Technical Manual

R410A 60Hz 14 SEER Top-Discharge Heat Pump Outdoor

Content

Part 1. General Information

1. Model Names of Indoor/Outdoor Units

1.1 Indoor Units

Model name	Dimension(W×H×D)(inch)	Power supply
SEER 14 Cooling Only & Heat Pump		
CTA14C018A	19-2/3×45-3/4×22	208~230V-1Ph-60Hz
CTA14C024A	19-2/3×45-3/4×22	208~230V-1Ph-60Hz
CTA14C030A	19-2/3×45-3/4×22	208~230V-1Ph-60Hz
CTA14C036A	19-2/3×45-3/4×22	208~230V-1Ph-60Hz
CTA14C042A	19-2/3×45-3/4×22	208~230V-1Ph-60Hz
CTA14C046A	22×53-1/8×24-1/2	208~230V-1Ph-60Hz
CTA14C060A	22×53-1/8×24-1/2	208~230V-1Ph-60Hz

1.2 Outdoor Units

Model name	Dimension (W×H×D) (inch)	Power supply
SEER 14 Cooling Only & Heat Pump		
CTV14HN018A	21-5/6×25×21-5/6	208~230V-1Ph-60Hz
CTV14HN024A	21-5/6×25×21-5/6	208~230V-1Ph-60Hz
CTV14HN030A	21-5/6×25×21-5/6	208~230V-1Ph-60Hz
CTV14HN036A	29-1/8×25×29-1/8	208~230V-1Ph-60Hz
CTV14HN042A	29-1/8×32-5/6×29-1/8	208~230V-1Ph-60Hz
CTV14HN046A	29-1/8×32-5/6×29-1/8	208~230V-1Ph-60Hz
CTV14HN060A	29-1/8×32-5/6×29-1/8	208~230V-1Ph-60Hz

2. External Appearance

2.1 Indoor unit

2.2 Outdoor unit

Note: Standard outdoor unit is using plastic grill. Metal grill can be customized.

4. Features

4.1 Operation features

- Long Piping & Cost Effective
- Low noise operation, as low as 57dB(A)
- 24V control, time delay relay, fan relay and transformer included.

4.2 Performance features

- AHRI Certified & ETL listed.
- R410A environment friendly refrigerant.
- Wide operation temperature range：Cooling: 64^0F-109^0F; Heating: 20^0F-109^0F
- Continuous Cooling Transformation Inner-grooved tube has high thermometric conductivity.

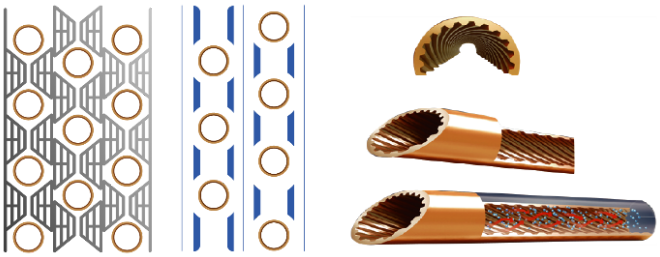
4.3 Reliability features

- Painted galvanized steel cabinet.
- Well-known brand fixed compressor, reliable quality.
- Condenser coils constructed with copper tubing and enhanced aluminum fins.
- 3-speed direct drive motors, provide selections of air flow to meet desired applications.
- Intelligent defrost programs, unit will choose different defrost program according to real condition.

Part 2. Indoor Unit

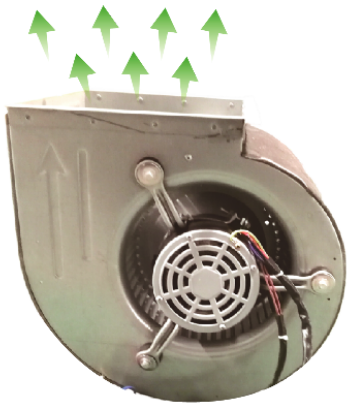
1. Features

(1) “A” shape coils, constructed with copper tubing and enhanced aluminum fins.

