficiency caused by long-term accumulation of scale.

Return water control function

This function allows users to turn on the tap to have hot water without draining a lot of cold water or waiting for a long time. The unit has two operation modes: manual water return and automatic water return. Manual water return: operate the water return key on the wire controller to return water. There are four options for automatic water return:

- Morning and evening (5:00～8:00,17:00～23:00)
- Morning, noon and evening (5:00～8:00，10:30～12:30,17:00～23:00)
- 5:00～23:00
- All the day

Electronic expansion valve

The advanced digital control technology of electronic expansion valve accurately controls the flow of refrigerant, so that the unit can be in the best operation state all year round, avoids excessive load of compressor in summer and liquid hammer damage in winter, and makes the operation of the unit more stable and efficient.

Power off memory function

In case of power failure during the operation of the unit, the unit will automatically restart when the power supply is restored and continue to work according to the state before power failure.

Antifreeze function

The unit has two-stage antifreeze function, which can effectively avoid the damage of waterway freezing caused by standby or shutdown of the unit at the ambient temperature below 0℃.

Auxiliary electric heating control

Two control modes: automatic and forced. Automatic operation: when the ambient temperature is low, the water temperature is low, or the unit fails, the auxiliary electric heating will operate automatically. In order to avoid excessive use of electric heating and save energy consumption, the electric heating will stop when the water temperature reaches 50℃. Forced operation: start and stop according to the water temperature set by the water tank.

Modular combined control

Multiple units can be installed in modular combination, controlled by one wire controller, and up to 16 units form a modular combination. In the modular combination, it can also automatically judge the number of units put into operation, rest more for long operation time and work more for short operation time, so as to prolong the service life of the unit.

Protection and fault self-diagnosis

In case of protection or fault during unit operation, self diagnosis, adjustment and repair will be carried out first. After repair, the unit will continue to operate and cancel the protection or fault code. If the unit cannot repair by itself, the protection or fault code will be reported all the time.

Multiple protection functions

- high voltage protection
- low voltage protection
- compressor exhaust temperature protection
- water flow protection
- inlet water temperature protection
- outlet water temperature protection
- power phase sequence and phase loss protection
- current protection

Timing function

The unit has two-stage timing function, which is convenient for users to set timing according to water consumption. There are also two kinds of timed aging: single effective, (daily) cycle effective.

Remote control / communication

- Stand-alone controls: the unit control system is equipped with remote start and stop contacts, and users can apply remote switch control according to needs.

- Building automation system (BAS) controls: equip BACnet, RS-485 communication interface with built-in Modbus communication protocol, which allows networked group control via system integration with BAS.

Main Components

The main components of Withair® water source heat pump are all selected famous brand products with excellent performance, so that the performance and reliability of the whole units are strongly guaranteed.

Some main components is as follows:

1. Compressors

Strong cooperation and creating high quality

2. Refrigerant accessories

3.Electric parts

HEAT PUMP MODEL AND SPECIFICATION

R410A — 220V/380V 50Hz

Model		WFYRS-11E1M	WFYRS-20E2M	WFYRS-42E2M
Power supply (V / Hz / Ph)		220～240/50/1	380～415/50/3	
Refrigerant		R410A	R410A	
Heating capacity	kW	12	20	42
Rated power input	kW	2.76	4.6	9.66
COP	W/W	4.35	4.35	4.35
Rated hot water output	L/h	235	428	900
Direct heating outlet water temp	℃	55	55	
Max tank water temperature	℃	55	55	
Circulating water flow	m^3/h	2.1	3.8	7.9
Noise	dB(A)	57	58	65
Water pipe connector	mm	G1"	G1"	G1-1/2"
Ambient condition	℃	-10～46	-10～46	
Net/Gross weight	kg	95/103	126/134	300/320
Unit dimensions(L×W×H)	mm	1160×510×1430	1160×510×1430	1445×740×1650

The data in the following table are tested under rated conditions as follows:
1. Heating test conditions: ambient air dry bulb temperature 20°C, wet bulb temperature 15°C;
2. Entering water temperature 15°C, leaving water temperature 55°C;
3. All specifications are subject to change without prior notice, please refer to the nameplate.

EVI R410A — 220V/380V 50Hz

Model		WFYRS-12E1PM	WFYRS-22E2PM	WFYRS-45E2PM
Power supply (V / Hz / Ph)		220～240/50//1	380～415/50/3	
Refrigerant		R410A	R410A	
Heating capacity	kW	13	22	45
Rated power input	kW	2.79	4.77	9.68
COP	W/W	4.66	4.61	4.65
Rated hot water output	L/h	257	470	960
Heating capacity(-12℃)	kW	6.24	11.44	23.4
COP(-12℃)	W/W	2.52	2.58	2.6
Heating capacity(-20℃)	kW	5.16	9.46	19.35
COP(-20℃)	W/W	2.16	2.21	2.23
Direct heating outlet water temp	℃	55	55	
Max tank water temperature	℃	60	60	
Circulating water flow	m^3/h	2.3	4.1	8.5
Noise	dB(A)	57	59	65
Water pipe connector	mm	G1"	G1"	G1-1/2"
Ambient condition	℃	-25～46	-25～46	
Net/Gross weight	kg	100/108	131/139	300/320
Unit dimensions(L×W×H)	mm	1160×510×1430	1160×510×1430	1445×740×1650

The data in the following table are tested under rated conditions as follows:
1. Heating test conditions: ambient air dry bulb temperature 20°C, wet bulb temperature 15°C;
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HEAT PUMP MODEL AND SPECIFICATION

R410A — 380V/3Ph/60Hz

Model		WFYRS-20E4M	WFYRS-42E4M
Power supply (V / Hz / Ph)		380/60/3	
Refrigerant		R410A	
Heating capacity	kW	20	42
Rated power input	kW	4.6	9.66
COP	W/W	4.35	4.35
Rated hot water output	L/h	428	900
Direct heating outlet water temp	℃	55	
Max tank water temperature	℃	55	
Circulating water flow	m^3/h	3.8	7.9
Noise	dB(A)	58	65
Water pipe connector	mm	G1"	G1-1/2"
Ambient condition	℃	-10～46	
Net/Gross weight	kg	126/134	300/320
Unit dimensions(L×W×H)	mm	1160×510×1430	1445×740×1650

The data in the following table are tested under rated conditions as follows:
1. Heating test conditions: ambient air dry bulb temperature 20°C, wet bulb temperature 15°C;
2. Entering water temperature 15°C, leaving water temperature 55°C;
3. All specifications are subject to change without prior notice, please refer to the nameplate.

