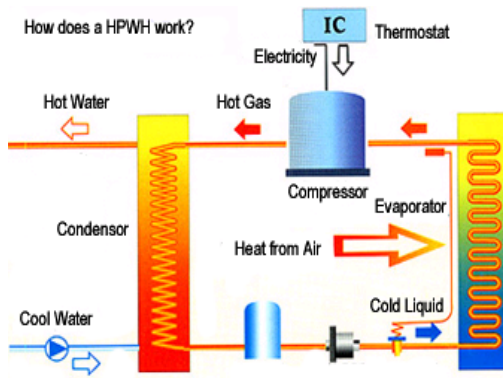


## How does a HPWH work?

Heat Pump Water Heater (HPWH) is a promising technology that uses the same mechanical principles as refrigerators and air conditioners to generate hot water. Unlike conventional electricity and fossil-fuel-fired water heaters, HPWHs take heat from the surrounding air and transfer it to the water in the tank.



The heat pump works by taking heat from the surrounding air and using it to heat low pressure liquid refrigerant in the heat pump's evaporator, vaporizing the liquid. The refrigerant then passes through the compressor, which raises the refrigerant pressure and thus the temperature as well. The heated refrigerant gas passes through the heat pump condenser, where it gives off its heat to the water and condenses back into the liquid state. The

liquid refrigerant now passed through an expansion valve where the pressure is reduced and the cycle starts over.

Heat pumps mainly consist of a compressor, fan, evaporator and the heat exchanger. The compressor requires electricity to compress the refrigerant and vaporize it, and the fan requires a small amount of electricity to continually blow air across the evaporator coils when the unit is operating. The only electricity cost is the operation of the compressor and the fan in order to collect the free heat and pump it to the hot-water.


## Why a heat pump in preference to a traditional water heater

HPWH/Traditional Water Heaters Economy Comparisons						
Heating 1000kg water from 20°C to 55°C requires 35000Kcal						
Heater Type	Coal Boiler	Fuel Boiler	Gas	Resistance	Electric-boosted Solar	HPWH
Energy Source	Coal	Diesel	Gas	Electricity	Solar & Electricity	Electricity & Air
Pollution	Very High	High	Moderate	None	None	None
Life Span	5 years	8 years	8 years	8 years	8 years	15 years
Hazard	Moderate	High	Very High	Moderate	Moderate	None
Fuel Value	5000kcal/kg	8550kcal/kg	26000kcal/kg	860kcal/kwh	860kcal/kwh	860kcal/kwh
COP value	0.55	0.65	0.65	0.96	3.3	3.8
Heat Value	2750kcal/kg	6630kcal/kg	16900kcal/kg	826kcal/kwh	2838kcal/kwh	3268kcal/kwh


Unit Energy Cost	¥0.70/kg	¥3.50/kg	¥12.8/m <sup>3</sup>	¥0.66/kwh	¥0.66/kwh	¥0.66/kwh
Energy Consumption	12.7kg	6.3kg	2.07m <sup>3</sup>	42.37kwh	12.3kwh	10.7kwh
Energy Cost per ton	¥8.89	¥22.05	¥26.51	¥27.96	¥8.12	¥7.06
Annual Energy Cost	¥3200	¥8100	¥9700	¥10200	¥2930	¥2540
Annual Labor Cost	¥4000	¥2000	¥2000	0	0	0
Annual Operation Cost	¥7200	¥10100	¥11700	¥10200	¥2930	¥2540

**Remarks:**

- 1) 95 rainy and cloudy days per year in the case of electric-boosted solar water heater.
- 2) ¥ is the symbol of China's currency RMB. Current exchange rate is 1USD=8.04RMB.
- 3) Above data are based on the energy market in Guangdong, China. The data are for reference only. Actual cost analysis should be conducted according to local markets.
- 4) According to the table:  
HPWH is even 13% more energy saving than electric-boosted solar water heater;  
Retrofitting solar water heating system with HPWH-boosted system can cut operation cost by 75%.



