Hot Water Heat Pump

Service Manual

CE

Before operating this product, please read the instructions carefully and save this manual for future use.

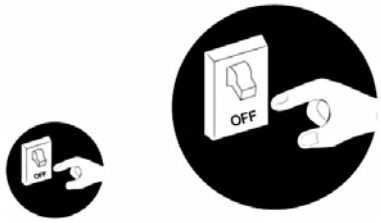
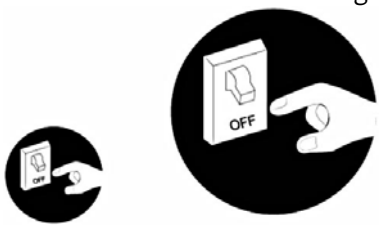
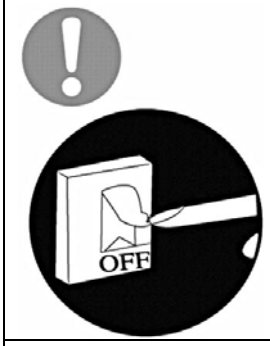
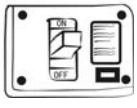
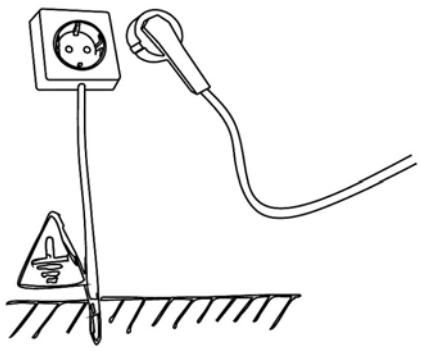
1 Safety precautions

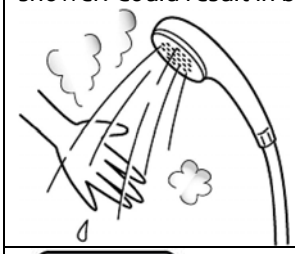
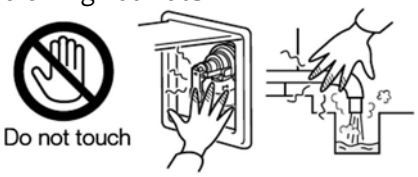
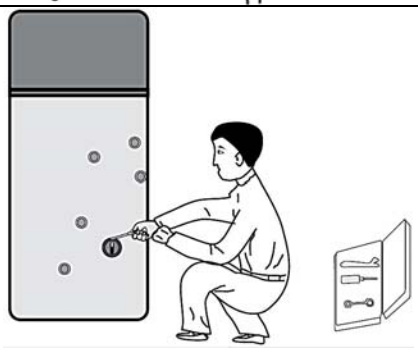
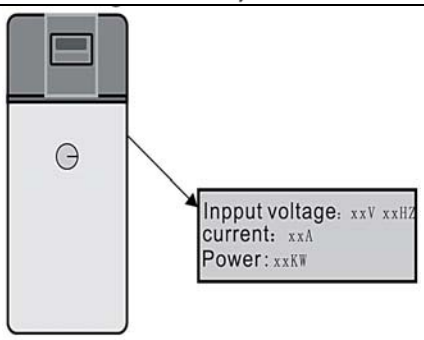
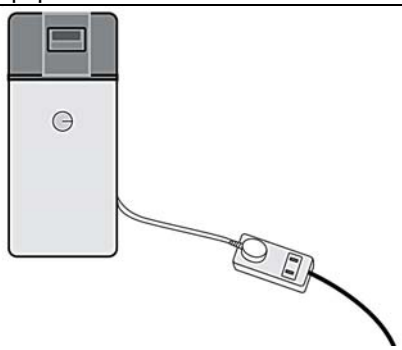
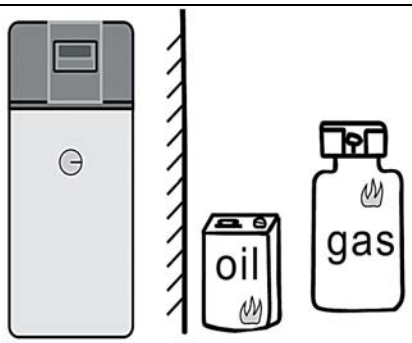
IMPORTANT

If heat pump is not running in the winter, it is necessary to keep power supply connected for Anti-freeze protection.
In cold weather (≤ 0℃), if heat pump is no longer needed, do drain out all the water inside the system.

Safety precautions

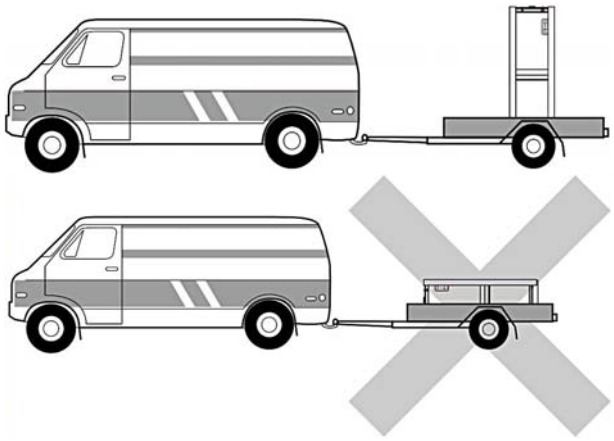
- Warning **- suggestion** **- prohibition**

Once abnormality like burning smell occurs, please cut off the power supply immediately and then contact with service center.  If the abnormality still exists, the unit may be damaged and electric shock or fire may result.	Be sure to pull out the power plug and drain the indoor unit and water tank when unit is not in use for a long time.  Otherwise, the accumulated dust may cause overheating fire or freeze of water tank or coaxial heater exchanger in winter.	Special circuit must be adopted for power supply to prevent fire.  Do not use octopus multipurpose plug or mobile terminal board for wire connection.
Before cleaning please cut off the power supply. Otherwise, it may cause electric shock or damage.  	Don't operate the unit with wet hand.  Otherwise, it may cause electric shock.	Never damage the electric wire or use the one which is not specified.  Otherwise, it may cause Overheating or fire.
The power supply must adopt special circuit with leakage switch and enough capacity. It is mandatory to use a suitable circuit-breaker for the heat pump and make sure the power supply to the heater corresponds to the specifications. Otherwise the unit might be damaged. 	 The unit must be earthed to avoid any risks caused by insulation defects.	Keep pressurized spray, gas holder and so on away from the unit above 1m. It may cause fire or explosion. 

Check the water temperature before supplying any hot water or taking a shower. Could result in being burnt. 	Do not touch the faucet while hot water is being supplied. Could result in being burnt by hot water 	Do not touch the relief valve, drainage pipe, drain outlet or drain elbow when inspecting the relief valve or while draining hot water. 
 The installation , commissioning and maintenance of these machines should be performed by qualified personnel having a good knowledge of standards and local regulations , as well as experience of this type of equipment	 Ensure that the electrical supply corresponds to the plate before proceeding with the connection in accordance with the wiring diagram supplied.	 Don't put anything on top of the heater, otherwise it may damage the unit or affect its performance.
 Please provide a dedicated power supply to the unit with proper breaker.	 Keep the unit away form any combustible or corrosive environment.	

Transport and storage :

Heat pump must be transported and stored upright and dry. It may however be carefully laid on its back when being moved into a building.



2 Working principle of Heat Pump (refrigerant circuit):

The refrigerant system consists of 6 main components:

Rotary type compressor, 4-way-valve, heat exchanger (condenser, refrigerant to water), electronic expansion valve, evaporator (air to refrigerant).

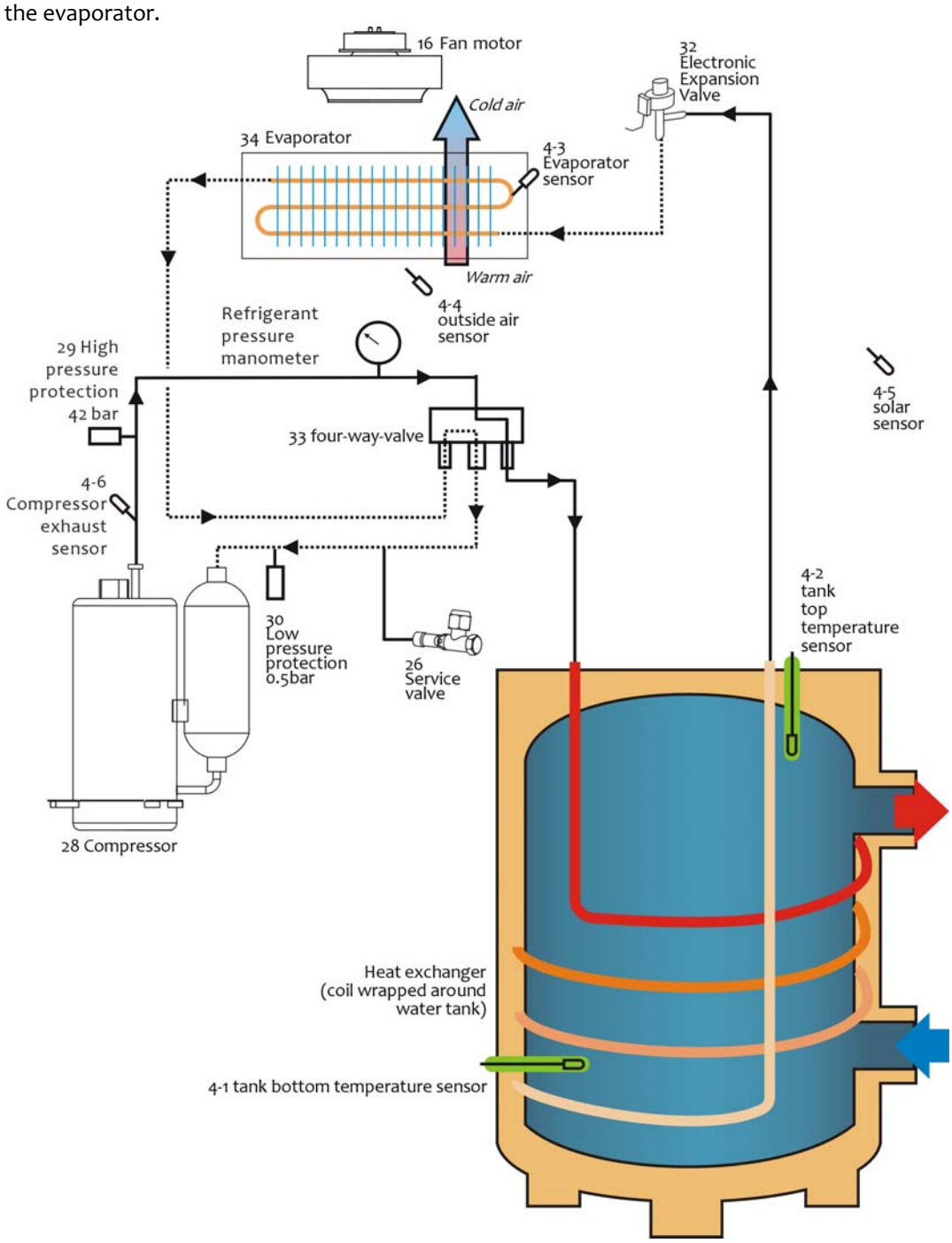
Heat pump can absorb the heating from air source. This makes the heat pump a very environmentally friendly and economically sound alternative for space heating.