EVI R410A — 380V/3Ph/60Hz

Model		WFYRS-20E4PM	WFYRS-42E4PM
Power supply (V / Hz / Ph)		380/60/3	
Refrigerant		R410A	
Heating capacity	kW	20	42
Rated power input	kW	4.34	9
COP	W/W	4.61	4.65
Rated hot water output	L/h	428	900
Heating capacity(-12℃)	kW	10.4	21.84
COP(-12℃)	W/W	2.58	2.6
Heating capacity(-20℃)	kW	8.6	18.1
COP(-20℃)	W/W	2.21	2.23
Direct heating outlet water temp	℃	55	
Max tank water temperature	℃	60	
Circulating water flow	m^3/h	3.8	7.9
Noise	dB(A)	58	65
Water pipe connector	mm	G1"	G1-1/2"
Ambient condition	℃	-25～46	
Net/Gross weight	kg	131/139	300/320
Unit dimensions(L×W×H)	mm	1160×510×1430	1445×740×1650

The data in the following table are tested under rated conditions as follows:
1. Heating test conditions: ambient air dry bulb temperature 20°C, wet bulb temperature 15°C;
2. Entering water temperature 15°C, leaving water temperature 55°C;
3. All specifications are subject to change without prior notice, please refer to the nameplate.

PROJECT CONNECTING WATER TANK

Tank model		Main water tank		Auxiliary water tank
		SX500	SXd500	SX500A
Volume	L	500	500	500
Auxiliary electric heater	W	/	6000+6000	/
Cold/hot water pipe connector	mm	G1-1/2"	G1-1/2″	G1-1/2″
Direct heating inlet connector (Pressure relief connector)	mm	G1″	G1″	G1″
Circulating inlet/outlet connector	mm	G1-1/2"	G1-1/2″	/
Drain connector	mm	G1/2″		
Net/Gross weight	kg	77/86	77/86	77/86
Unit dimensions（D×H）	mm	Ø700×1893	Ø700×1893	Ø700×1893

ENGINEERING APPLICATION DIAGRAM

Diagram 1 — Hot water system

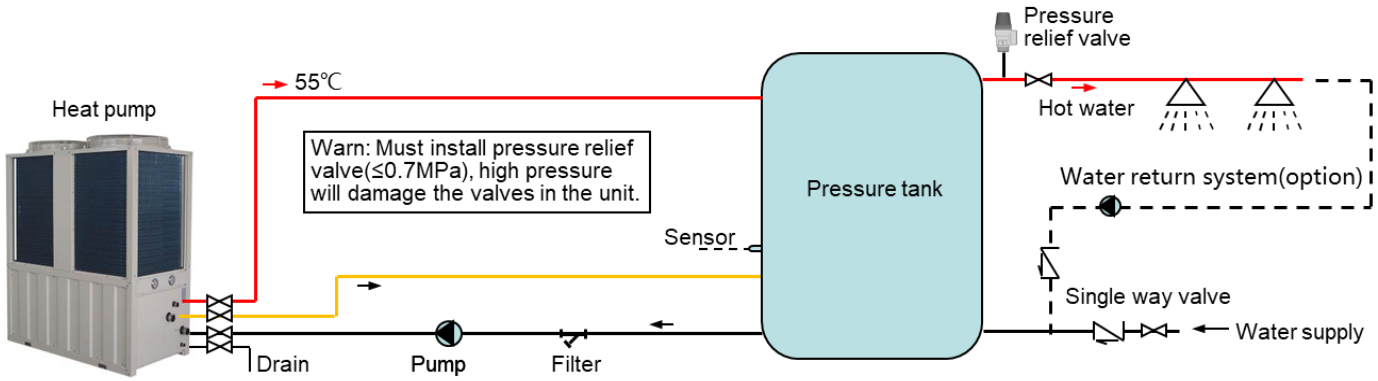


Diagram 2 — Hot water system(with auxiliary heater)