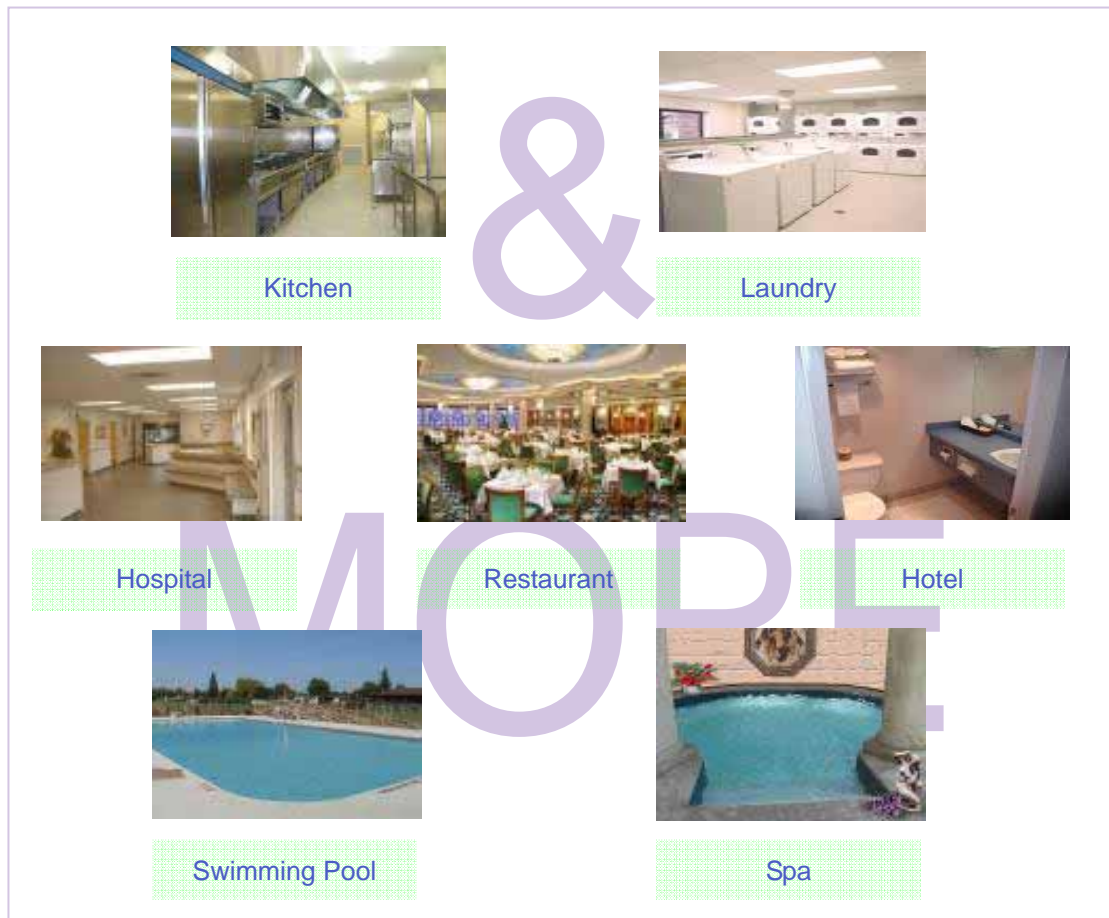
VS



1. Easier installation and requires much less installation space.
2. Heat pump will work at night.
3. Heat pump can deliver more hot water over the day.
4. Heat pump works well in all weather conditions.
5. In a commercial installation of HPWH the air duct can be connected to output of air conditioning system to give improved performance.
6. Able to deliver free cooled air simultaneously to satisfy additional cooling requirements.

## Applications

Heat pump water heaters are ideal in applications where there is a steady simultaneous need for cool air and hot water. They are widely used in hotels, college dormitories, restaurants, hospitals, swimming pools/spas, under-floor house heating and radiator heating.



### **SIRAC, the biggest & most quality-reliable HPWH in China**

In 2003, SIRAC, one of the pioneering commercial air conditioner manufacturers in China, began to design, manufacture and sell heat pump water heaters. The energy cost rise in recent years makes energy-saving products more and more popular, and this trend will not cease for the years to come. Thanks to the experience and expertise we have accumulated in heat pump field in the last decade, we have built up a reputation as the biggest and most quality reliable commercial HPWH manufacturer in China. Producing its own steel plate case, heat exchangers and copper tube aluminum fin coils, SIRAC promises not only better full-scale control of unit quality but also lowest costs in the market.

In 2005, Sirac began to market its heat pumps in the global market. Till today we have built up a distributing network in over 20 countries. Our heat pumps are CE mark approved, and a UL certification application is already underway.



**SIRAC HPWH**  
**Assembly**  
**Workshop**

**Unit**  
**Inside**  
**View**



**HPWH**  
**Warehouse**

**Project  
Installation**



**CE Certificates**

**SIRAC Air Enthalpy Difference Lab** is used to test unit performance and capacity under various controlled operating conditions. SIRAC HPWHs work reliably even in severe conditions with a chilling temperature as low as minus 15°C. In freezing conditions the unit removes accumulated coil frost in just seconds.



## Comments from Distributors

- The first (air source) installation is running very well, even in chilling conditions -19 ° C.
- I have to tell you, we have temperatures in our warehouse at 5c, yet your little 1,000 watt heat pump is managing to maintain my office temperature through under floor heating and a fan convector at 39c as of 12pm today while my locally made heat pump in my home is all frozen up on the fan coil side exposed to the air in the loft, so have had to shut it down and use the gas boiler. Also the local model is also not coping with such low temperatures. What is it you have developed that these local companies have not? What makes your unit work in very cold temperatures, and there's go into a frost cycle? The local model is struggling to heat a tank of 300 litres to above 30c, when it was 15c, we got 55c.
- The first installation we did by us on our firma was installation of LSQ02CR. Now the air temperature is -5 to +5oC in our town. We heat by LSQ02CR, but have a second source -- gas boiler. If the ambient temperatures go under -10oC we switch on the gas boiler.....it seems like good installation, no problems with it.
- I have the Heat Pump now running well at our test facility here at our office. I am very happy with the performance so far but I will continue testing until I leave for China at the end of this week.
- The air to water HP is in use, and we haven't received any bad feedback from the costumer.
- You will be pleased to know that we have yesterday successfully demonstrated to a number of influential people your heat pump model LSQ015CR. They are very happy with the performance so I am sure this will lead to orders very soon. We have this heat pump connected to a 425 litre storage tank which was heated to 55°C in just under 3 hours.