* Evaporator: low temperature, low pressure refrigerant go through evaporator, to boil and turn from liquid to gas.

* Compressor: compressor absorb refrigerant, and compress to high temperature, high pressure status.

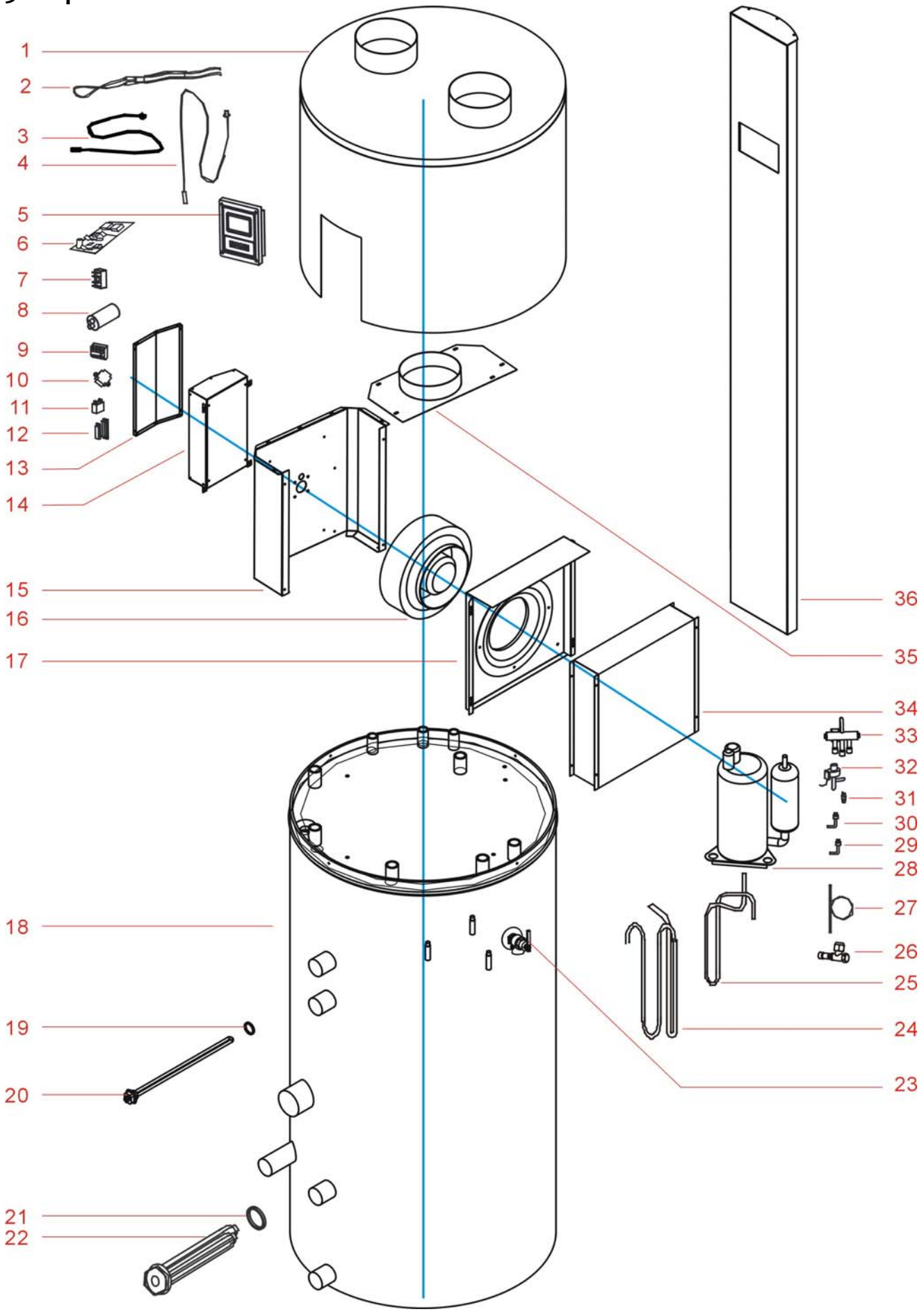
* Condenser: refrigerant release heat energy to heat exchanger. Refrigerant temperature reduces, and it returns from gas status to liquid status.
The heat energy is absorbed by water, circulated by a circulation pump to indoor radiator or floor heating systems.

* EEV: at last the refrigerant go through the electronic expansion valve, where its pressure is reduced, and then continues to the evaporator.



3 Explored view & Main components

3.1 explored view



3.2 Main components


28 compressor


34 evaporator


32 Electronic Expansion valve


29 high pressure switch


16 Fan motor


8 Compressor capacitor


11 Motor capacitor


33 four-way-valve


6 main board


5 Wire controller

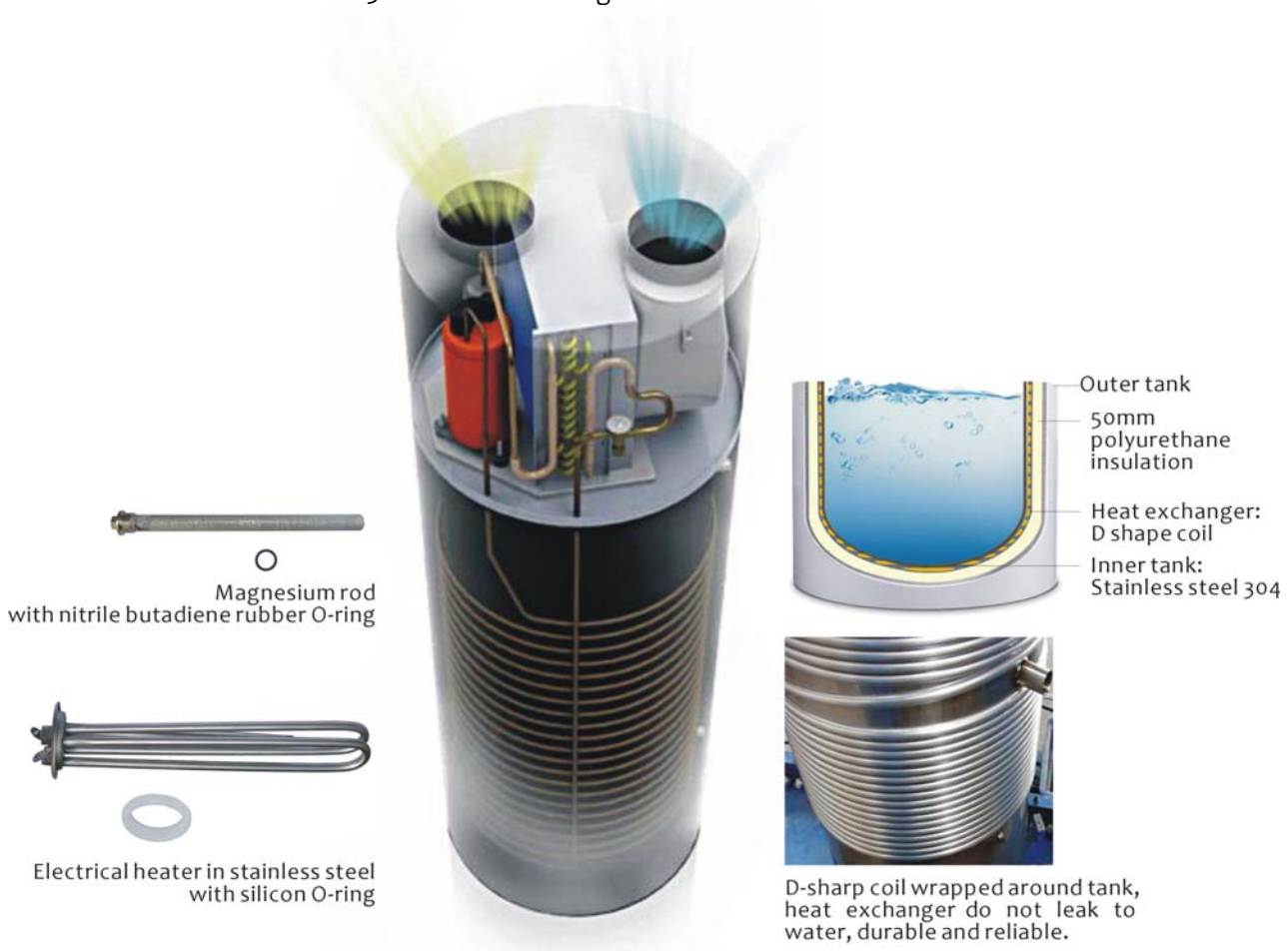

4 sensor


22 Electrical heater


20 Magnesium rod

3.3 water path

The water path on heat pump has following component:
1) Inner tank material: stainless steel 304
2) Magnesium rod with nitrile butadiene rubber O-ring, nut with stainless steel 304
3) Electrical heater in stainless steel 316 with silicon O-ring.