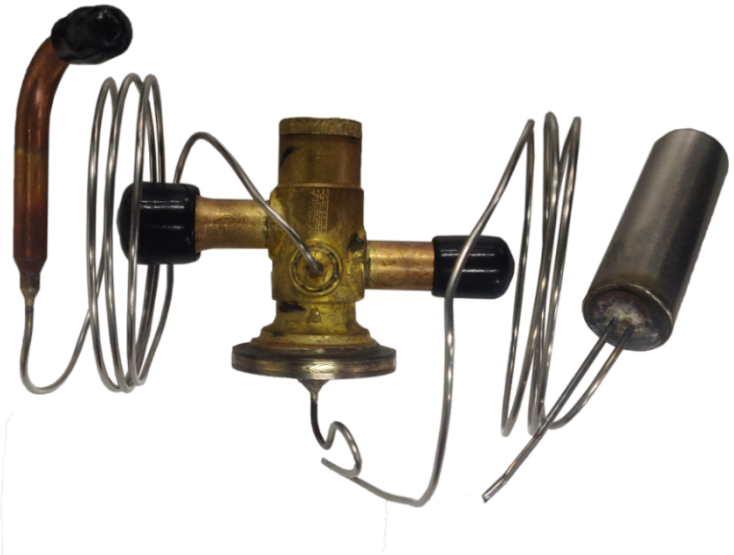


(2) Direct drive motors, 3 speed, provide selections of air flow to meet desired applications.

(3) φ10″large fan blade that has powerful wind speed, and the motor is covered with insulation material, which can ensure that the motor runs in a safe state.

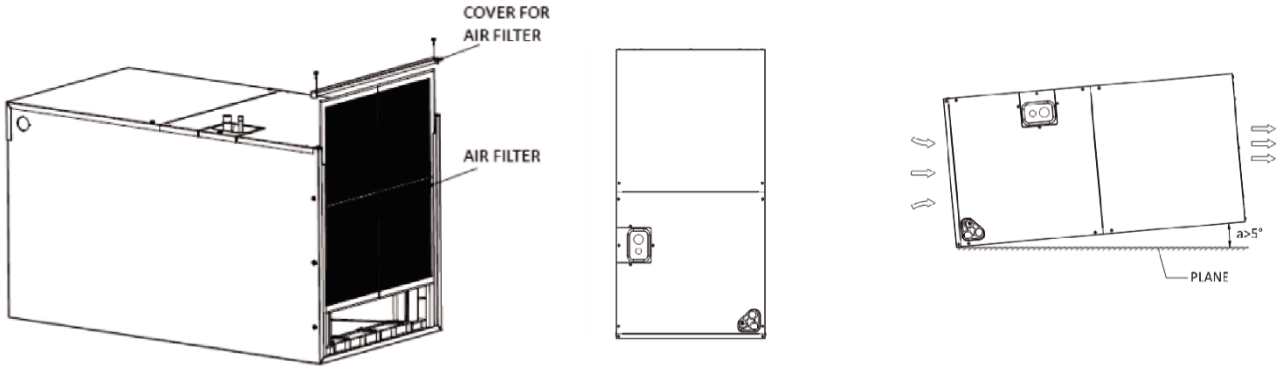


(4) Use TXV as throttle device (14 SEER air handler)



(5) Detachable air filter for cleaning or renewal

Versatile 4-way convertible design for vertical up airflow, horizontal right airflow.