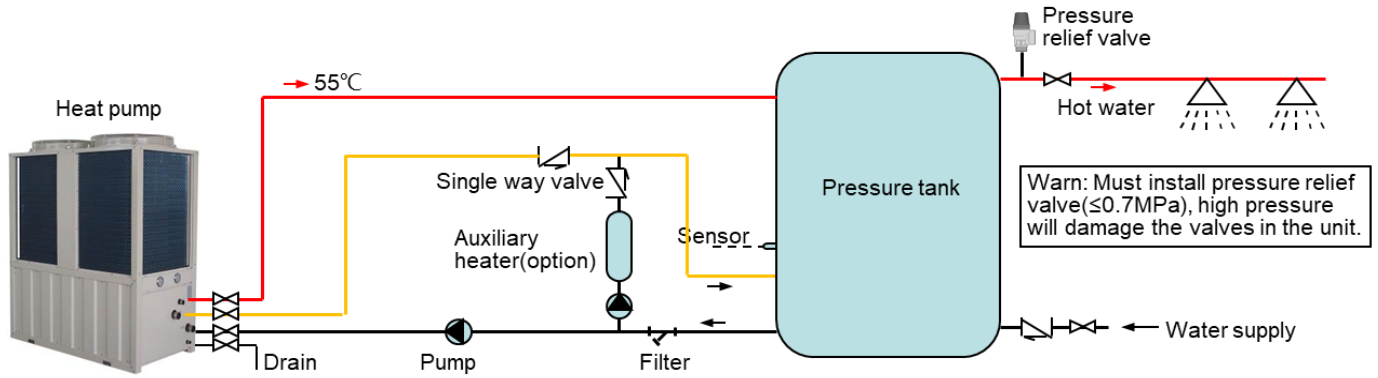
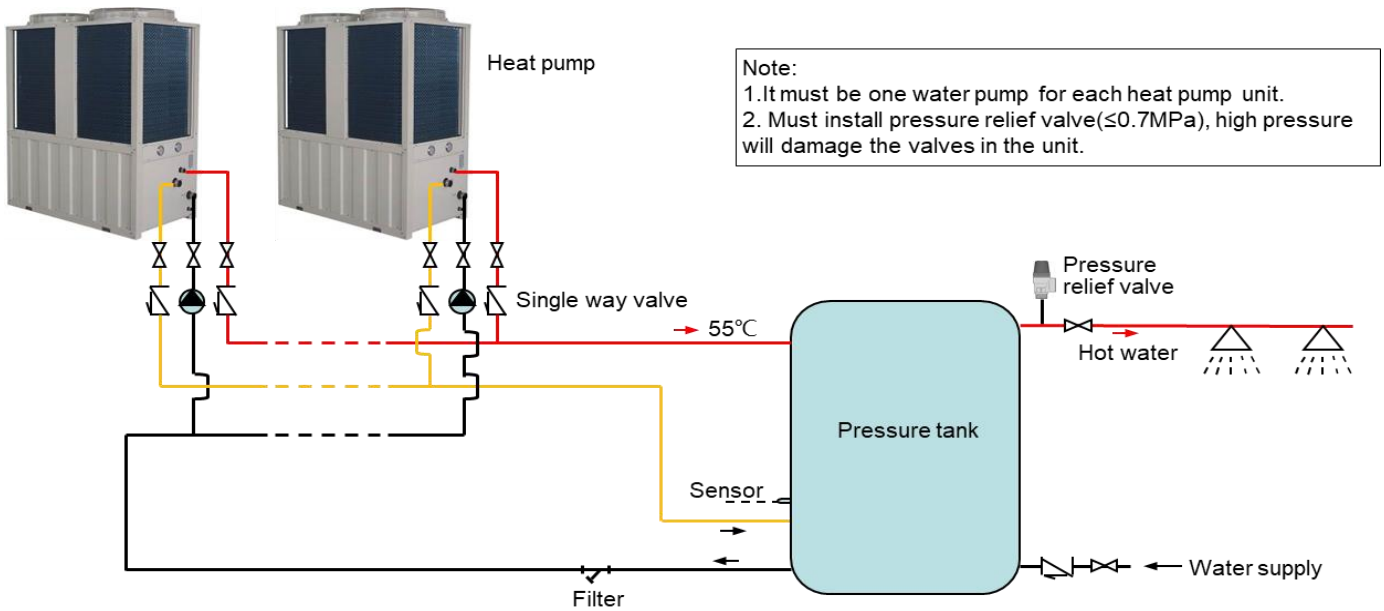


Diagram 3 — Modular hot water system



ENGINEERING APPLICATION DIAGRAM

Diagram 4 — Hot water system with series tanks

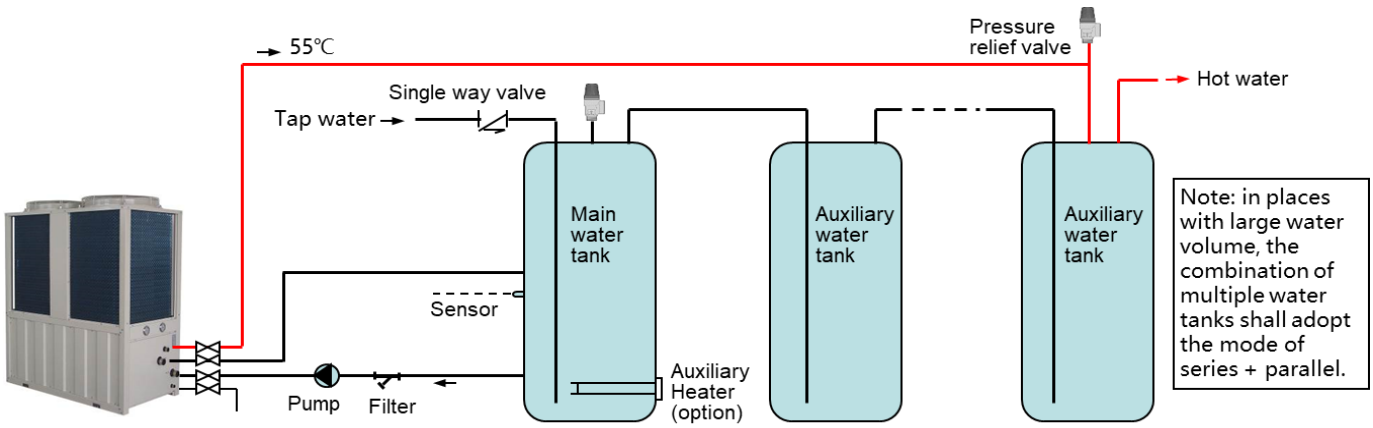
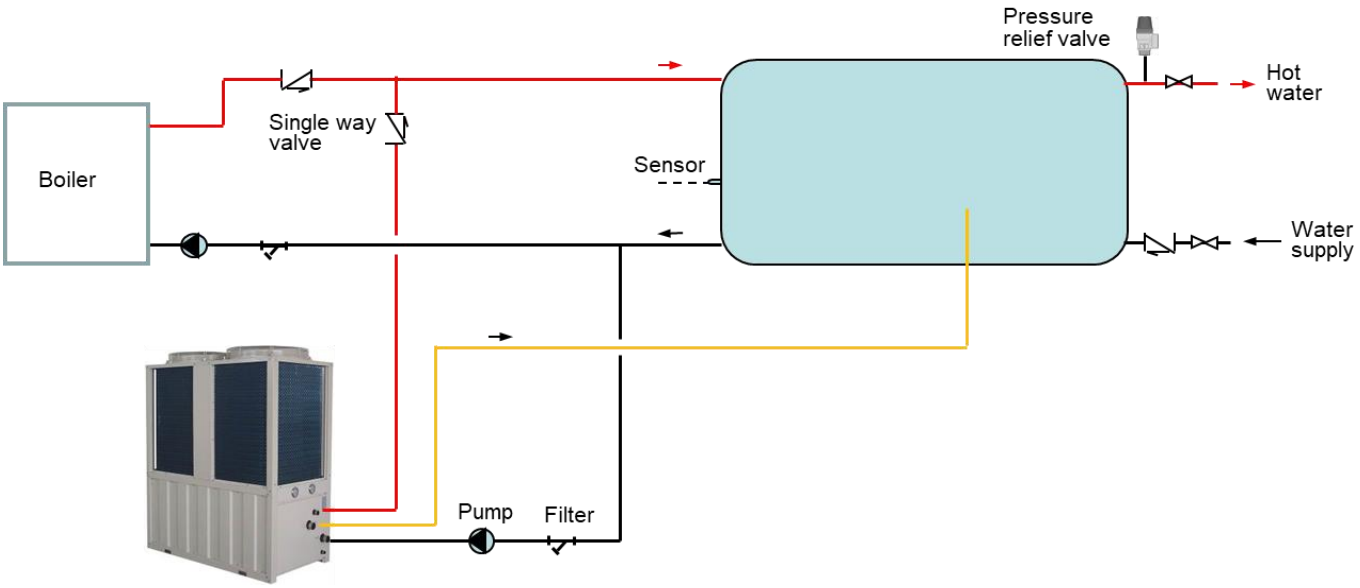