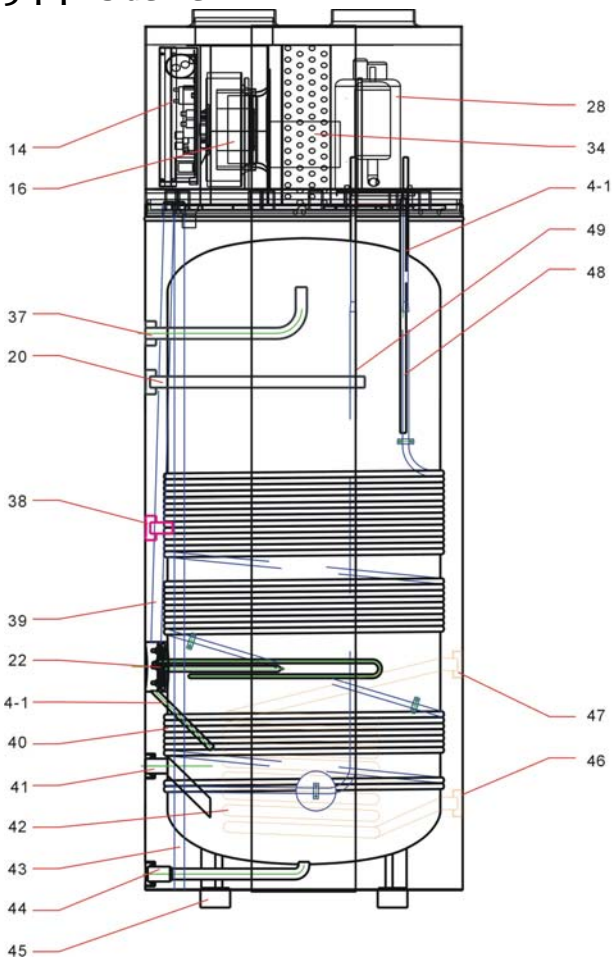


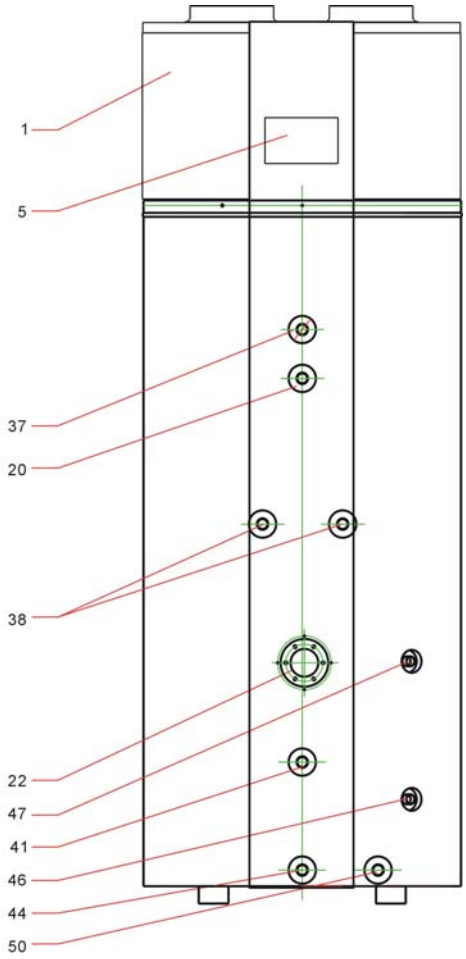
Safety:

1) Complete isolation between water and electricity. No electric shock potential.
2) No fuel tubes and storage, no potential danger from oil leakage, fire, explosion etc.
3) No cross contamination potential - heat exchanger coil wrapped around inner tank

3.4 tank drawing

3.4.4 inside view



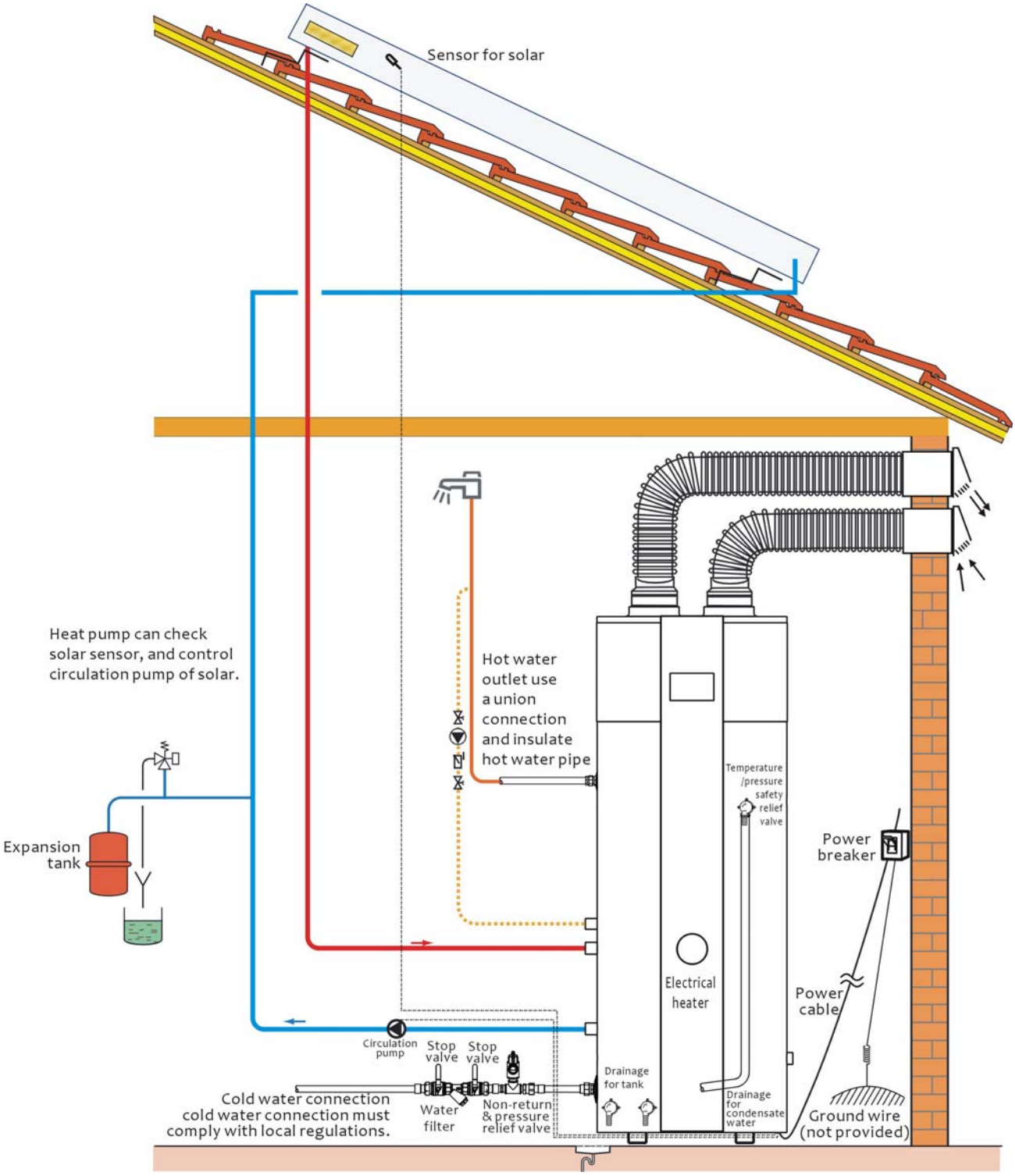


1	Top cover		23	Temperature/pressure safety relief valve
2	Compressor cable		24	Return pipe
3	Connective cable		25	Exhaust pipe
4	Sensor		26	Service valve
4-1	Tank bottom temperature sensor		27	Capillary
4-2	Tank top temperature sensor		28	Compressor
4-3	Evaporator temperature sensor		29	High pressure Protection
4-4	Ambient temperature		30	Low pressure Protection
4-5	Solar temperature		31	Filter
4-6	Pipe (Compressor exhaust) Temperature sensor		32	Electronic expansion valve
5	Wire controller		33	4-way-valve
6	Main board		34	evaporator
7	Public terminal		35	Air outlet plate
8	Compressor capacitor		36	Front cover
9	Terminal		37	Hot water outlet
10	Transformer		38	circulation
11	Motor capacitor		39	PVC pipe for bottom-water sensor & electrical heater
12	Power cable clamp		40	Heat exchanger
13	Cover for electrical control box		41	Cold water inlet
14	Electrical control box		42	Stainless steel coil for gas boiler
15	Motor support		43	PVC pipe for power cable
16	Fan motor		44	Drain for water tank
17	Airflow channel		45	Rubber stand
18	Water tank		46	Gas boiler outlet
19	O-ring for Magnesium rod		47	Gas boiler inlet
20	Magnesium rod		48	Refrigerant inlet pipe
21	O-ring for electrical heater		49	Refrigerant outlet pipe
22	Electrical heater		50	Drain for condensate water

4 Installations

4.1 topical installation drawing:

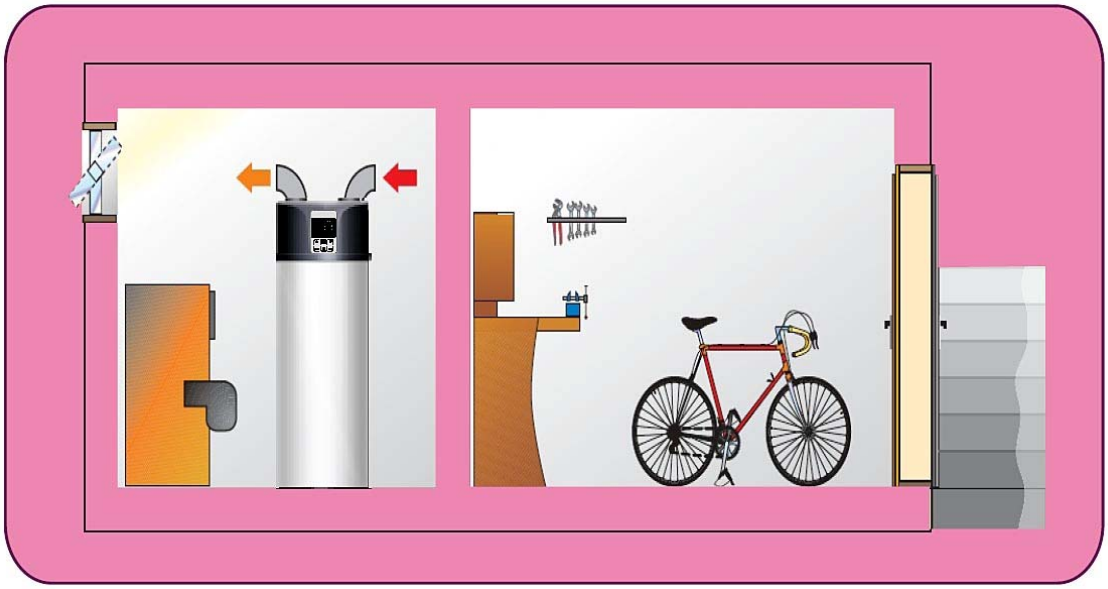
Heat pump can connect to solar panel or gas boiler.



4.2 Installation position

(1) Waste heat is useful heat

The standard heat exchanger of the hot-water heat pump enables direct connection to a second heat generator, e.g. a solar heating system or a boiler.