2. Dimension

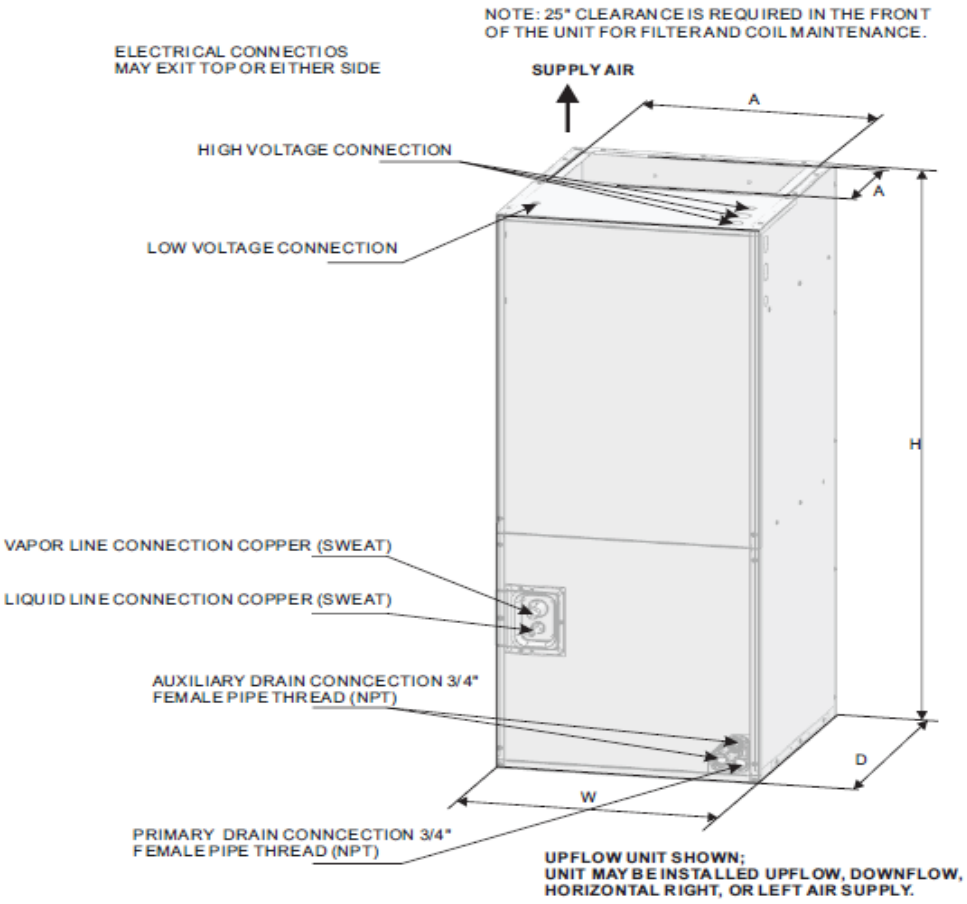


Fig.1 DIMENSIONS

DIMENSIONAL DATA

MODEL SIZE	Dimensions inch[mm]				
	UNIT HEIGHT "H" IN. [mm]	UNIT WIDTH "W" IN. [mm]	UNIT LENGHT "D" IN. [mm]	SUPPLY DUCT "A" IN [mm]	LIQUID LINE/ VAPOR LINE IN
18K	45-3/4" [1162]	19-2/3" [500]	22" [560]	17-7/8" [454]	3/8" / 3/4"
24K	45-3/4" [1162]	19-2/3" [500]	22" [560]	17-7/8" [454]	3/8" / 3/4"
30K	45-3/4" [1162]	19-2/3" [500]	22" [560]	17-7/8" [454]	3/8" I 3/4"
36K	45-3/4" [1162]	19-2/3" [500]	22" [560]	17-7/8" [454]	3/8" I 3/4"
42K	45-3/4" [1162]	19-2/3" [500]	22" [560]	17-7/8" [454]	3/8" I 3/4"
48K	53-1/8" [1350]	22" [560]	24-1/2" [623]	19-1/2" [496]	3/8" I 7/8"
60K	53-1/8" [1350]	22" [560]	24-1/2" [623]	19-1/2" [496]	3/8" / 7/8"