## SIRAC Heat Pump Water Heater

### Commercial Heat Pump – Top Air Discharge

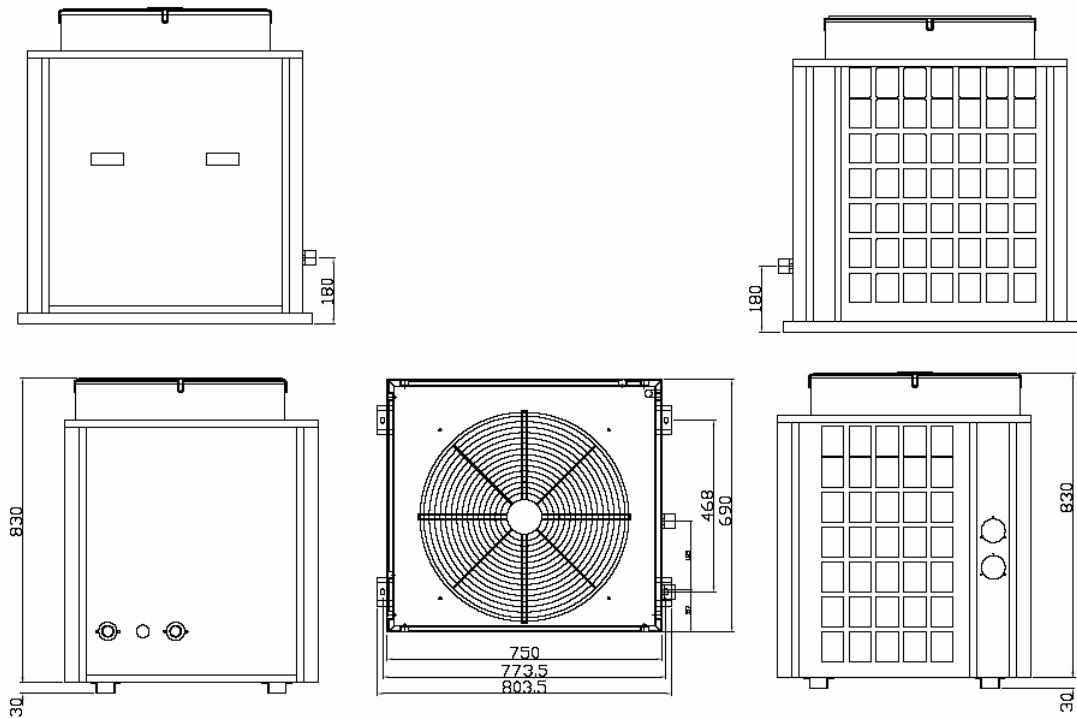


Features :

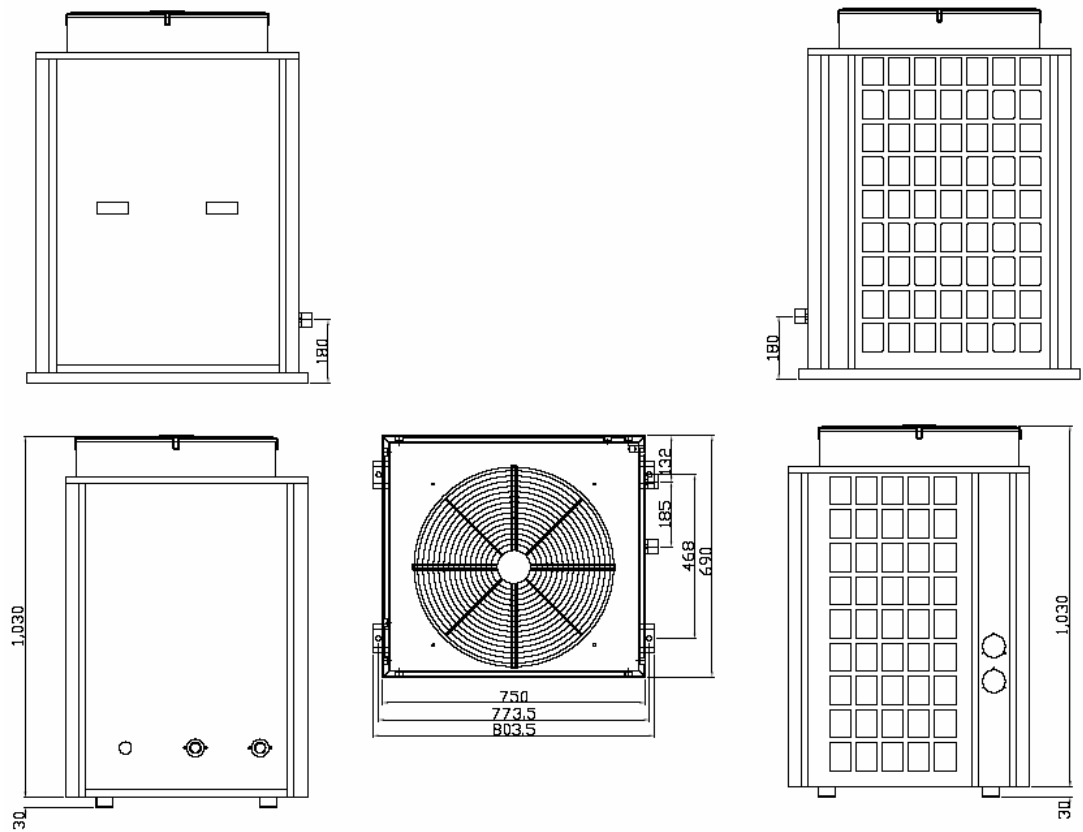
- 1 . Rated Conditions : ambient air temperature at 20 , inlet water temperature at 20
- 2 . LCD display control panel
- 3 . Automatic unit on/off timer clock
- 4 . Insufficient water flow and high/low pressure protection
- 5 . Users can regulate the outlet water temperature in accordance with different project requirements.
- 6 . Almost no human attendance is required once the unit begins to work.



Model	LSQ03R	LSQ05R	LSQ10R
Outlet Water Rated Temp.( )	55		
Outlet Water Max. Temp( )	60		
Heating Capacity(KW)	10.6	17.1	35
Rated Power Input(KW)	2.8	4.5	9.2
Power Supply (V/PH/HZ)	220(380)/1/50(60)	380/3/50(60)	
Compressor Type	Copeland Scroll		
Compressor Qty	1	1	2
Cabinet Material	Powder Coated Steel Plate ( 304 Stainless Steel Plate optional)		
Refrigerant Flow Restriction	Alco Thermal Expansion Valve		
Defrosting Device	4-way Reversing Valve		
Refrigerant Type	R417A		
Pipe size (inch)	1		1.25"
Package Dimensions(mm)	Length	830	1500
	Width	710	745
	Height	885	1085
Ambient Air Range	-20 -45		
Air Discharge Direction	Top		
Weight(kg)	115	150	280
Quantity per 20FT cntr	42	42	24