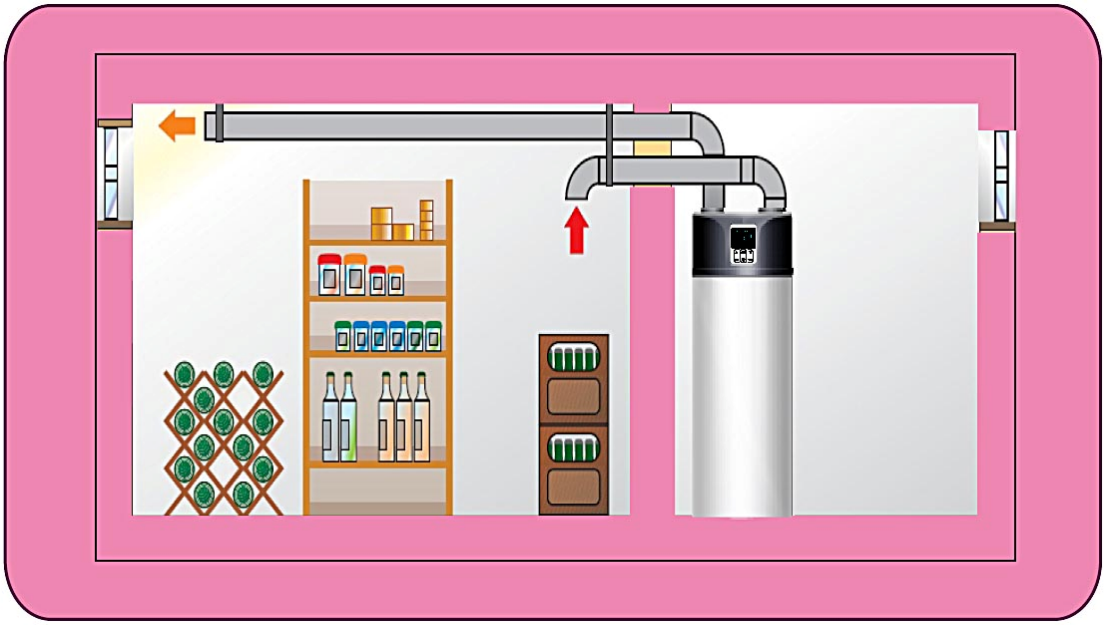


(2) Dehumidification in the recirculation air mode

Dehumidified air in the laundry room supports laundry and prevents moisture-induced damage

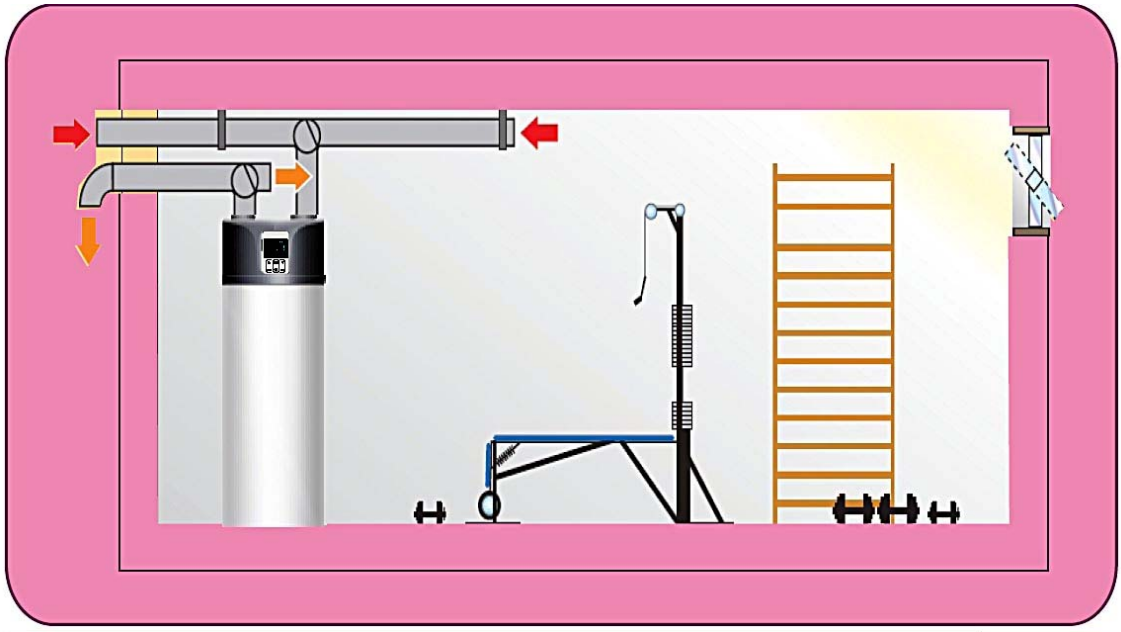
(3)Cooling in the recirculation air mode

The room air is extracted from the storage room or a wine cellar, subsequently cooled and dehumidified in the heat pump and finally re-introduced into the room, Recreation rooms, boiler rooms or utility rooms are ideal installation sites. The air ducts leading through warm sections must be insulated to prevent the formation of condensation.



(4)Variable change over of intake air

A duct system with integrated bypass flaps allows for variable utilization of the heat contained in the outside air or room air for the production of hot water.



Installation attentions

i. **Choose the right path to move the unit**
ii. **Thy to move the unit as original case**

If the unit installed in the building of the metal part, it must work for electrical insulation and comply with the relevant technical standards of electrical equipment.

4.3 Installation precautions

(1)The unit must be located on a flat, solid, preferably cemented surface

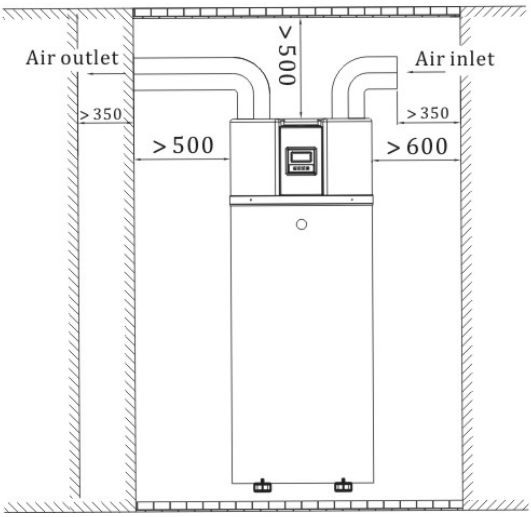
(2) Don't block air intake and air discharge way. These obstacles may cause performance deficiency or shutdown of the unit.

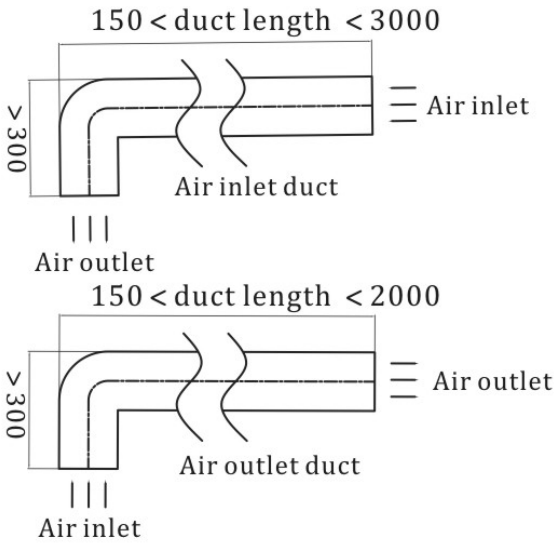
4.4 Installation of the air duct

1) The inner diameter of the air duct should be 150mm. The air duct is preferable to use PVC material.
2) It is recommended to install the air inlet duct no longer than 3.3M , and air outlet duct no longer than 2.3M. Otherwise the air path might have too much resistance.
3) The air inlet and outlet duct should be free from rain

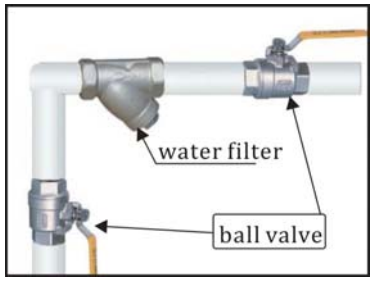
unit:mm

Installation Figure

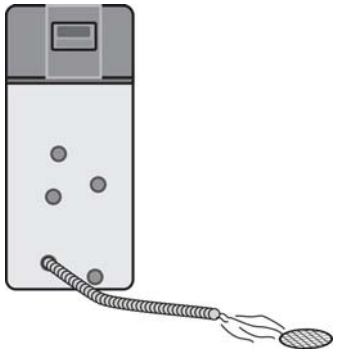




For a longer lifetime, please add a filter to the water inlet pipes. Install two ball valves, one before one after the filter, in order to clean the filter occasionally.



Locate the unit where there is a sewage port, so the condensate water from the unit can be drained away.
Enough space should be left around the unit for future maintenance.



Please add circulation pump to the water system if necessary.

Filling of water: When filling the tank for the first time, feed the tank with water till water comes out from the hot water outlet.

4.5 Electric Wiring

4.5.1 Attention

Heat pump should power separately and the power voltage should be in line with rated voltage.

* The power supply circuit should be earthed, the power cord should be connected with the external earth line and all the external earth cables are properly installed.
* The connection of the wiring should be carried out by professionals in accordance with the circuit diagram.
* Set up leakage protection devices in accordance with the requirements of the relevant national technical standards.
* The power cord and the signal line should be laid neatly without cross-interference and there should be no contact with the connection pipes or valves.
* Check whether all the connections are correct before powering the unit.

4.5.2 Power specification

Power supply	Diameter of the thinnest cable	Earth wire	Air breaker	Use	Leakage protector
220~240V-1phase-50Hz	Outer length = 1.5meter 1.5mm² / 3 core	1.0 mm²	16A	16A	< 30mA 0.1sec

4.6 Filling the water heater

Fill the water heater by opening all hot water taps and opening the cold water inlet to allow the water heater to fill and air in the system to be expelled. Close each hot water tap, as the flow becomes free of air. Check all piping for leaks.

Check that water flows freely by gently open rating the lever on the Pressure Temperature Relief valve.

Power should not be turned on until the water heater is completely filled with water.

4.7 Air filter

Install an air filter on the air inlet duct.

4.8 Examination before trial run

1. Check the water tank is filled with water, and open the water outlet tap till water flow out.
2. Check the water pressure is normal (0.15Mpa~0.7Mpa).
3. Check the air inlet or outlet is well connected; and the air outlet pipe heat insulation is completed.
4. Check the power supply voltage is normal, whether according with the nameplate requirement. (Range ± 10%).
5. Check whether the equipped parts are screwed /locked well.
6. Check whether the wirings are according with the Circuit diagram, and the earth-wire is connected.
7. Check whether the air inlet and outlet has been cleaned up and no obstacle.
8. Check whether the condensate drain pipe is connected well and no blockage.
9. After power-ON, check the control panel display is normal.

4.9 Trial running

1. After the machine is running, to hear and determine whether there is abnormal sound or collision during operation, if there is abnormal sound, stop the unit immediately and check for it until there is no abnormal sound to continue operation.
2. For the first time power on, the compressor will have 3 minutes delay protection function.
3. Observe whether the drainage of condensate water is smooth, prevent the chassis stagnant or spill water.
4. For the first time discharge hot water or start the units after a long time closure, the water tap of outlet pipe may flow muddy water, this is a normal phenomenon, and continue to drain for a period of time can be cleared.
5. After stop operation for a long time, there may have condensation water hereabout the air outlet or pipe (especial in humidity weather), this is a normal phenomenon, use a dry washcloth to clean it or by air dry.
6. The advance setting parameters of the operation panel has been set at the factory, users no need to reset it, the maintenance person should be carefully set if needed.
7. After the compressor has been working for about 10 minutes, the temperature at the air outlet is at least 5 to 6°C below that of the incoming air.

