

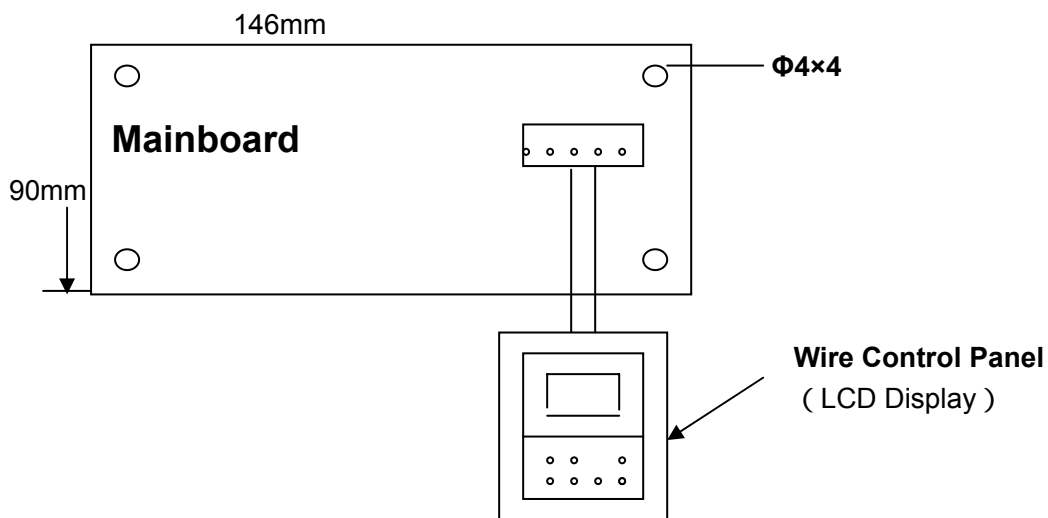
**CONTROL PANEL INSTRUCTIONS
(RSQ-4)**

FOR

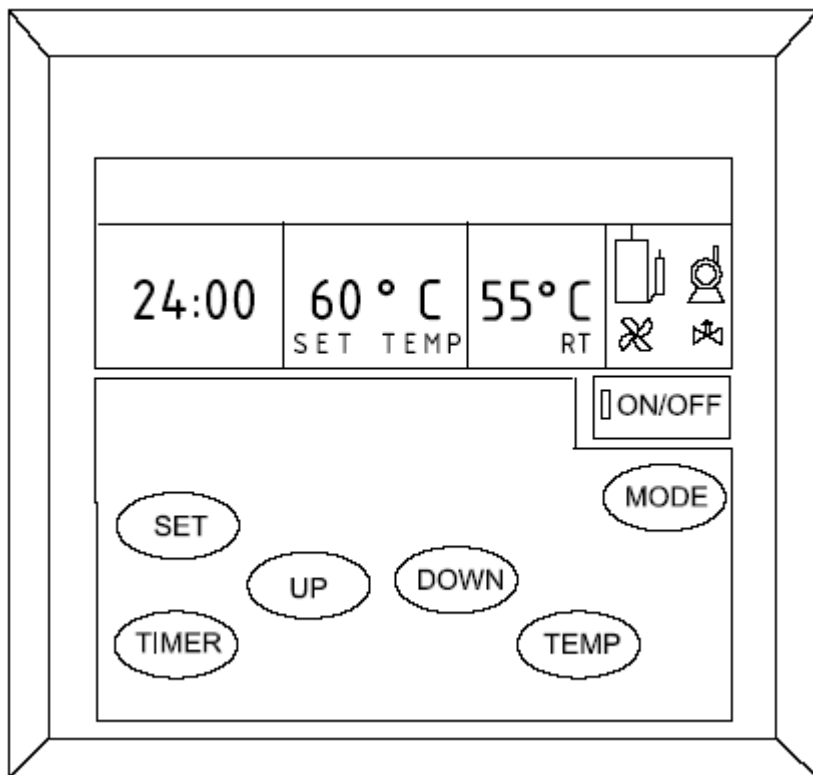
SIRAC AIR TO WATER HEAT PUMP
(SINGLE COMPRESSOR, AIR TO WATER)

1) System Configuration

This system is composed of mainboard and wire control panel.



2) Panel Regulation



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

Hold Set Button for five seconds and then Up/Down Button to set parameter values.

3. Timer Button

Press Timer Button then Up/Down Button to set unit automatic on/off time.

First Press: set HOUR digit for unit automatic on;

Second Press: set MINUTE digit for unit automatic on;

Third Press: set HOUR digit for unit automatic off;

Fourth Press: set MINUTE digit for unit automatic off.

Fifth Press: exit Timer state.

Note: when the set times for automatic on and off are the same, the timer setting will become invalid.

Hold Timer Button for five seconds to set clock time.

First Press: set HOUR digit of the clock time.

Second Press: set MINUTE digit clock time.

Third Press: exit clock time setting.

Note: if no action is made in five seconds, the controller will exit setting state.

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.

7. Mode Button

Press Mode button to select the activation or inactivation of backup electricity heating function.

3) Function

1. Heating

(T_i — Inlet Water Temperature , T_d — Set Temperature Differential (P0) , 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 (three minutes minimum) .