Diagram 5 — Connected to the original boiler hot water system



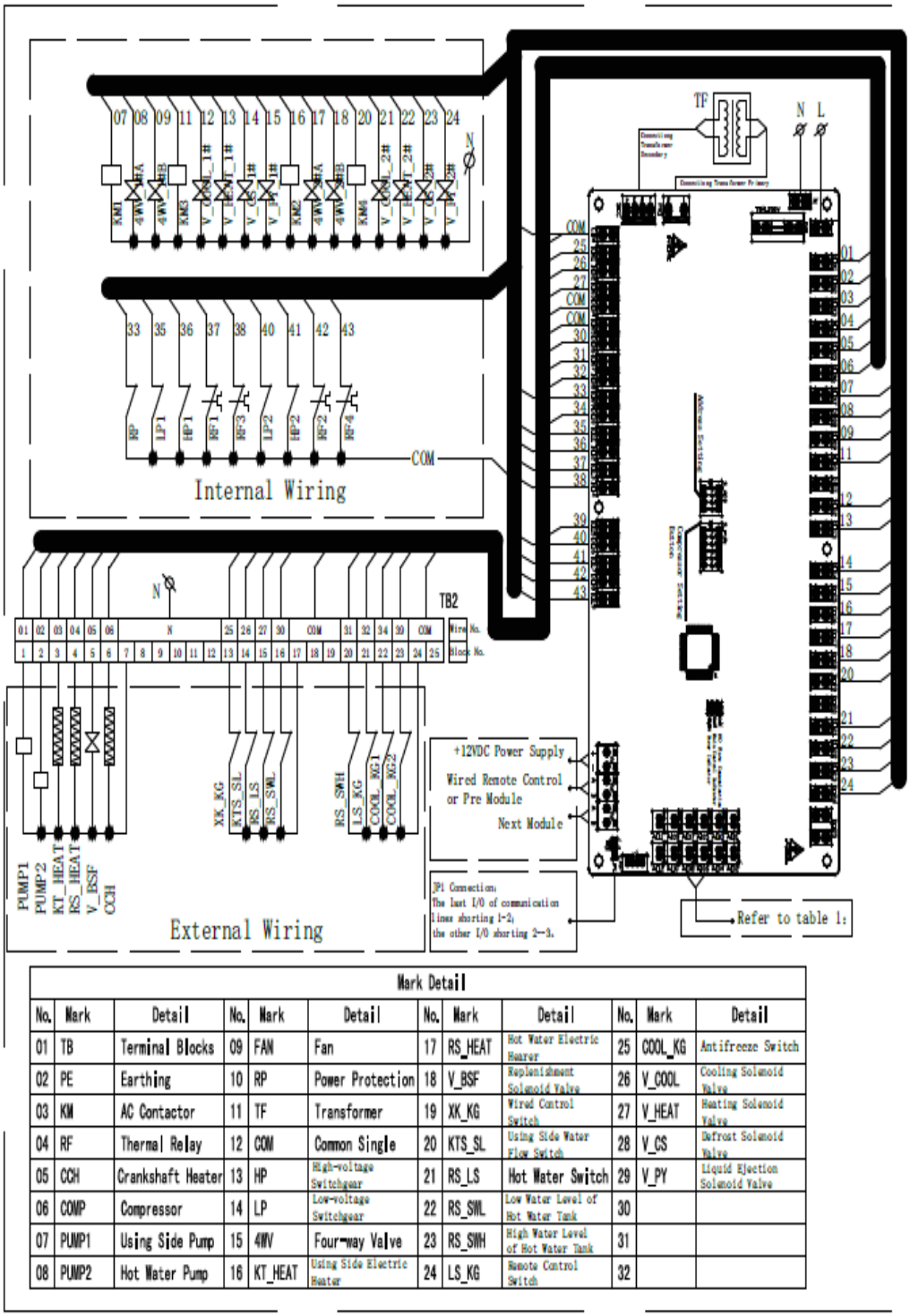
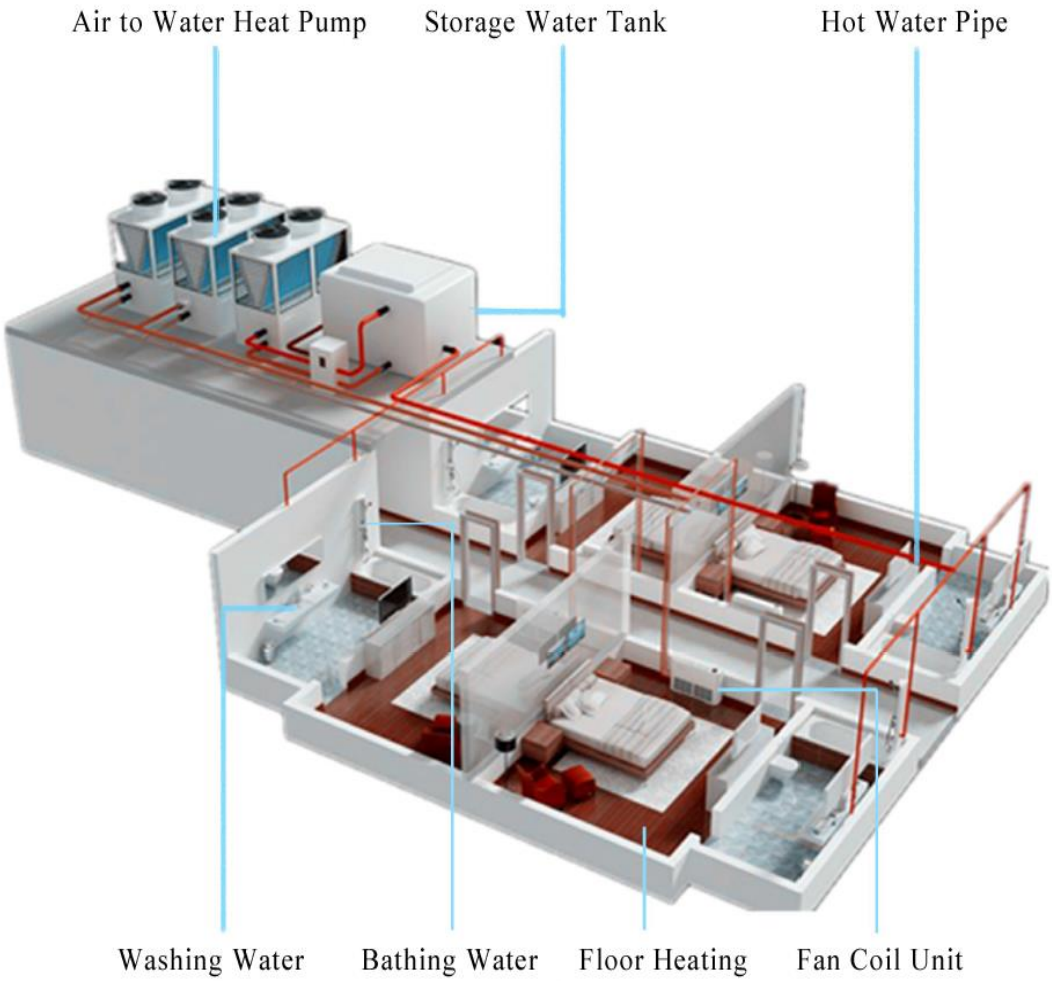