4.10 Maintenance and service

1. The inlet water filter needs to be cleaned once per 3 months. At the same time, we suggest draining all the storage water and repeatedly wash for 2-3 times to remove the dirt and sediment.
2. To clean the evaporator, use a hard nylon brush to clean it or the dustproof filter-net. Be careful not to damage the copper tube. If there has compressed air, use a high pressure air tube to clean the evaporator. This need to be done once per 6 months.

3. When clean the water tank or evaporator must turn off the machine and power supply.
4. If the supply cord is damaged, it must be replaced by the manufacturer or its service agent or a similarly qualified person.

4.10.1 Advice for users

* Flushing of sediment and draining:

To flush or to drain heat pump, power must be turned off and then turn off the cold water supply to heat pump. The lever on the pressure and temperature relief valve should be opened but care should be taken so the lever does not snap back as it could damage the valve seat. The pressure in heat pump will be released when the lever is opened. The union at the cold water inlet to the water heater should be undone and a hose should be attached to the water heater side of the union. The other end of the hose should go to a drain.

Opening the pressure and temperature relief valve allows air into heat pump and for the water to drain. Following complete draining of heat pump, the closest hot water taps may be opened fully and the pressure and temperature relief valve closed with care. Following reconnection at the cold water inlet, the cold water stop valve is now opened fully and the water heater may be filled with cold water and flushed through to ensure the cylinder contains no sediment and is clean. Finally the closest hot taps are closed and power may be turned on again to the completely filled water heater.

* In the event of an anomaly - the heater does not heat or steam is released from the Pressure Temperature Relief valve - switch off the electric power supply and contact your reseller.

* This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

4.10.2 Maintenance by a qualified professional

To protect the performance of your appliance for many years to come, it must be checked by a professional every 2 years.

* Switch off the electric power supply (circuit breaker, fuses, etc.).
* Drain the tank:
  close the cold water inlet (isolating valve),
  open a hot water tap,
  set the safety valve to the drain position.
* Remove top plastic cover:
* Disconnect the wires from the terminals of the thermostat.
* Remove the heating assembly.
* Remove any scaling that is deposited in the shape of sludge or a film on the floor of the tank and thoroughly clean the ducts of the heating elements and the thermostat. Do not scratch or strike the scaling on the walls, or you might damage the coating. Any residue can be removed using a water and dust vacuum cleaner.
* Clean the interior of the sheath to remove any scaling.
* remove magnesium rod.
* Install the heating assembly with a new seal. Tighten the nuts gradually to a reasonable torque. Alternately tighten nuts that are opposite one another.
* Fill the water to heat pump, with a hot water tap open. When water reaches the hot water tap, the tank is full.
* Check the seal for leaks and then install the thermostat and its support and connect the electric power supply.
* On the following day, check the seal again for leaks and slightly tighten the bolts, if necessary.
* Check the electric connections.
* Check that the temperature sensor is properly positioned in the pocket near the electric backup. The sensor must be fully inserted in the pocket.
* clean the air filter monthly to ensure no deterioration of heating performance.

Evaporator

* Check that the evaporator and the fan are clean once a year. If these parts are soiled, the performance of the heat pump will be diminished.

* To access the evaporator, remove the cover by unclipping it with a screwdriver. The left half-shell can also be removed in cases of difficult access.

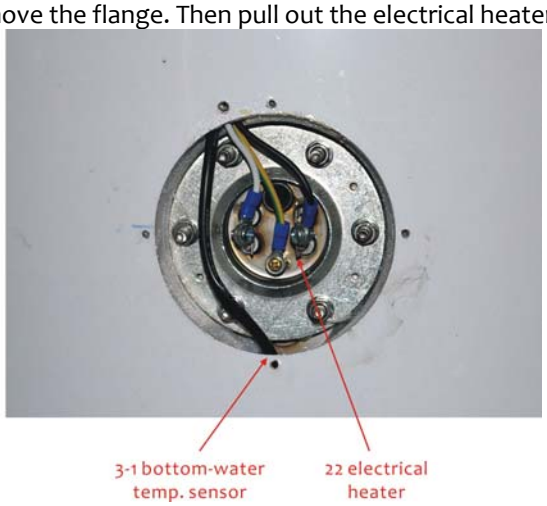
* If necessary, clean the evaporator and the fan with a soft brush. Brush the evaporator very carefully to avoid damaging the vanes. If the vanes are folded, straighten them using a suitable comb.

Condensate evacuation tube

Check that the condensate evacuation tube (item 12 on page 5) is clean. Local pollution by dust can result in deposits in the condensate catch tray. These deposits may block the condensate evacuation tube, resulting in the excessive accumulation of water in the tray, which can cause malfunctions.

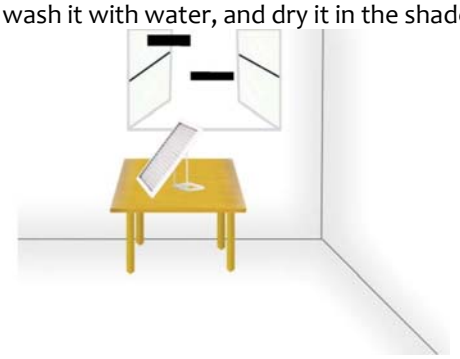
Electrical heater

If electrical heater needs maintenance, remove the screws on the plastic cover with screwdriver, and remove the plastic cover. Remove the nut on flange with span, and remove the flange. Then pull out the electrical heater for maintenance.



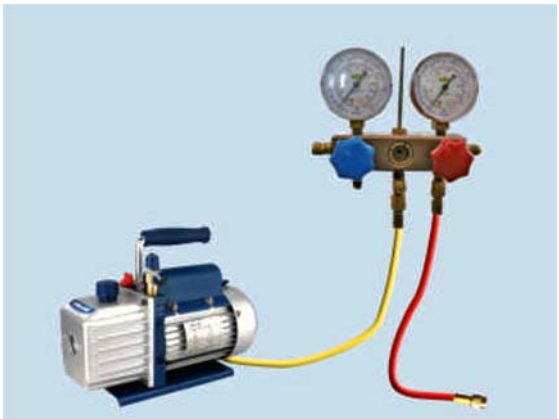
Air filter cleaning

Clean air filter to keep good performance of heat pump.
Clean air filters with vacuum cleaner or wash it with water, and dry it in the shade.

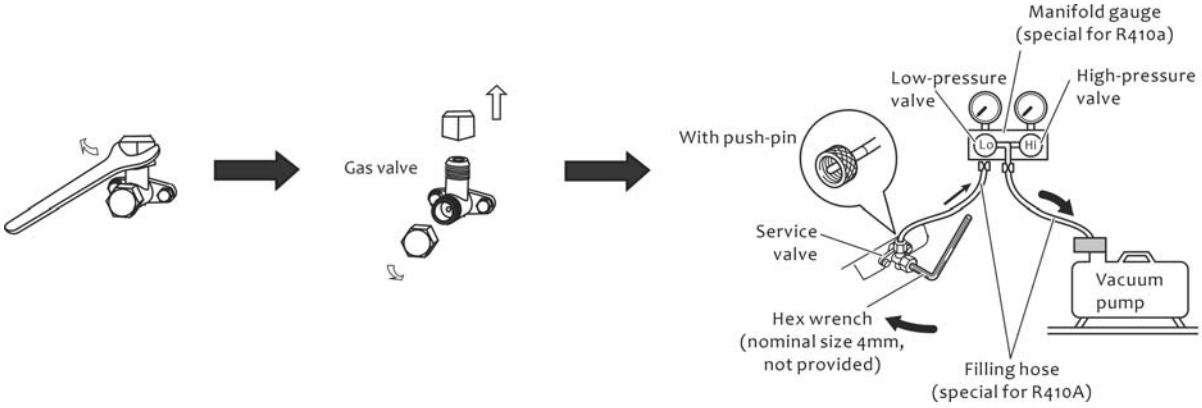


4.11 vacuum

A vacuum pump and manifold gauge are needed.



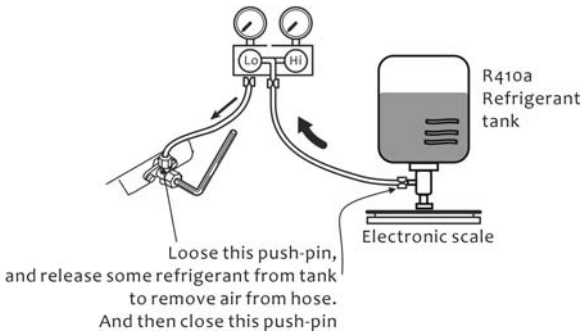
Remove the copper nut. Connect the pressure gauge to the vacuum pump. Vacuum heat pump at least 15 minutes till negative value shown on the pressure gauge, and close the service valve.



4.12 refrigerant filling

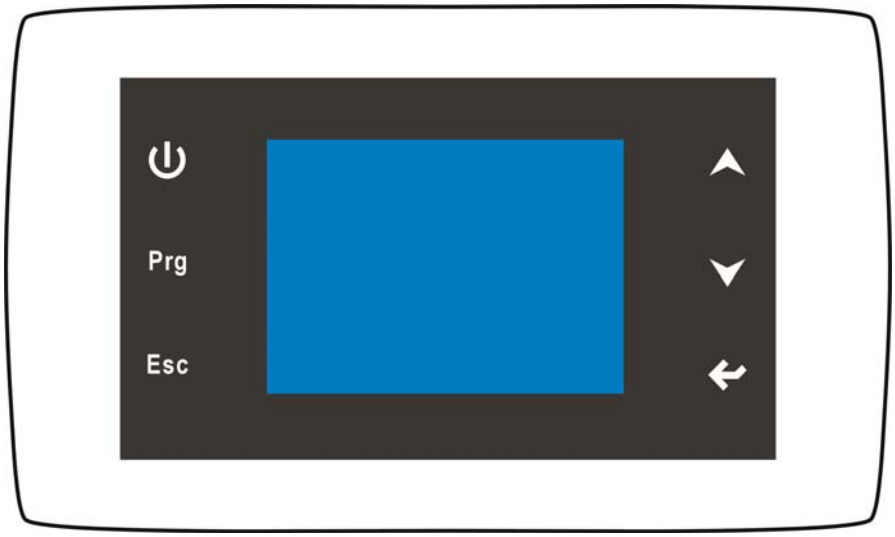
Loose the push-pin, and release some refrigerant from tank to remove air from hose. And then close push-pin.