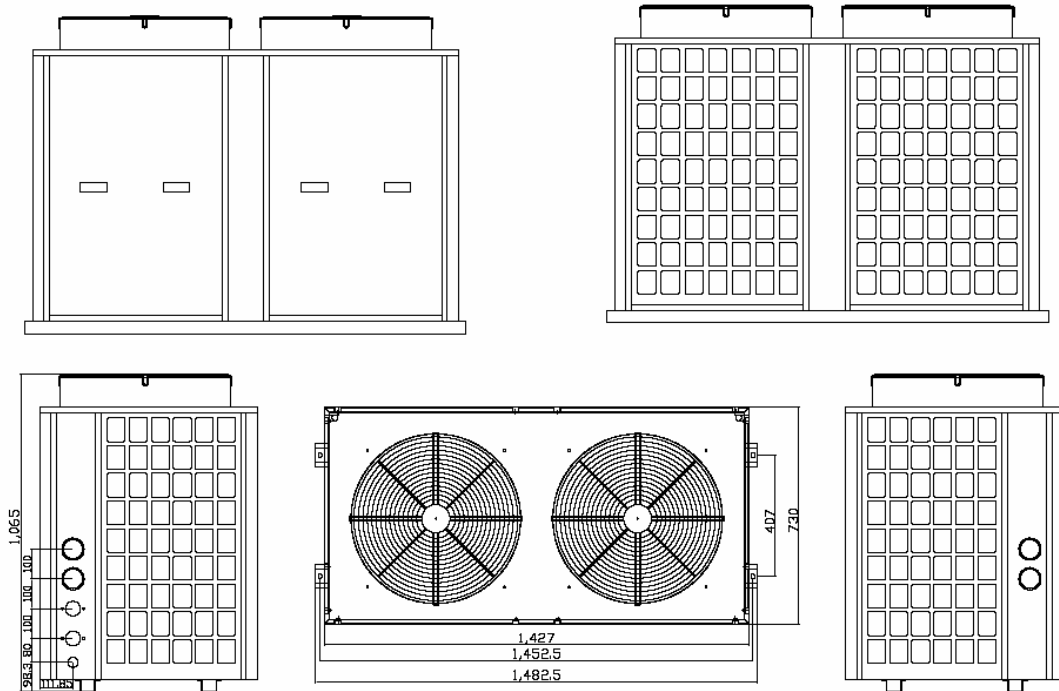


Dimension Drawing LSQ03R



Dimension Drawing LSQ05R





Dimension Drawing LSQ10R

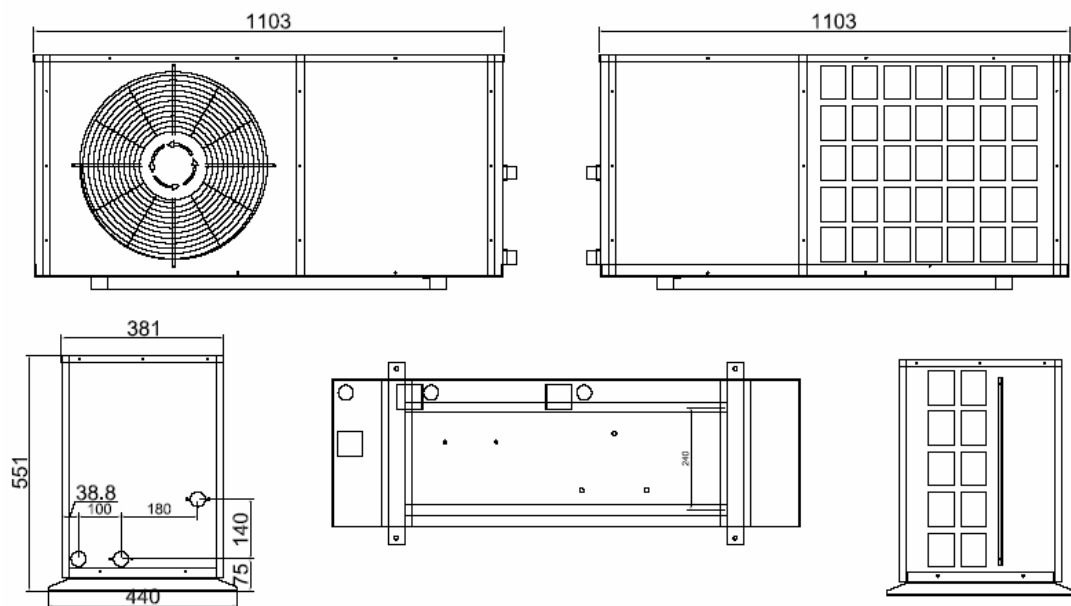
### Commercial Heat Pump – Side Air Discharge Series



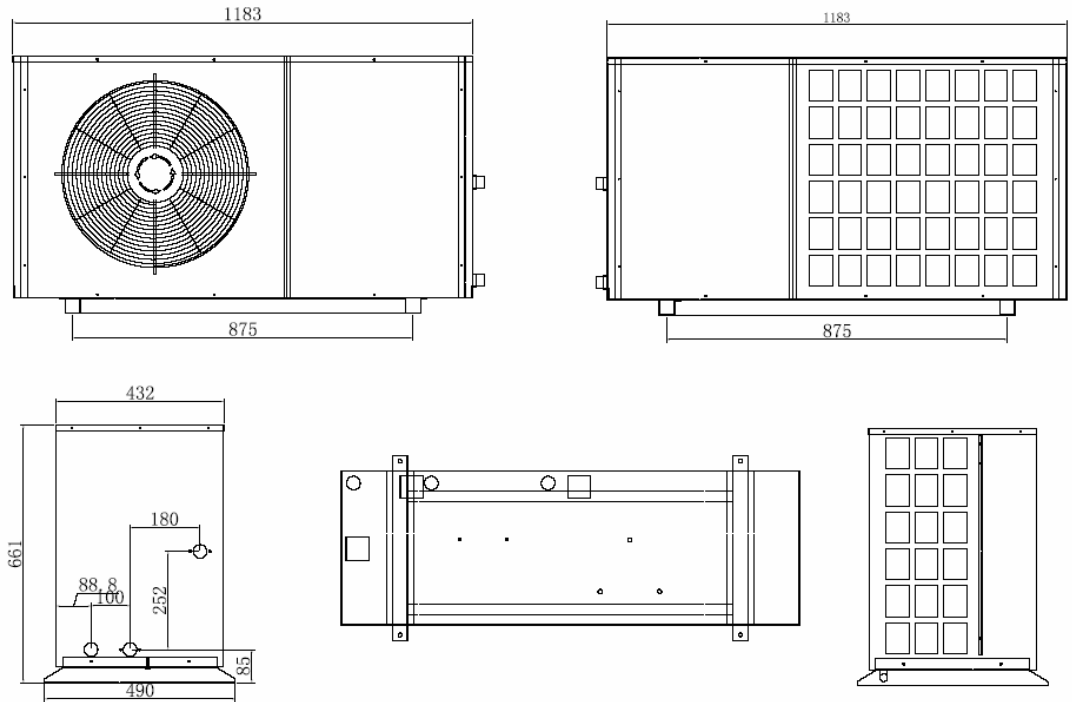
#### Features :

- 1 . Rated Conditions : ambient air temperature at 20 , inlet water temperature at 20
- 2 . LCD display control panel
- 3 . Automatic unit on/off timer clock
- 4 . Insufficient water flow and high/low pressure protection
- 5 . Users can regulate the outlet water temperature in accordance with different project requirements.
- 6 . Almost no human attendance is required once the unit begins to work.