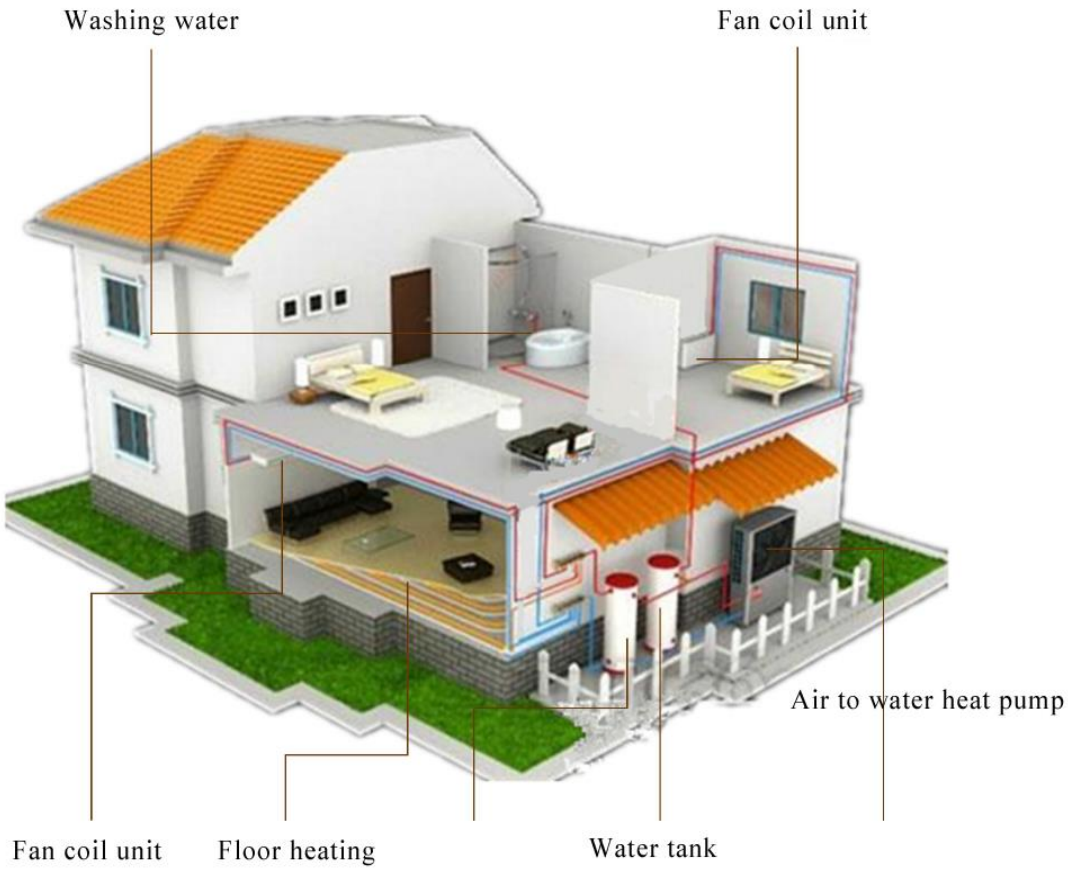
Table 1: Sensor Installation	
Block	Sensor Location
AI01	1# Fin Temp. Sensor
AI02	2# Fin Temp. Sensor
AI03	1# Exhaust Temp. Sensor
AI04	2# Exhaust Temp. Sensor
AI05	1# Using Side Outlet Water Temp.
AI06	2# Using Side Outlet Water Temp.
AI07	1# Outlet How Water Temp.
AI08	2# Outlet How Water Temp.
AI09	Using Side Inlet Water Temp.
AI10	Outdoor Ambient Temp.
AI11	Temp.Sensor of How Water Tank
Notes: 1、2# Using side outlet temp. 2# outlet hot water temp. are avalibel only to double circle system;	