Open the service valve by hex wrench, fill refrigerant into heat pump. And close the service valve when fill enough refrigerant into heat pump.



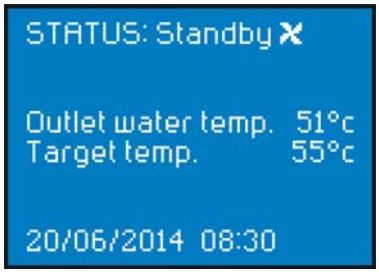
5 Wire controllers

5.1 LCD display and controller.

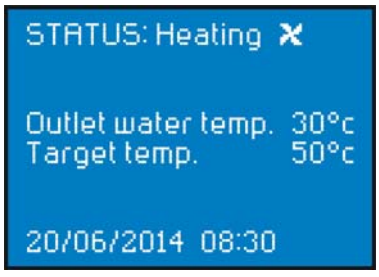


	switch ON/OFF unit		up button
Prg	to menu		down button
Esc	exit to previous menu		confirm button

5.2 ON/OFF heat pump



The unit is standby, press **to switch ON the heat pump.**



Heat pump start.

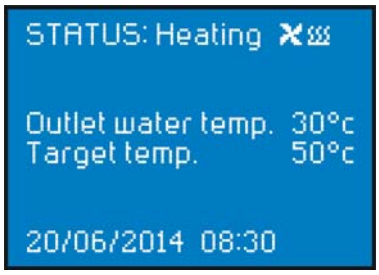
Outlet water temp. is Tank top temperature sensor.
Target temp. is setting water temperature for compressor.

5.3 menu setting

Press Prg to menu.
Press Esc to STATUS display.
Press or to next sub-menu.
Press to enter sub-menu.

5.4 model select

Aux heating: On/Off
When **On**, electrical heater activate.
When **Off**, electrical heater cancel.

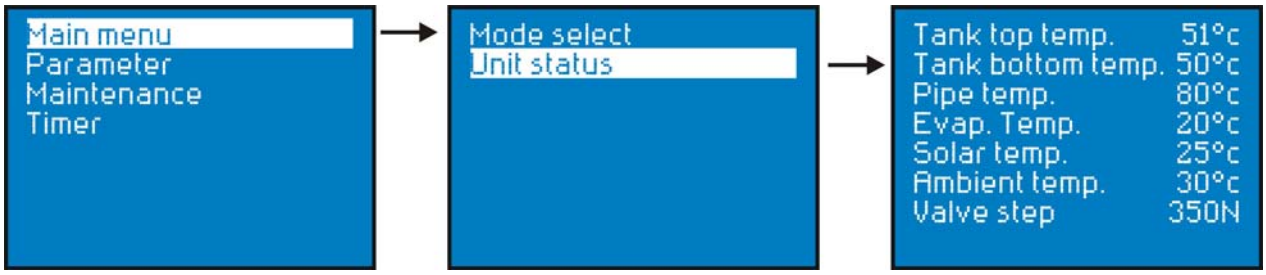


When electrical heater activate.
symbol will appearance

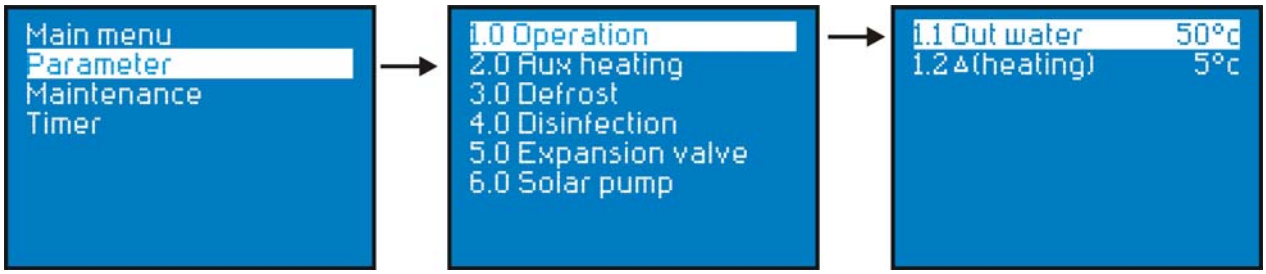
Fan mode: On/Off
When **On**, heat pump run at air source. The current heat pump must set to **On**.
When **Off**, electrical run at ground source.

5.5 unit status

Check heat pump running status.



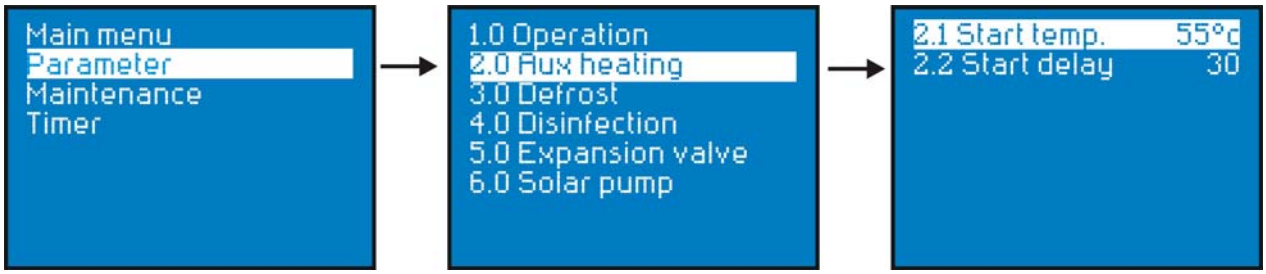
5.6 setting of water heating



1.1 Out water: setting temperature for heat pump (tank bottom temperature sensor)
1.2 Δ (heating): restart for heat pump

When tank bottom temperature ≥ 50℃, heat pump stop.
When tank bottom temperature ≤ 45℃, heat pump restart.

5.7 setting of electrical heater



2.1 Start temp.: setting temperature for electrical heater ON. 3℃ temperature different for restart.
Decided by tank top temperature sensor.
2.2 Start delay: electrical heater delay time (minute)

When sub-menu Aux heating **is On (activate).**
When tank top temperature ≤ 47℃, 30 minutes later electrical heater switches ON.
When tank top temperature ≥ 51℃ , electrical heater switch OFF.

Electrical heater will forcibly switch ON in defrosting.

5.8 setting of defrosting

3.1 Def. cyc:	defrost cycle	30 minutes
3.2 Def. in:	defrost start temperature	-4℃ (evaporator sensor)
3.3 Def. out:	defrost end temperature	8℃ (evaporator sensor)
3.4 Max time:	max defrost running time	8 minutes

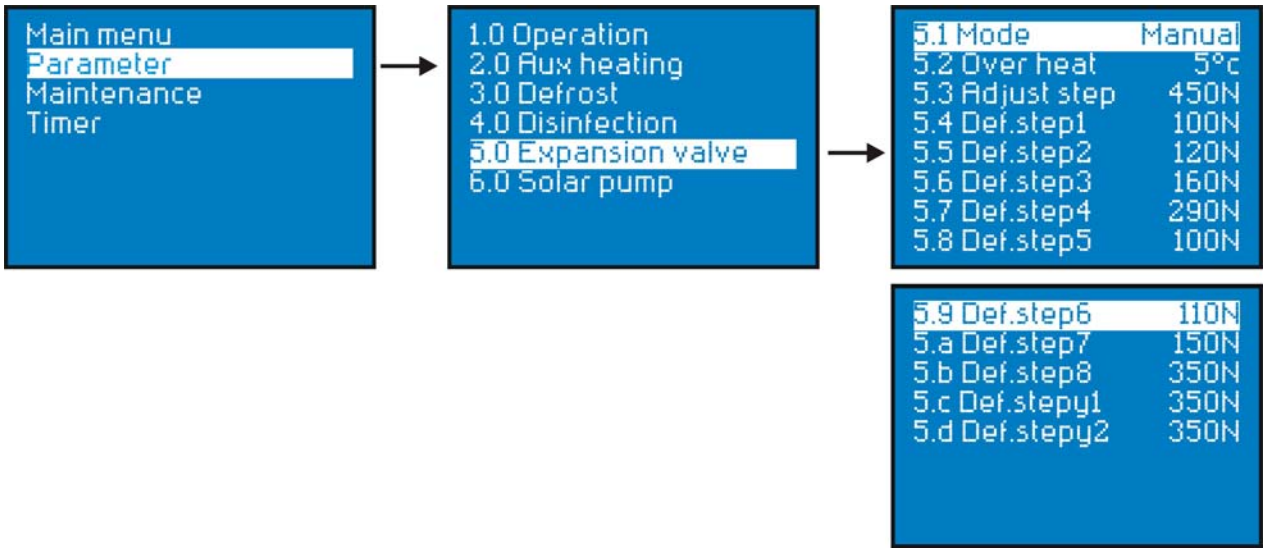
Defrost start condition:
When compressor runs 30 minutes, and evaporator temperature ≤ -4℃, then defrost start.

Defrost exit condition:
When evaporator temperature reach to 8℃, or max defrost running time is 8 minutes, then defrost exist.

5.9 setting of disinfection

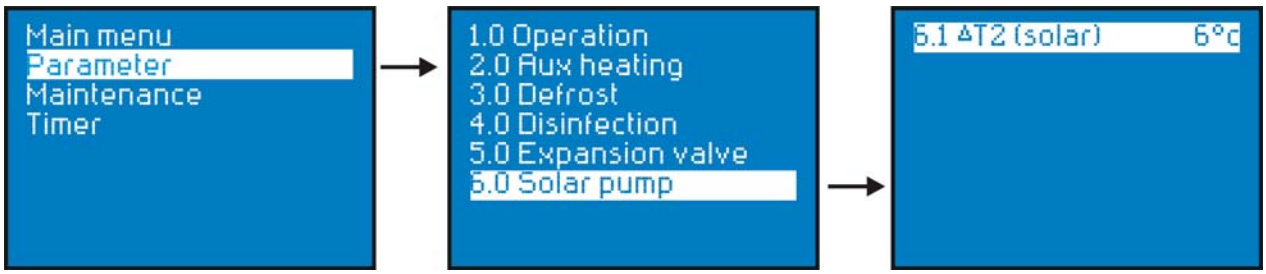
4.1 Target temp.: **setting tank top** temperature of electrical heater switch ON every week
4.2 Maintain time: **hold time of disinfection.**