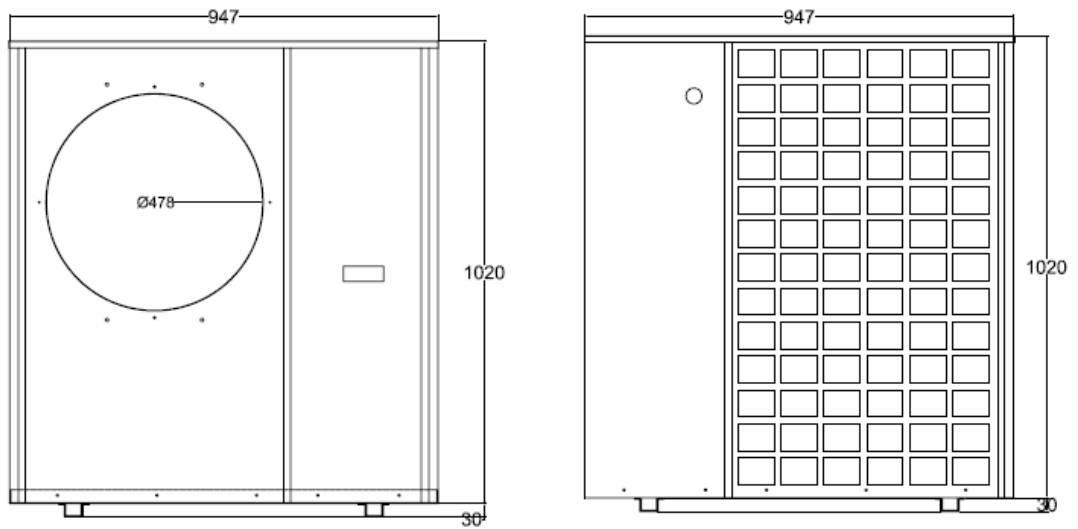
Model	LSQ008CR	LSQ015CR	LSQ02CR	LSQ03CR	LSQ04CR	LSQ05CR
Outlet Water Rated Temp.( )	55					
Outlet Water Max. Temp( )	60					
Heating Capacity(KW)	2.6	5	6.9	10.6	14	17.1
Rated Power Input(KW)	0.7	1.32	1.82	2.8	3.7	4.5
Power Supply (V/PH/HZ)	220/1/50(60)			220(380)/1/50(60)		380/1/50(60)
Compressor Type	Hitachi Rotary			Copeland Scroll		
Compressor Qty	1	1	1	1	1	1
Cabinet Material	Powder Coated Steel Plate ( 304 Stainless Steel Plate optional)					
Refrigerant Flow Restriction	Alco Thermal Expansion Valve					
Defrosting Device	4-way Reversing Valve					
Refrigerant Type	R417A					
Pipe size (inch)	3/4"			1"		
Package Dimensions(mm)	Length	922	982	1148	1000	1040
	Width	320	402	456	500	542
	Height	590	695	580	1080	1280
Ambient Air Range	-20 -45					
Air Discharge	Side					
Weight(kg)	40	60	70	115	130	150
Quantity per 20FT ctnr	168	108	104	48	48	22