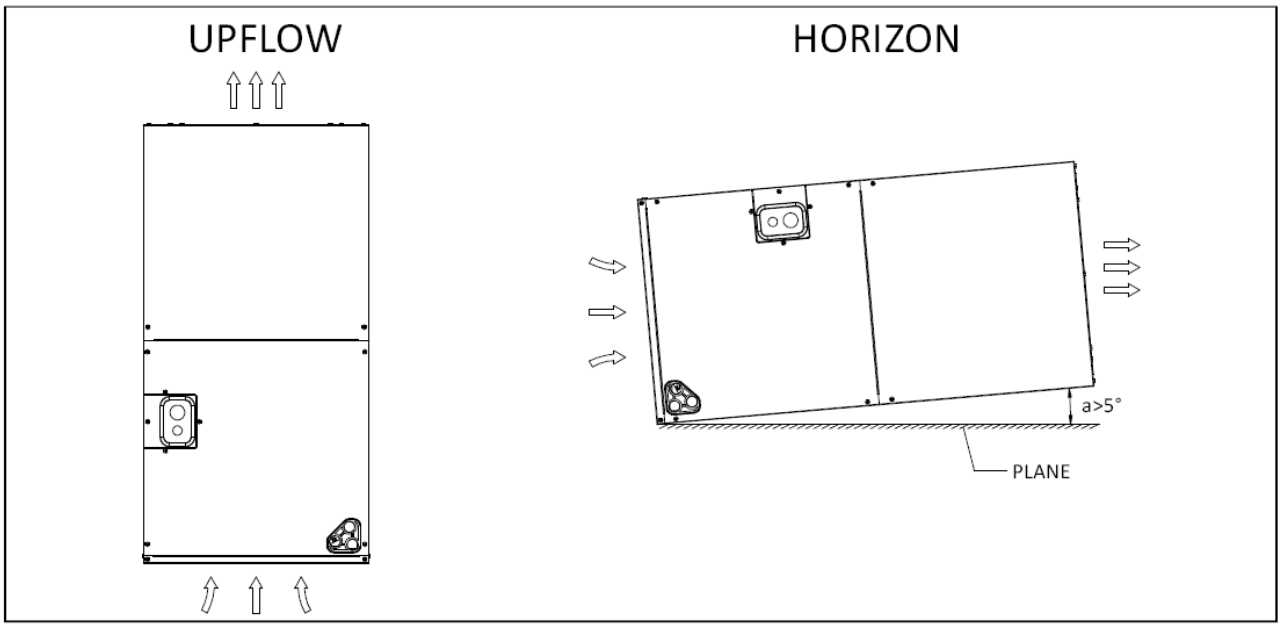
3. Service Space

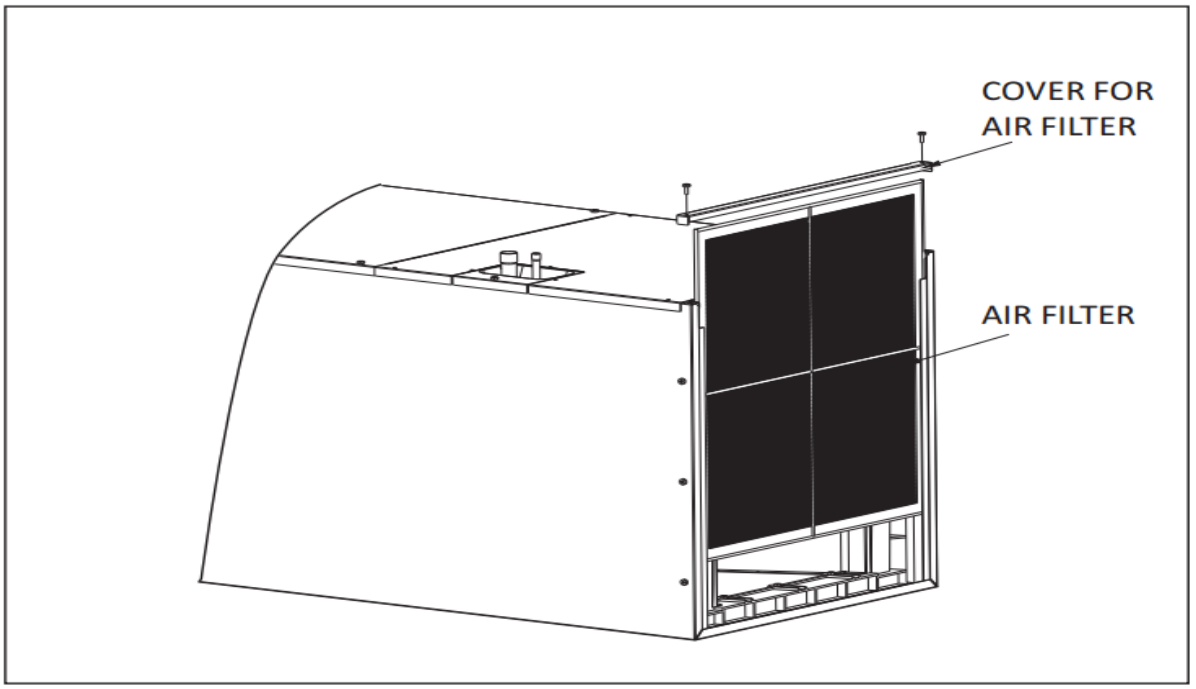
The indoor unit should be installed in a location that meets the following requirements:
INSTALLATION NOTES: .