5.10 setting of electronic expansion valve step



5.1 Mode: Control mode of EEV electronic expansive valve (Manual/Auto), factory setting is Manual.
5.2 Over heat: superheat of evaporator for Auto
5.3 Adjust step: begin step for Auto
5.4 Def.step1: EEV step at tank bottom temperature < 45°C, ambient temperature < 0°C
5.5 Def.step2: EEV step at tank bottom temperature < 45°C, 0°C < ambient temperature < 10°C
5.6 Def.step3: EEV step at tank bottom temperature < 45°C, 11°C < ambient temperature < 26°C
5.7 Def.step4: EEV step at tank bottom temperature < 45°C, ambient temperature > 26°C
5.8 Def.step5: EEV step at tank bottom temperature > 45°C, ambient temperature < 0°C
5.9 Def.step6: EEV step at tank bottom temperature > 45°C, 0°C < ambient temperature < 10°C
5.a Def.step7: EEV step at tank bottom temperature > 45°C, 11°C < ambient temperature < 26°C
5.b Def.step8: EEV step at tank bottom temperature > 45°C, ambient temperature > 26°C
5.c Def.stepy1: for ground source (no use)
5.d Def.stepy2: for ground source (no use)

5.11 setting of solar pump

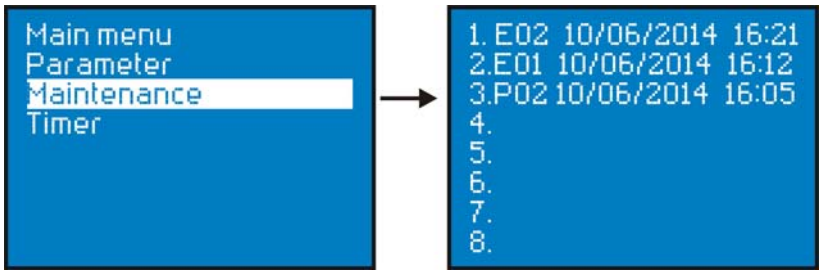


6.1 ΔT2(solar): **tank bottom** temperature difference of solar pump boiler to restart

Start condition: when solar sensor > tank bottom temperature + 6°C
End condition (any condition match, solar pump will switch OFF):
1. When solar sensor ≤ tank bottom temperature + 1°C
2. The running time of solar pump > 30 minutes.

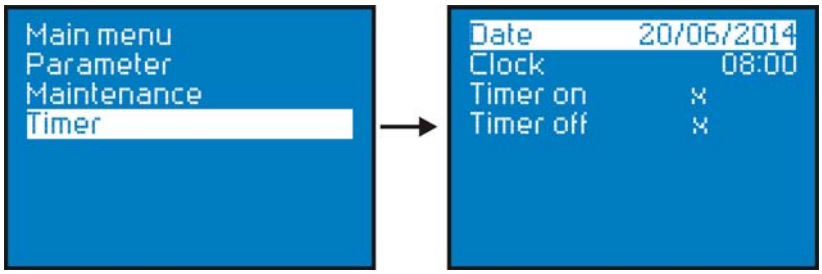
When solar sensor > tank bottom temperature + 6°C, solar pump switch ON for 30 minutes max;
and PCB will check solar sensor 3 minutes later.

5.12 setting of maintenance



Record of error code of heat pump.

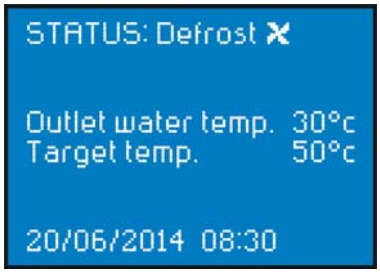
5.13 setting of Timer



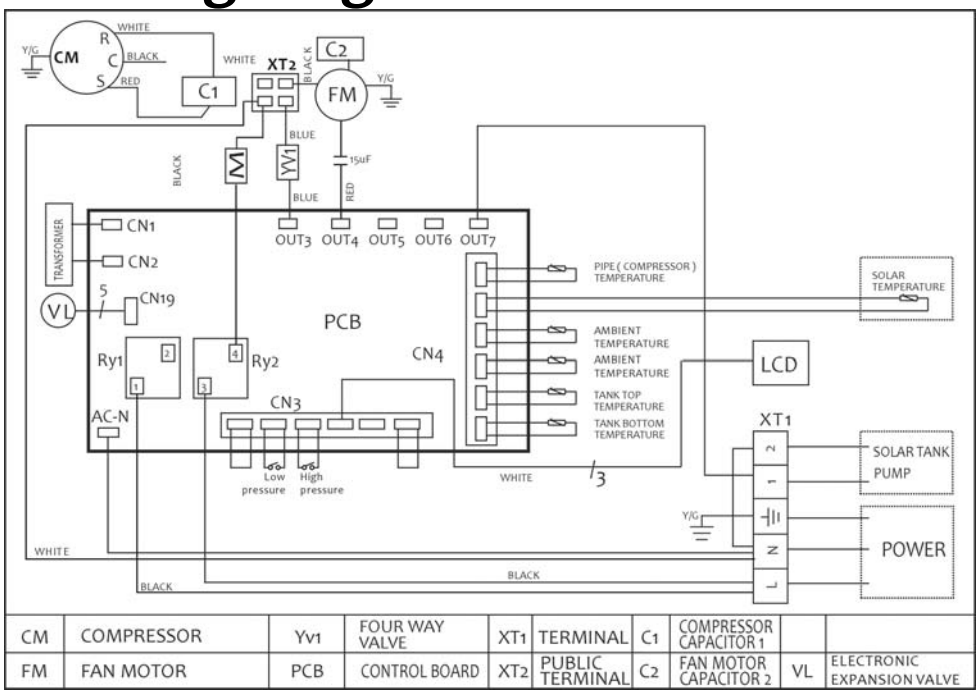
Set date, clock, TIMER.

5.14 coercive Defrost:

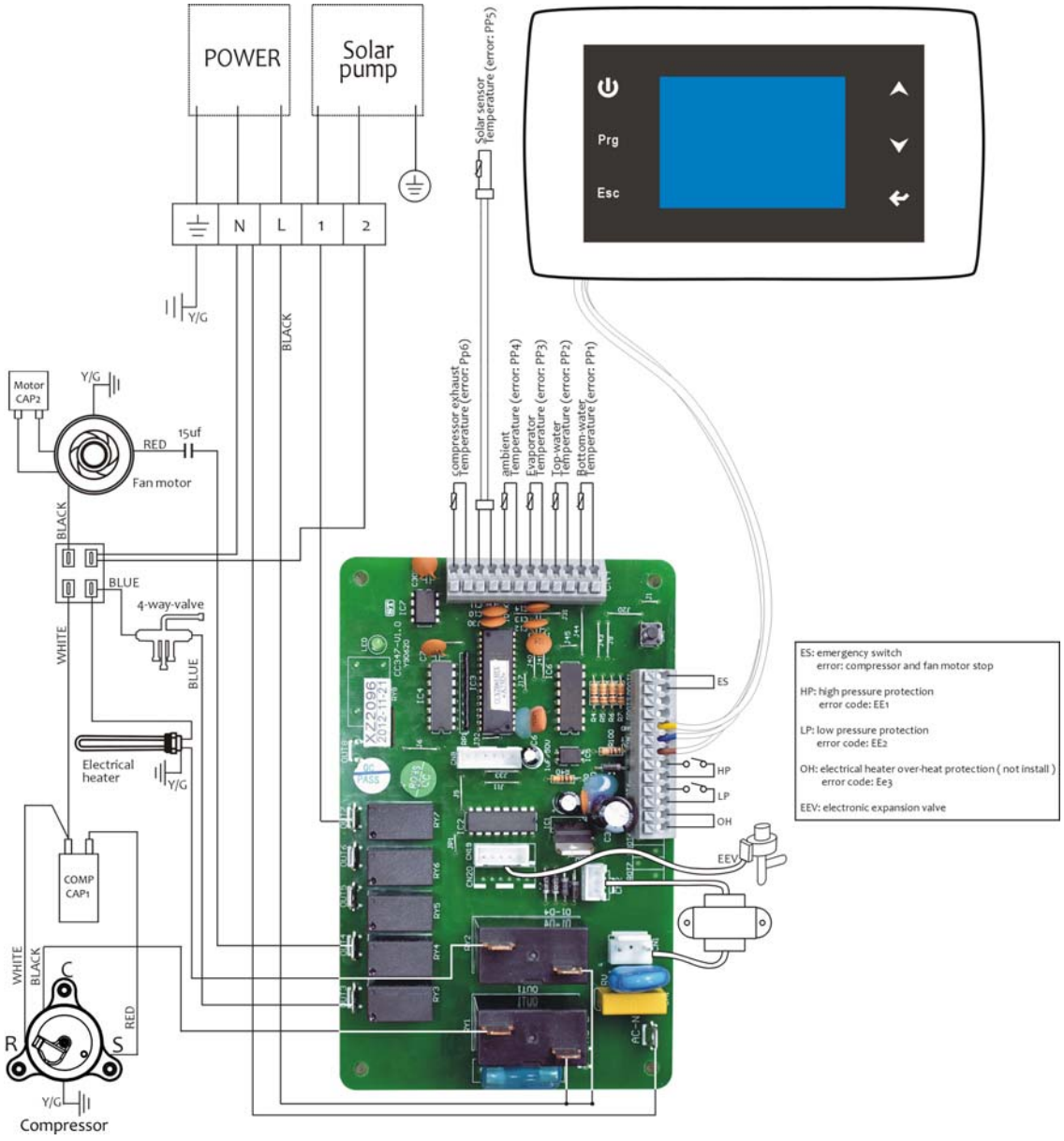
1. When heat pump stop, press 5 seconds.
   Heat pump will run defrosting.
2. When the evaporator temperature ≥ 3.3 Def. out or press , defrost finish.