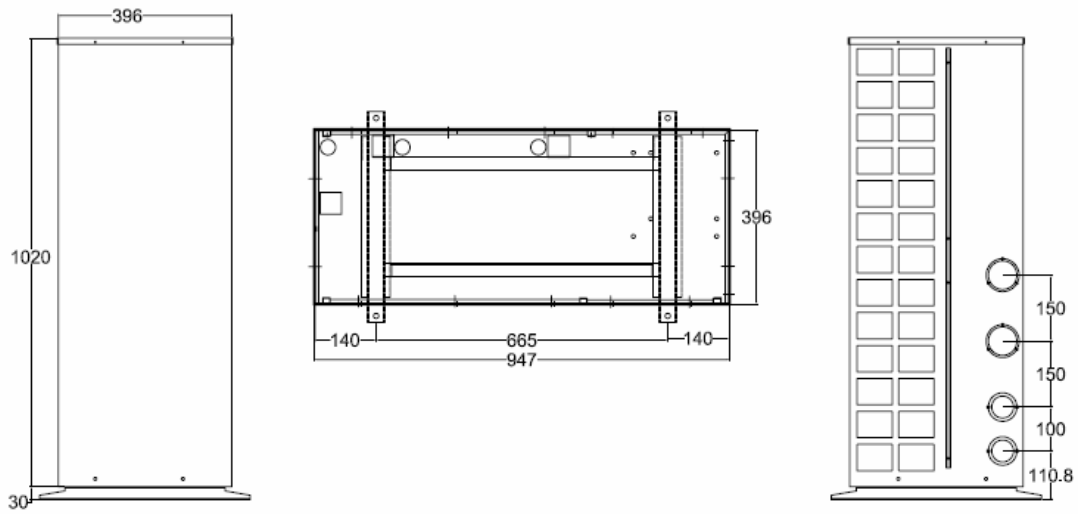


Dimension Drawing LSQ02CR

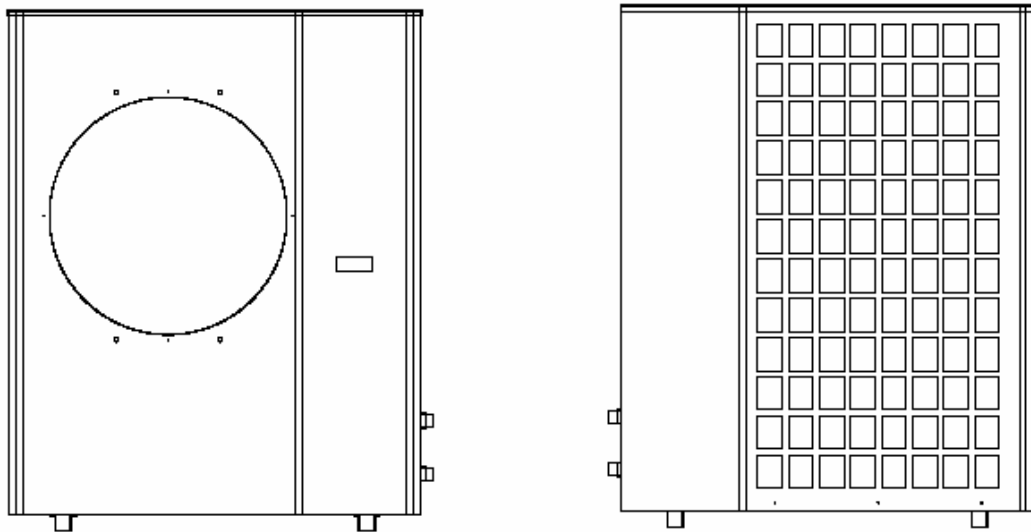


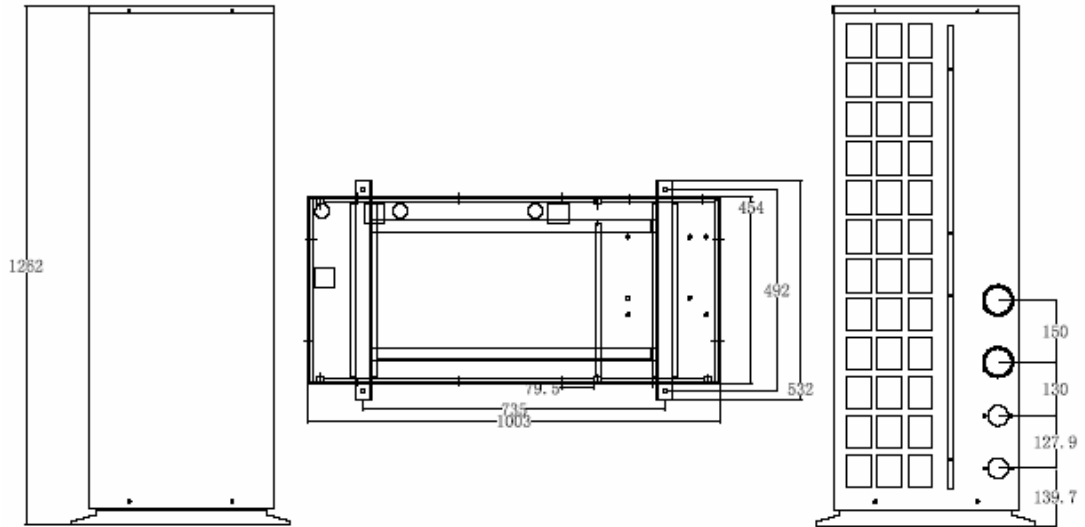
Dimension Drawing LSQ025CR





Dimension Drawing LSQ03CR LSQ04CR





Dimension Drawing LSQ05CR

### Ducted HP Water Heater



Model	KS015R	KS02R	KS03R	KS05R
Outlet Water Rated Temp.( )	55			
Outlet Water Max. Temp( )	60			
Nominal Heating Capacity(KW)	4.8	6.5	10.6	17.1
Nominal Cooling Capacity(KW)	3.5	4.8	7.8	12.6
Rated Power Input(KW)	1.25	1.7	2.8	4.5
Power Supply (V/HP/Hz)	220/1/50(60)			380/3//50(60)
Compressor Type	Hitachi Rotary			Copeland Scroll
Compressor Qty	1	1	1	1
Cabinet Material	Powder Coated Steel Plate ( 304 Stainless Steel Plate optional)			
Refrigerant Flow Restriction	Alco Expansion Valve			
Defrosting Device	4-way Reversing Vavle			
Fan Type	Coaxial			
Refrigerant Type	R417a			

Pipe size (inch)	3/4"		1	
Package Dimensions(mm)	Length	670	1100	
	Width	460	460	
	Height	400	450	
Ambient Air Range	-20 -45			
Air Discharge	Side			
Weight(kg)	95	130	150	180

**Features :**

- 1 . Rated Conditions : ambient air temperature at 20 , inlet water temperature at 20
- 2 . LCD display control panel
- 3 . Automatic unit on/off timer clock
- 4 . Insufficient water flow and high/low pressure protection
- 5 . Users can regulate the outlet water temperature in accordance with different project requirements.
- 6 . Almost no human attendance is required once the unit begins to work.
- 7 . Ceiling mounted installation to save space
- 8 . Coaxial fan creates a high static pressure and hence the cooled air can be pushed far to a place where there is a cooling load.

**Pool Heat Pump**



Model	LSQ015PR	LSQ02PR	LSQ03PR	LSQ04PR	LSQ05PR
Heating Capacity(KW)	6.3	8.7	13.4	18	22.3
Rated Power Input(KW)	1.32	1.82	2.8	3.75	4.65
Cop	4.8	4.8	4.8	4.8	4.8
Power Supply (V/PH/HZ)	220/1/50(60)		220(380)/1(3)/50(60)		380/3/50
Compressor Type	Hitachi Rotary		Copeland Scroll		
Compressor Qty	1	1	1	1	1
Cabinet Material	Powder Coated Steel Plate ( 304 Stainless Steel Plate optional)				
Refrigerant Flow Restriction	Alco Thermal Expansion Valve				
Defrosting Device	4-way Reversing Valve				

Refrigerant Type		R417A				
Pipe size (inch)		1	1	1.5	1.5	1.5
Package Dimension (mm)	Length	1148		830	830	
	Width	456		710	710	
	Height	580		885	1085	
Ambient Air Range		-20 -45				
Air Discharge		Side	Side	Top	Top	Top
Weight(kg)		65	70	120	130	150

**Features :**

- 1 . Rated Conditions : ambient air temperature at 27 , inlet water temperature at 27
- 2 . Corrosion resistant titanium heat exchanger
- 3 . LCD display control panel
- 4 . Automatic unit on/off timer clock
- 5 . Insufficient water flow and high/low pressure protection
- 6 . Almost no human attendance is required once the unit begins to work.