S-ADD Button Setting				
SET State				Module No.
1	2	3	4	
OFF	OFF	OFF	OFF	1# Main Module
ON	OFF	OFF	OFF	2# Sub-module
OFF	ON	OFF	OFF	3# Sub-module
ON	ON	OFF	OFF	4# Sub-module
OFF	OFF	ON	OFF	5# Sub-module
ON	OFF	ON	OFF	6# Sub-module
OFF	ON	ON	OFF	7# Sub-module
ON	ON	ON	OFF	8# Sub-module
OFF	OFF	OFF	ON	9# Sub-module
ON	OFF	OFF	ON	10# Sub-module
OFF	ON	OFF	ON	11# Sub-module
ON	ON	OFF	ON	12# Sub-module

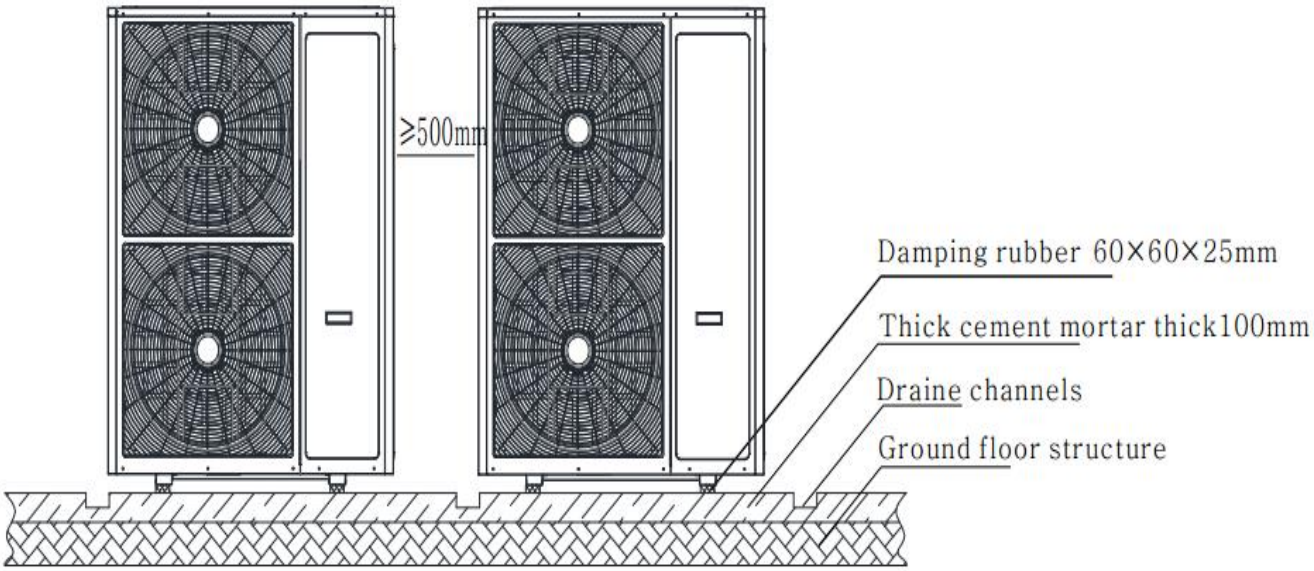
Mark Detail											
No.	Mark	Detail	No.	Mark	Detail	No.	Mark	Detail	No.	Mark	Detail
01	TB	Terminal Blocks	09	FAN	Fan	17	RS_HEAT	Hot Water Electric Heater	25	COOL_KG	Antifreeze Switch
02	PE	Earthing	10	RP	Power Protection	18	V_BSF	Replenishment Solenoid Valve	26	V_COOL	Cooling Solenoid Valve
03	KM	AC Contactor	11	TF	Transformer	19	XK_KG	Wired Control Switch	27	V_HEAT	Heating Solenoid Valve
04	RF	Thermal Relay	12	COM	Common Single	20	KTS_SL	Using Side Water Flow Switch	28	V_CS	Defrost Solenoid Valve
05	CCH	Crankshaft Heater	13	HP	High-voltage Switchgear	21	RS_LS	Hot Water Switch	29	V_PY	Liquid Ejection Solenoid Valve
06	COMP	Compressor	14	LP	Low-voltage Switchgear	22	RS_SWL	Low Water Level of Hot Water Tank	30		
07	PUMP1	Using Side Pump	15	4WV	Four-way Valve	23	RS_SWH	High Water Level of Hot Water Tank	31		
08	PUMP2	Hot Water Pump	16	KT_HEAT	Using Side Electric Heater	24	LS_KG	Remote Control Switch	32		

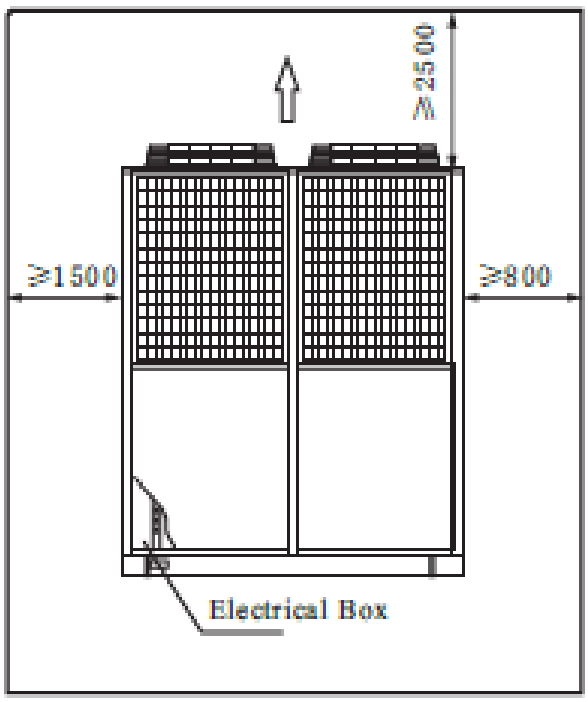
S-FUN 拨码功能设置			
No.	State	Function	Detail
1	OFF	Unit Type	Cooling Only Unit
	ON		Heat Pump Unit
2	OFF	Hot Water	No
	ON		Yes
3	OFF	Hot Water Only	No
	ON		Yes
4	OFF	Water Circle Type	Double Circle
	ON		Single Circle
5	OFF	1# system heat recovery type	Waste Heat
	ON		Full Heat Recovery
6	OFF	2# system heat recovery type	Waste Heat
	ON		Full Heat Recovery