6 Wiring Diagram



CM	COMPRESSOR	Yv1	FOUR WAY VALVE	XT1	TERMINAL	C1	COMPRESSOR CAPACITOR 1		
FM	FAN MOTOR	PCB	CONTROL BOARD	XT2	PUBLIC TERMINAL	C2	FAN MOTOR CAPACITOR 2	VL	ELECTRONIC EXPANSION VALVE



7 Temperature sensor resistance table:

7.1 compressor exhaust temperature sensor resistance t °c -- kΩ 50 k

t °c	R(KΩ)	t °c	R(KΩ)	t °c	R(KΩ)	t °c	R(KΩ)	t °c	R(KΩ)	t °c	R(KΩ)	t °c	R(KΩ)
-30	866.96	-7	234.08	16	75.001	39	27.677	62	11.487	85	5.2629	108	2.6218
-29	815.70	-6	222.02	17	71.625	40	26.578	63	11.083	86	5.0974	109	2.5479
-28	767.71	-5	210.69	18	68.416	41	25.528	64	20.694	87	4.9379	110	2.4764
-27	722.87	-4	199.98	19	65.368	42	24.524	65	10.321	88	4.7842	111	2.4072
-26	680.87	-3	189.86	20	62.474	43	23.566	66	9.9628	89	4.6359	112	2.3403
-25	641.59	-2	180.34	21	59.719	44	22.648	67	9.6187	90	4.4931	113	2.2755
-24	604.82	-1	171.33	22	57.104	45	21.773	68	9.2882	91	4.3552	114	2.2128
-23	570.34	0	162.81	23	54.620	46	20.935	69	8.9706	92	4.2222	115	2.1522
-22	538.03	1	154.78	24	52.253	47	20.134	70	8.6655	93	4.0939	116	2.0934
-21	507.74	2	147.19	25	50.000	48	19.368	71	8.3723	94	3.9700	117	2.0365
-20	479.34	3	140.00	26	47.857	49	18.635	72	8.0903	95	3.8506	118	1.9814
-19	452.68	4	133.21	27	45.817	50	17.932	73	7.8193	96	3.7351	119	1.9280
-18	427.67	5	126.79	28	43.877	51	17.260	74	7.5586	97	3.6238	120	1.8764
-17	404.17	6	120.72	29	42.027	52	16.616	75	7.3077	98	3.5162	121	1.8263
-16	382.11	7	114.96	30	40.265	53	16.001	76	7.0667	99	3.4123	122	1.7778
-15	361.35	8	109.51	31	38.585	54	15.410	77	6.8345	100	3.3120	123	1.7308
-14	341.86	9	104.34	32	36.987	55	14.844	78	6.6109	101	3.2150	124	1.6852
-13	323.53	10	99.456	33	35.462	56	14.302	79	6.3960	102	3.1214	125	1.6411
-12	306.29	11	94.826	34	34.007	57	13.782	80	6.1890	103	3.0310		
-11	290.06	12	90.426	35	32.619	58	13.284	81	5.9894	104	2.9435		
-10	274.78	13	86.262	36	31.297	59	12.807	82	5.7976	105	2.8589		
-9	260.4	14	82.312	37	30.034	60	12.384	83	5.6126	106	2.7772		
-8	246.85	15	78.561	38	28.827	61	11.909	84	5.4346	107	2.6982		

7.2 water/ambient/evaporator temperature sensor resistance t °c – kΩ 5 k

t °c	R(KΩ)	t °c	R(KΩ)	t °c	R(KΩ)	t °c	R(KΩ)	t °c	R(KΩ)	t °c	R(KΩ)	t °c	R(KΩ)
-20	37.4111	-7	19.6768	6	10.9023	19	6.3328	32	3.8354	45	2.4091	58	1.5618
-19	35.5384	-6	18.7693	7	10.4393	20	6.0846	33	3.6961	46	2.3276	59	1.5123
-18	33.7705	-5	17.9092	8	9.9987	21	5.8475	34	3.5626	47	2.2493	60	1.4647
-17	32.1009	-4	17.0937	9	9.5794	22	5.6210	35	3.4346	48	2.1740	61	1.4188
-16	30.5237	-3	16.3203	10	9.1801	23	5.4046	36	3.3120	49	2.1017	62	1.3746
-15	29.0333	-2	15.5866	11	8.7999	24	5.1978	37	3.1943	50	2.0320	63	1.3319
-14	27.6246	-1	14.8903	12	8.4377	25	5.0000	38	3.0815	51	1.9651	64	1.2908
-13	26.2927	0	14.2293	13	8.0925	26	4.8109	39	2.9733	52	1.9007	65	1.2511
-12	25.0330	1	13.6017	14	7.7635	27	4.6300	40	2.8694	53	1.8387	66	1.2128
-11	23.8412	2	13.0055	15	7.4498	28	4.4569	41	2.7697	54	1.7790		
-10	22.7133	3	12.4391	16	7.1506	29	4.2912	42	2.6740	55	1.7216		
-9	21.6456	4	11.9008	17	6.8652	30	4.1327	43	2.5821	56	1.6663		
-8	20.6345	5	11.3890	18	6.5928	31	3.9808	44	2.4939	57	1.6131		

8 Error codes and what to do:

This table explains the error codes caused by a defective regulating component or by a security operation.

Screen and state of the heat water pump	Component
PP 1	Tank bottom temperature sensor
PP 2	Tank top temperature sensor
PP 3	evaporator temperature sensor
PP 4	Compressor return temperature sensor
PP 5	Solar temperature sensor
PP 6	Pipe temperature sensor (compressor exhaust)
EE 1	High pressure protection
EE 2	Low pressure protection
EE 3	Electrical heater over-heat (cancel)
EE 4	Compressor over-heat protection
EE8	Wire control Communication error

1) Message: low pressure protection

Cause	Troubleshooting	remedy
Lack of refrigerant.	Using manometer apparatus and thermometer, check that the unit's overheating is correct for the specific refrigerant.	Follow the correct procedure (depending on type of refrigerant) to add the correct amount of refrigerant. If there appears to be a leak in the refrigerant circuit, carry out leak tracing and any necessary corrective action.
Electronic expansion valve defective or incorrectly set.	* Using manometer apparatus and thermometer check what the over heating reading of the unit is. * Also check that bulb and capillary tube are undamaged and that the bulb is correctly installed.	If the overheating reading does not correspond with the instructions for the specific refrigerant, adjust the expansion valve until the correct value is obtained. See separate instructions for cooling techniques. If overheating cannot be adjusted with the expansion valve or if the capillary tube/bulb is damaged, replace it.
Cable break or loose cable on low pressure switch	* Check that both cables are connected to the pressure switch. * Using the buzzer, check that there are no cable breaks. In order to do this, disconnect the cables from the pressure switch and circuit board.	If a cable has come loose, reconnect it. If there is a cable break, replace the cable.

2) Message: high pressure protection

Cause	Troubleshooting	remedy
Closed or partially closed thermostats/ valves in the heating system.	Check that the thermostats/valves in the heating system is open.	Open closed thermostats/valves.
Cable break or loose cable to high pressure switch	* Check that both cables are connected to the pressure switch. * Using the buzzer, check that there are no Cable breaks. In order to do this, disconnect the cables from the pressure switch and circuit board.	If a cable has come loose, reconnect it. If there is a cable break, replace the cable.
Overfilled refrigerant circuit.	Using manometer apparatus and thermometer, check that the unit's overheating is correct for the specific refrigerant.	Follow the correct procedure (depending on type of refrigerant) to add the correct amount of refrigerant.

		If there appears to be a leak in the refrigerant circuit, carry out leak tracing and any necessary corrective action.
Blocked condenser on the water side.	If there is no strainer in the heating system, there is a risk of dirt sticking in the condenser and blocking it. Unfortunately there is no easy way of checking if the condenser is blocked.	If the condenser is thought to be blocked, try flushing it. If this does not work, it must be replaced.
Blocked condenser on the refrigerant side.	Using manometer apparatus and thermometer, check that the unit's overheating is correct for the specific refrigerant.	If the condenser is thought to be blocked by oil for example, try blowing nitrogen through it to release the oil. If this does not work, it must be replaced

3) Alarm sensor (all)

Cause	Troubleshooting	remedy
Sensor fault alternatively cable fault.	* When reading the resistance of the sensors, the sensor leads must first be disconnected from the control equipment or terminal block. * First take a reading from the sensor including cable and check against the temperature sensor resistance table. * If the read off value does not correspond with the table, only measure the sensor and check the table.	If the sensor gives a correct value, the cable is defective. If the sensor does not give a correct value, the sensor is defective.

5) Message:Compressor over-heat protection

Cause	Troubleshooting	remedy
Compressor exhaust sensor fault	Check what the sensor shows. Is it a plausible/actual value? Measure the resistance of the sensor, check against ohm table in Measurement points.	If the sensor is defective, replace it.
Lack of refrigerant, not enough refrigerant in the system.	Using manometer apparatus and thermometer, check that the unit's overheating is correct for the specific refrigerant.	Follow the correct procedure (depending on type of refrigerant) to add the correct amount of refrigerant. If there appears to be a leak in the refrigerant circuit, carry out leak tracing and any necessary corrective action. If leak tracer is not available, brush soap water on the suspected leak and look for bubbles. Also check for oil as this can come out from the refrigerant circuit.
Electronic expansion valve incorrect setting, or blocked.		

A1 : No hot water ; compressor Not Running.

Cause	Troubleshooting	remedy
1. Power Failure	Check power supply fault, cable & connections loose.	If CB off refer to 2.
2. Circuit breaker tripped off.	Check for short circuit (SC) in line or wiring. If circuit breaker trips off when compressor re-starts, check compressor grounding and winding resistance.	Remove line or wiring SC Replace compressor if found SC.
3. Faulty / incorrect capacitor.	Check capacitor operation if compressor will not start.	Replace faulty or wrong capacitor.
4. Compressor Seized.	Compressor will not start, draws high current, or mechanically noisy when trying to start.	Check the voltage. Hit the compressor gently by a wood hammer. Replace compressor.
5. Thermal cut-out	No power to compressor after thermal cut out	Reset the TCO by pressing

(TCO) on digital controller tripped off.	(TCO). If TCO trips off repeatedly, see table "A2".	the "SET" button on the digital controller. Check the gas amount from sight glass.
6. Faulty water thermostat.	Thermostat did not cut in even though water temperature is below the restart point. Electrical disconnection at the thermostat.	Check / replace water thermostat or digital controller. Reconnect or replace if faulty.
7. Compressor cuts out on current overload protector	Test for faulty capacitor. Test for compressor short circuit / compressor seized	Replace faulty capacitor Replace compressor if faulty

A2 : No Hot Water; Compressor Running

Cause	Troubleshooting	remedy
1. Tank water drawn off. unit only recently started.	Wait until water is heated.	If water is not heated in the expected time, check for other reasons like short of refrigerant.
2. Low or no refrigerant.	Check for shortage of refrigerant or leakage in the system.	
3. Compressor not compressing.	a. Check for internal valve leak. When shut off, gas will go back through the compressor making noise and vibration. b. Minimum pressure difference across compressor due to EEV malfunction (open too much). Change value of EEV.	a. Replace compressor if faulty. b. Adjust step of EEV or Replace a new EEV.
4. Frozen evaporator.	a. Malfunction of defrost system or persistent cold weather resulting in poor performance of evaporator. b. Blocked evaporator. c. Restricted airflow. 4. four-way-valve can not change direction.	a. Repair or replace de-ice system or avoid running in constant cold weather. b. Repair blockage or replace parts. c. Clean or replace air filter (if fitted), or clear an blockages on the air ways.
5. four-way-valve inner leakage		Change four-way-valve.

A 3: Shortage of Hot Water

Cause	Troubleshooting	remedy
1. System under sized.	heck actual load with design load	Re-size.
2. Unexpected load or weather condition.	a. Check for excessive hot water draw. b. Check for not water leakage. c. Check heat loss if the heater is on reticulation circuit.	a. Re-size if extra hot water draw is to be included in the design. b. Repair leakage if found. c. Re-size with heat loss included in the design or install booster.
3. System not producing enough heat.	Check according to Table A.3: item 2, 3 & 4.	See Table A.3: items 2, 3 & 4.