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 at least 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

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: Water flow switch will only be checked twenty seconds after the unit is started. The unit from Sirac does not come with a water flow switch and it is strongly recommended that a water flow switch is installed to protection the unit from damage resulting from water pump failure or insufficient water flow.

6 . Water Pump Control

The controller PCB board can send signals to control the water pump if water pump is wired to it (which is recommended). Water pump with a power input bigger than 200W should be connected to the PCB board via a relay.

The water pump will begin to run 10 seconds before the compressor is started, and stop 30 seconds after the compressor is shut down.

When the unit is in standby state, the water pump will run when $T_i \leq T_s - T_d$. After 60 sec if this condition is still satisfied, the compressor will start. Otherwise the compressor will not start and the water pump will also stop.

7 . Defrost Control

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

a. Compressor continuous running time \geq Defrost Cut-in Time (P2)

b. Evaporator Coil Temperature \leq Defrost Cut-in Temperature (P3)

When the unit enters defrosting mode, the 4-way reversing valve will de-energize, directing the

Control Panel Instructions for Sirac Air to Water Heat Pump, Single Compressor

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 (P5)
- b. Defrosting time \geq Defrost Cut-out Time (P4)

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

Forced Defrost:

When the unit is in standby state, hold Down button for five seconds will lead to forced defrost function. After any Defrost Cut-out condition is satisfied, the unit will drop out of defrost state.

8. Backup Electricity Heater Control

Cut-in Conditions:

- a. Ambient air temperature is lower than backup electricity Heater cut-in air temperature (P6)
- b. The backup electricity heating function is activated (See Mode Button).
- c. $T_i <$ Backup Electricity Heater Cut-in Water Temperature (P7)
- d. The compressor running time is bigger than the Backup Electricity Heater Cut-in Time (P8)

Only when all the above conditions are satisfied will the backup electricity Heater start.

Cut-out Conditions:

- a. Ambient air temperature is higher than backup electricity Heater cut-in air temperature (P6)
- b. The backup electricity Heater is inactivated (See Mode Button)
- c. $T_i >$ Backup Electricity Heater Cut-in Water Temperature (P7)

When any of the above conditions is satisfied, the backup electricity Heater will stop working.

9 . High Pressure Protection

When the high pressure switch jumps off, the unit will enter high pressure protection.

10 . Low Pressure Protection

When the low pressure switch remains jumpoff state for a continuous 10 seconds, the unit will enter low pressure protection.

11 . Anti-freeze Protection

During unit off state (power is not disconnected) , 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.

12 . Anti-bacteria Function

Based on parameter values set in P9, Pa, Pb, Pc and Pd, the heat pump will automatically and periodically start the back-up electricity heater in the hot water tank (if installed and controlled by the heat pump PCB board) to raise the water temp to a high level to kill harmful bacteria in the hot water.

Control Panel Instructions for Sirac Air to Water Heat Pump, Single Compressor

The backup electricity heater will run once every [P9] days.

The backup electricity heater will automatically start at clock time [Pa] [Pb].

The water temperature needs to be kept at above [Pc] for [Pd].

Cut-in Conditions

.Backup Electricity Heater is valid ;

.P9 is satisfied ;

.Pa and Pb are satisfied

When all the above conditions are satisfied, the unit will enter Anti-bacteria state

Cut-out Conditions :

.Backup Electricity Heater is inactivated ;

.Pc and Pd are satisfied.

When either of the above condition is satisfied, the unit will drop out of Anti-bacteria state.

4) Display of Errors

No	Input Port	Fault	Code	Protection
1	///	Communication Error	E0	Close all outputs
2	CN4	Inlet Water Temperature Sensor Fault	E1	Close all outputs
3	CN5	Evaporator Coil Temperature Sensor Fault	E2	Close all outputs
4	CN6	Ambient Air Temperature Sensor Fault	E3	Close all outputs
5	HP	High Pressure Protection	E4	Close all outputs
6	LP	Low Pressure Protection	E5	Close all outputs
7	SHUI	Insufficient Water Flow Protection	E6	Close all outputs

5) Temperature Checkup

Code	Parameter
0	Evaporator Coil Temperature
1	Ambient Air Temperature

6) Parameter Setting

Control Panel Instructions for Sirac Air to Water Heat Pump, Single Compressor

	Parameter	Range	Default
	Set Water Temperature	25°C —60°C	40°C
P0	Set Inlet/Outlet Water Temperature Difference	1°C —10°C	5°C
P1	Temperature Precision	0°C —10°C	0°C
P2	Defrost Cut-in Time	20min – 90min	45min
P3	Defrost Cut-in Temp	-15°C —5°C	-5°C
P4	Defrost Cut-out Time	3min – 15min	8min
P5	Defrost Cut-out Temp	5°C —25°C	15°C
P6	Backup Electricity Heater Cut-in Air Temp	-10°C —12°C	6°C
P7	Backup Electricity Heater Cut-in Water Temperature	30°C —45°C	35°C
P8	Backup Electricity Heater Cut-in Compressor Running Time	45min – 60min	50min
P9	Anti-bacteria Interval Period	1 day — 7 day	3 day
Pa	Anti-bacteria On Hour Digit	0 — 23	0
Pb	Anti-bacteria On Minute Digit	0 — 59	0
Pc	Anti-bacteria Temp	50°C —65°C	60
Pd	Anti-bacteria Duration	0 min—300 min	120 min