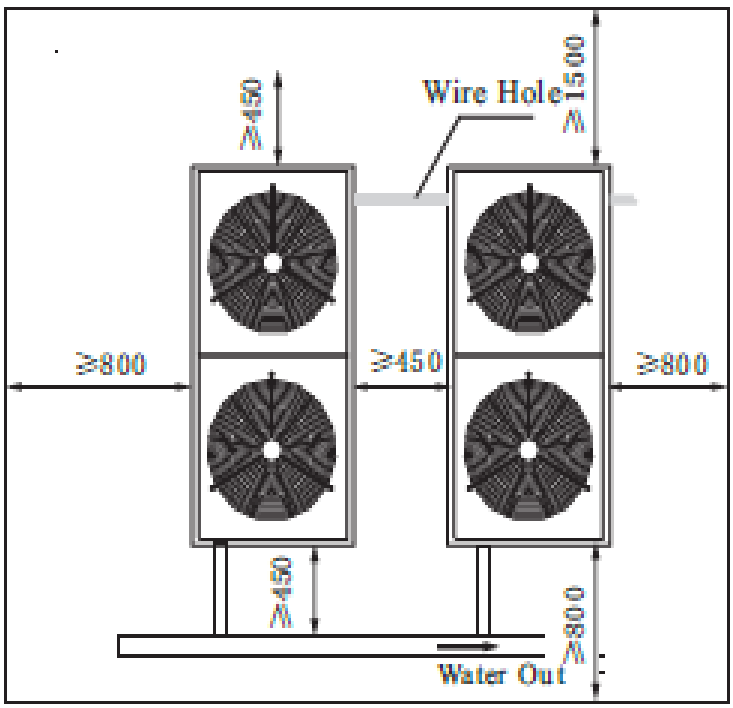

Air to Water Heat Pump
Storage Water Tank
Hot Water Pipe
Washing Water
Bathing Water
Floor Heating
Fan Coil Unit


Washing water
Fan coil unit
Air to water heat pump
Fan coil unit
Floor heating
Water tank

☆ Installation location







Notes:

A). Near to in the indoor terminal, reducing water system resistance losses.
B). Near to the power and convenient for wiring connection.
C). Near to the water source and convenient for installation.
D). Strong enough to support unit weight and running vibration.
E). Enough space in order to install, repair, maintenance.
F). Water source not near to the dirty and corrosive fluid, keep pure water, water chlorinity does not exceed 25ppm

Assembly and Test

The unit shall be completely factory assembled, pre-charged and wired. Complete unit must be test operated at factory prior to shipment.

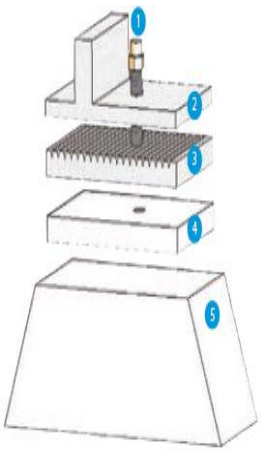
Refrigerant System

Each refrigerant circuit shall include a high-efficiency scroll compressor, high pressure control, low pressure control, TXV, and refrigerant pressure gauge connections.

Electrical

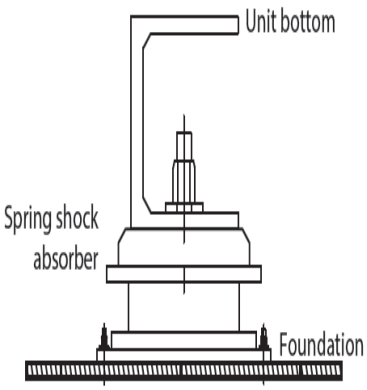
The unit shall have 24-volt electromechanical controls and include compressor contactors, 24-volt transformer, terminal strip, compressor staggered start, fault lockout circuit, compressor anti-short cycle, low pressure switch by-pass timer, LED for compressor ON/OFF and fault status, and the necessary relays for compressor and reversing valve operation.
The reversing valve is energized in the cooling mode.

(1) Be sure to take the base preparation and structure into consideration seriously during installation, particularly on rooftop
installations in order to avoid noise and vibration. Consulting the building designer before conducting installation is recommended.
(2) A drainage ditch should surround the base to ensure dewatering occurs
(3) Anti-vibration pad is to be placed between the base frame and foundation in order to avoid vibrations and unnecessary noise, and make sure the unit is horizontal during installation.
(4) The maximum altitude difference (levelness) should be within 3mm for the chiller base.
(5) The base should be raised by 100mm.
(6) The installation base of the unit must be concrete or steel structure, which can bear the running weight of the
machine. The top should be horizontal. It is ideal to prepare a drainage ditch around installation base.
(7) Put the steel plate and anti-vibration pad in the correct position. Finish the installation of the unit and the
foundation bolt before secondary concreting. The foundation bolt should protrude 100mm.
(8) Spring isolators are specified on the sales order as an option.