**Water to Water Heat Pump Water Heaters**



Model	WSQ02R	WSQ025R	WSQ03R	WSQ05R	WSQ10R
Outlet Water Temp	55°C				
Maximum Water Temp	60°C				
Heating Capacity(KW)	7.6	9.4	12	19.5	39
Power Input(KW)	1.7	2.1	2.7	4.35	8.7
Power Supply ( V/Ph/Hz)	220/1/50 (60)		220(380)/1(3)/50(60)		380/3/50(60)
Compressor Type	Hitachi Rotary		Copeland Scroll		
Compressor Qty	1	1	1	1	2
Cabinet Material	Powder Coated Steel Plate ( 304 Stainless Steel Plate optional)				
Refrigerant Flow Restriction	Alco Expansion Valve				

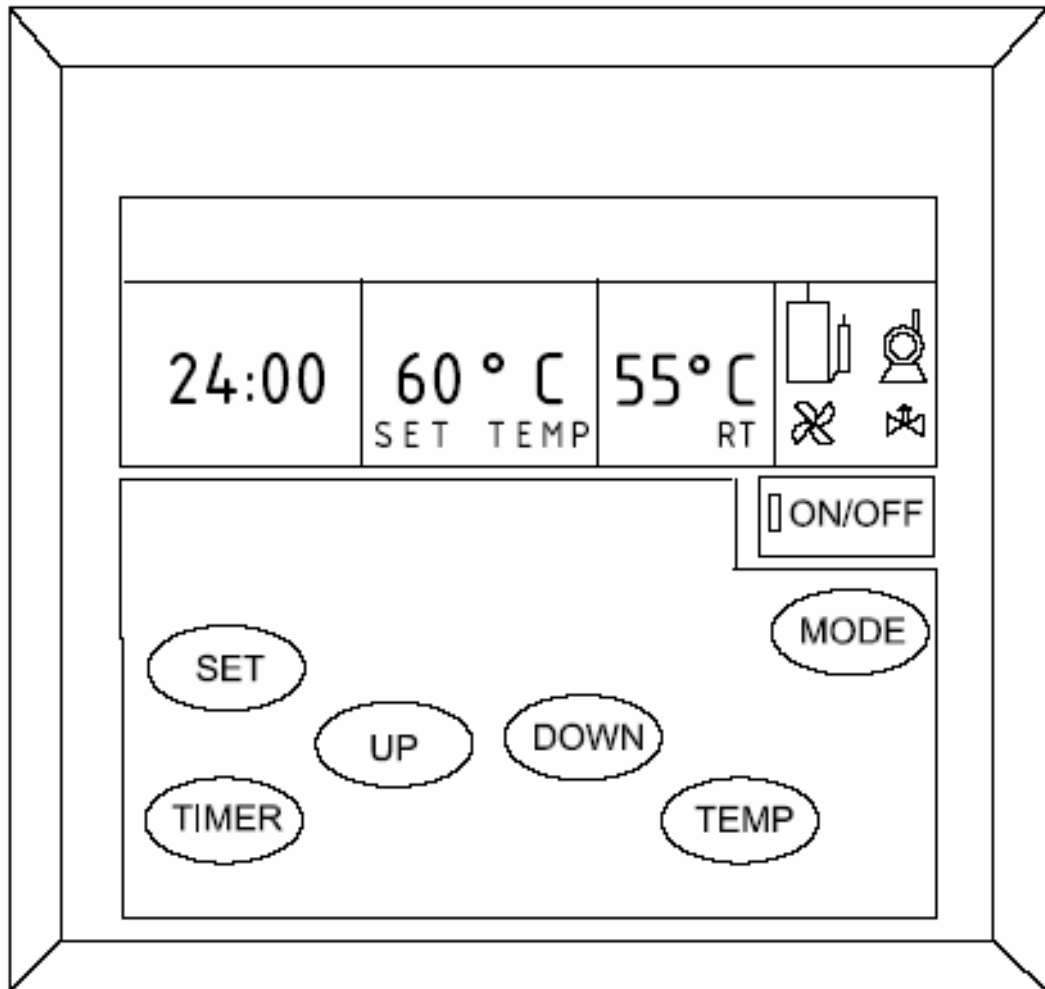
Refrigerant Type		R417a				
Pipe Size		3/4"	1"	5/4"		
Package Dimensions ( mm)	Length	810		810	810	
	Width	520		570	590	
	Height	740		900	1410	
Weight (kg)		85	110	120	150	280

### Typical Bill of Material

Part No.	Description	Part No.	Description
1	Compressor	12	Thermal Overload Relay
2	Vapor/Liquid Separator	13	Solder Tube Union
3	Liquid Receiver	14	4-way Reversing Valve
4	Evaporator	15	Low Pressure Switch
5	Evaporator Coil Temperature Sensor	16	High Pressure Switch
6	Fan	17	Thermal Protector
7	Fan Motor	18	Oil Pressure Gauge
8	Control Board	19	Coaxial Heat Exchanger
9	Phase-sequence Relay	20	Thermal Expansion Valve
10	Capacitor	21	R417A Refrigerant
11	AC Contactor		



Panel Regulation (Air to Water, Single Compressor)



The sign of Compressor



The sign of water pump



The sign of fan motor

The above signs will show up on the display screen if the corresponding components are working.



The sign of defrosting

The above sign will show up on the display screen if the unit is in defrosting state.