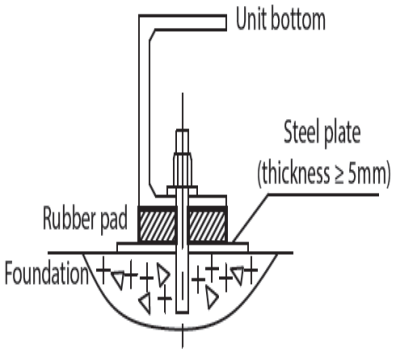


Typical Isolation structure

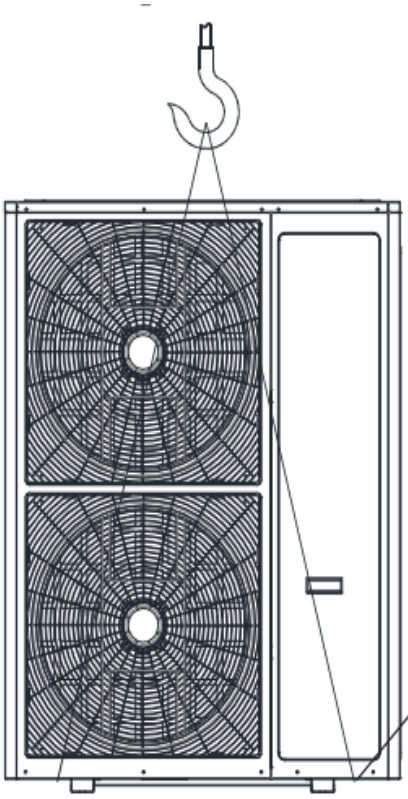
1 Anchor Bolt
2 Chiller Frame Base
3 Rubber Pad
4 Steel Base Plate
5 Concrete Base



Spring isolator

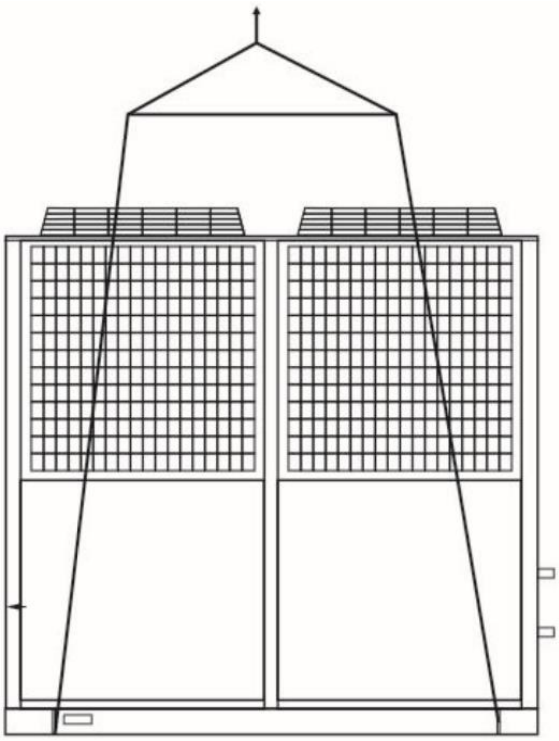


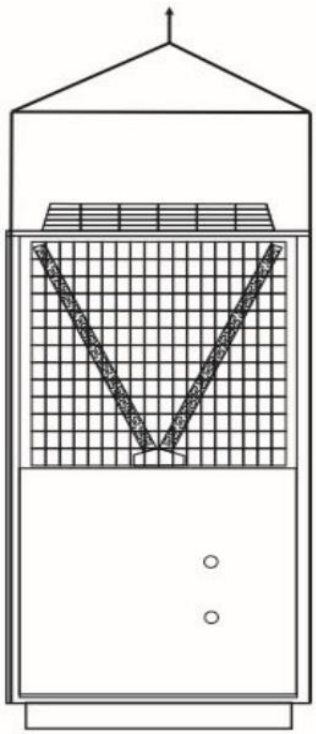
Rubber pad



Hoisting schematic

To prevent the unit surface scratches, deformation, it should be at least 50 mm thick mat of wood, cloth or cardboard between the place of unit and Sling contact points. When lifting, do not stand any person under the unit.





1. The preparation

1) After arriving the installation site, check all the items of the unit carefully according to the packing list if there are damage, lack of parts or damage during transport, notify the sales department.

2) The user must provide a rigid non-deforming foundation or concrete footings, based on the size of the unit four positioning hole; the foundation of the unit can also be framework structure, framework should be placed on main beam or column, and be capable of bearing the weight 150% heavier than the unit. The horizontal level should have no slope.

3) For easy handling, users should use the crane, the machine should properly protected by soft material on the point of force applied, and also be in balanced status during handling to avoid possible damage.

4) Choose the Installation Place

Units can be installed indoor or outdoor, should consider the following factors：

a) Installation place should be capable of bearing the weight 150% heavier than the unit. The horizontal level should have no slope.
b) Should keep enough space surrounding and on the top of the machine for access of maintenance.
c) Should have drain in the surrounding of the machine for release the water for seasonal stop of machine.

5) Foundation reference

a) The foundation should be concreted structure or frame of steel, with a plane surface
b) 10-20mm isolator for shock absorption should be placed between the unit and foundation.
c) Foundation design can based on the machine net weight.
d) Fix the unit with φ16 foundation bolt
e) foundation diagram

2. Maintenance

First maintenance before seasonal running:

1.Check whether the wiring is loose, breakage before operation.
2.Check whether there is gas leakage
3.Check whether there are crack, flat, blockage and tilt of exhaust pipe
4.Check and clean the filter
5.Ensure water system without fracture, jam, etc.

Operation after using season is over

1.Stop running and switch off the unit, cut off the power.
2.Let out the water in the system in winter for cooling model so as not to freeze to damage. Unit using in winter shall be powered on always so as to run the anti-freeze function

Benefits At A Glance

Withair® designed the complete line of Water to Water Heat Pumps for high efficiency, individually-zoned comfort control in offices, schools, assisted living facilities, manufacturing facilities and other commercial buildings. Our reputation for outstanding reliability and quiet operation has been reinforced in thousands of successful installations.

Using feedback from building owners, consulting engineers, contractors and service engineers, we designed the latest version Water Source Heat Pumps to give you maximum flexibility to design, install, operate and maintain the ideal water source heat pump system for your building project. And we incorporated non-ozone depleting R-410A refrigerant, which–along with high Energy Efficiency Ratios (EER's)–helps preserve our environment and precious energy resources.

For Building Owners and Managers

- Quiet operation
- Easy to maintain
- Reliable operation
- Reduces operating expenses
- Environmentally sound refrigerant
- Building automation system compatible

For Consulting Engineers

- HFC refrigerants
- High-efficiency optimization
- Ideal for replacement projects
- Compliant local code requirements
- Quick response technical support services

For Contractors

- 100% run-tested
- Compact footprint
- Diagnostic controls
- Easy to break down
- Ideal for replacement
- Reliable performance
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