1. **On/off Button**  
Press On/Off button to switch on/off the unit.  
Press this button when the unit is in automatic On/Off state will abort the state
2. **Set Button**  
Press Set Button for 10 seconds and then Up/Down Button to set parameters.
3. **Timer Button**  
Press Timer Button and then Up/Down Button to set unit automatic on/off time.  
Press Timer Button for 10 seconds and then Up/Down Button to set clock time.
4. **Up Button**  
Press Up Button to set temperatures or time upwards.
5. **Down Button**  
Press Down Button to set temperatures or time downwards.
6. **Temp Button**  
Press Temp Button to check Evaporator Coil Temperature and Ambient Air Temperature.

## Function

1. **Heating :**  
(  $T_i$ — Inlet Water Temperature ,  $T_d$ — Set Inlet/Outlet Water Temperature Difference ,  $T_s$ — Set Water Temperature )  
When  $T_i \leq T_s - T_d$  , the compressor is started.  
When  $T_i \geq T_s + 1^\circ\text{C}$  , the compressor is shut down.  
Remarks: The start or shutdown of the compressor is subject to time delay protection of the unit.
2. **Fan Motor Control :**  
The fan motor will begin to work after the compressor is started; the fan motor will cease after the compressor is shut down.  
Remarks: Exceptional in defrost mode.
3. **Time Delay Protection of Compressor :**  
The compressor can be restarted only three minutes after the compressor is shut down.
4. **Sensor Fault Protection :**  
Water Temperature Sensor Fault : Close all outputs  
Evaporative Coil Temperature Sensor Fault : Close all outputs  
Gas Discharge Temperature Sensor Fault: Close all outputs

Ambient Air Temperature Sensor Fault: Close all outputs

**5. Water Flow Switch Protection :**

If the water flow switch is observed to be disconnected for ten seconds continuously, water flow protection will be activated and all outputs will be closed.

Remarks:

1. Water flow switch will only be checked twenty seconds after the unit is started.
2. Water flow switch is required in the installation. If no water flow switch is installed, the unit will always enter insufficient water flow protection even though the actual water flow is sufficient. To block this protection, terminals 1 and 2 on the wiring diagram should be short connected. However, if terminals 1 and 2 are short connected, the unit will never enter insufficient water flow protection, even the water pump has stopped. As a result the unit could be damaged.

**6. Pump Control :**

The pump will begin to work thirty seconds after the compressor is started, and stop sixty seconds after the compressor is shut down.

When the unit is in standby state, the pump will run for thirty seconds every ten minutes to check the inlet water temperature.

**7. Defrost Control :**

Defrost Cut-in Conditions : ( only when both conditions are satisfied )

- a. Compressor continuous running time  $\geq$  Defrost Cut-in Time
- b. Evaporator Coil Temperature  $\leq$  Defrost Cut-in Temperature

When the unit enters defrosting mode, the 4-way reversing valve will de-energize, directing the hot gas to the evaporator coil. The fan motor will stop but the compressor and pump will continue working.

Defrost Cut-out Conditions : ( when either condition is satisfied )

- a. Evaporator Coil Temperature  $\geq$  Defrost Cut-out Temperature
- b. Defrosting time  $\geq$  Defrost Cut-out Time

When the unit reverts to heating from defrosting mode, the 4-way reversing valve will energize and the fan motor will begin to work.

**8. Anti-freeze Protection :**

During unit standby state, the unit will be switched on to heat the water automatically if the water is observed to be below 3 °C for a continuous sixty seconds. After the water temperature is above 15°C, the unit will be shut down.

## Unit Protection

No	Input Port	Fault	Code	Protection
1	CN3	Water Temperature Sensor Fault	E1	Close all outputs

2	CN4	Evaporator Coil Temperature Sensor Fault	E2	Close all outputs
3	CN6	Discharge Gas Temperature Sensor Fault	E3	Close all outputs
4	SHUI	Insufficient Water Flow	E4	Close all outputs
5	63H1	High/Low Refrigerant Pressure	E5	Close all outputs
6				
7	CN5	Ambient Air Temperature Sensor Fault	E7	Close all outputs

### Temperature Checkup

Code	Parameter
0	Evaporator Coil Temperature
1	Ambient Air Temperature

### Parameter Setting

	Parameter	Range	Default
	Set Water Temperature	25°C —60°C	55°C
P0	Set Inlet/Outlet Water Temperature Difference	1°C —10°C	5°C
P1	Temperature Precision	0°C —10°C	3°C
P2	Defrost Cut-in Time	20min – 90min	30min
P3	Defrost Cut-in Temp	-15°C —5°C	-2°C
P4	Defrost Cut-out Time	3min – 15min	8min
P5	Defrost Cut-out Temp	5°C —25°C	15°C
P6	Electricity Resistance Heater Cut-in Temp	0°C —12°C	3°C

### Electrical Specifications

Model			LSQ008CR	LSQ015CR	LSQ02CR	LSQ03(C)R	LSQ04CR	LSQ05(C)R	LSQ10R		
Power Supply (V/Ph)			220/1				380/3	220/1	380/3		
Power Cord	Phase Wire	Cross Section (mm <sup>2</sup> )	1.5	2.5	2.5	4	2.5	6	4	4	6
		Number	1	1	1	1	3	1	3	3	3
	Neutral Wire	Cross Section (mm <sup>2</sup> )	1.5	2.5	2.5	4	2.5	6	2.5	2.5	4
		Number	1	1	1	1	1	1	1	1	1
	Earth Wire	Cross Section	1.5	2.5	2.5	4	2.5	6	4	4	6

	( mm2 )								
	Number	1	1	1	1	1	1	1	1
Recommended Pump Specification	Water Flow (m3/h)	0.5	0.9	1.26	2.04	2.7	3.42	6.72	
	Pump Head (m)	5	5	6	8	8	8	10	
	Power Input (W)	>40	>60	>90	>150	>200	>250	>400	

### Contact

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[Http://www.sirac-cn.com/hpwh.htm](http://www.sirac-cn.com/hpwh.htm)