1. When up hand discharge , how to trap or plug all drains is see the left Figure.

2. When right hand discharge , how to trap or plug all drains is see the top Figure.

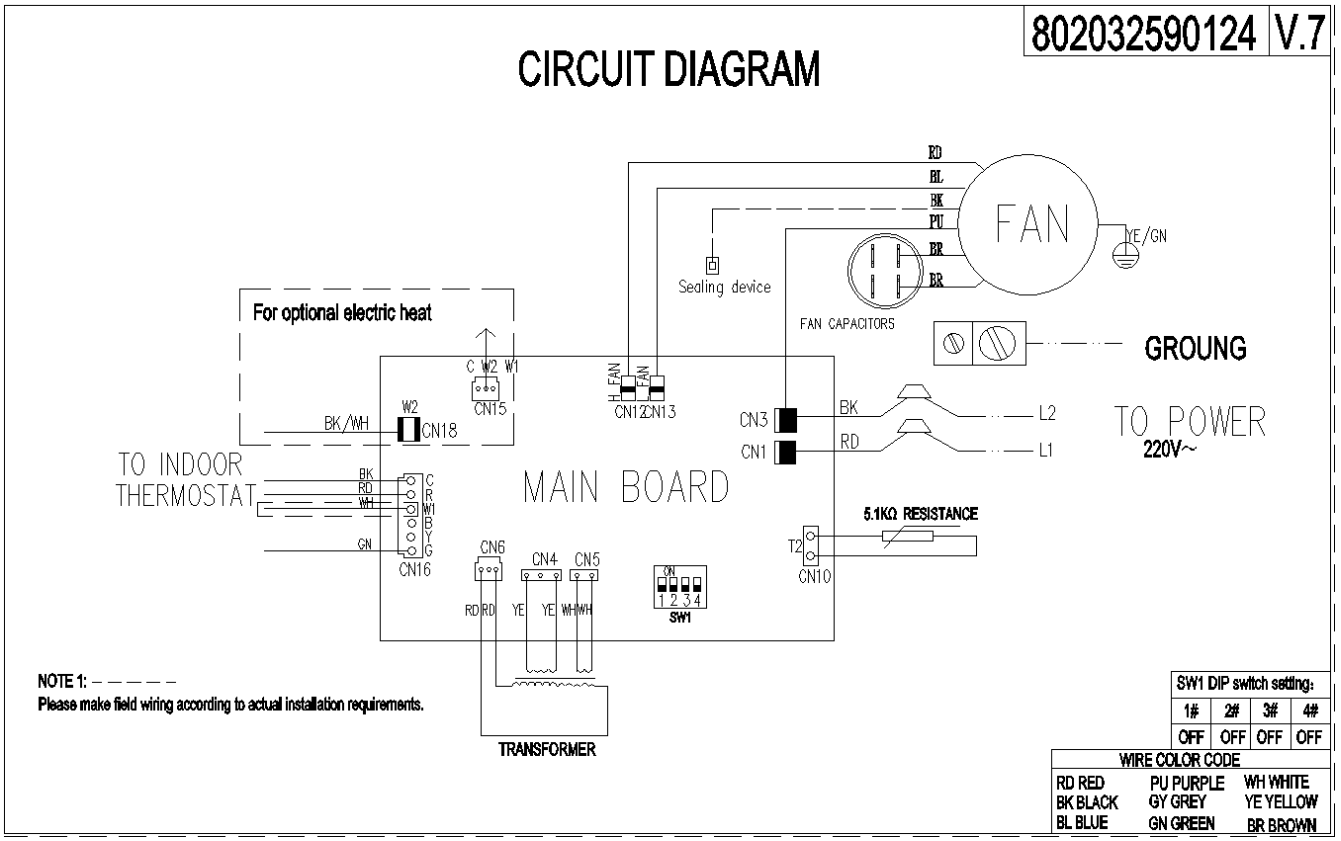
3. The seal-plugs are supplied as accessories , and be screwed tightly only with hand.



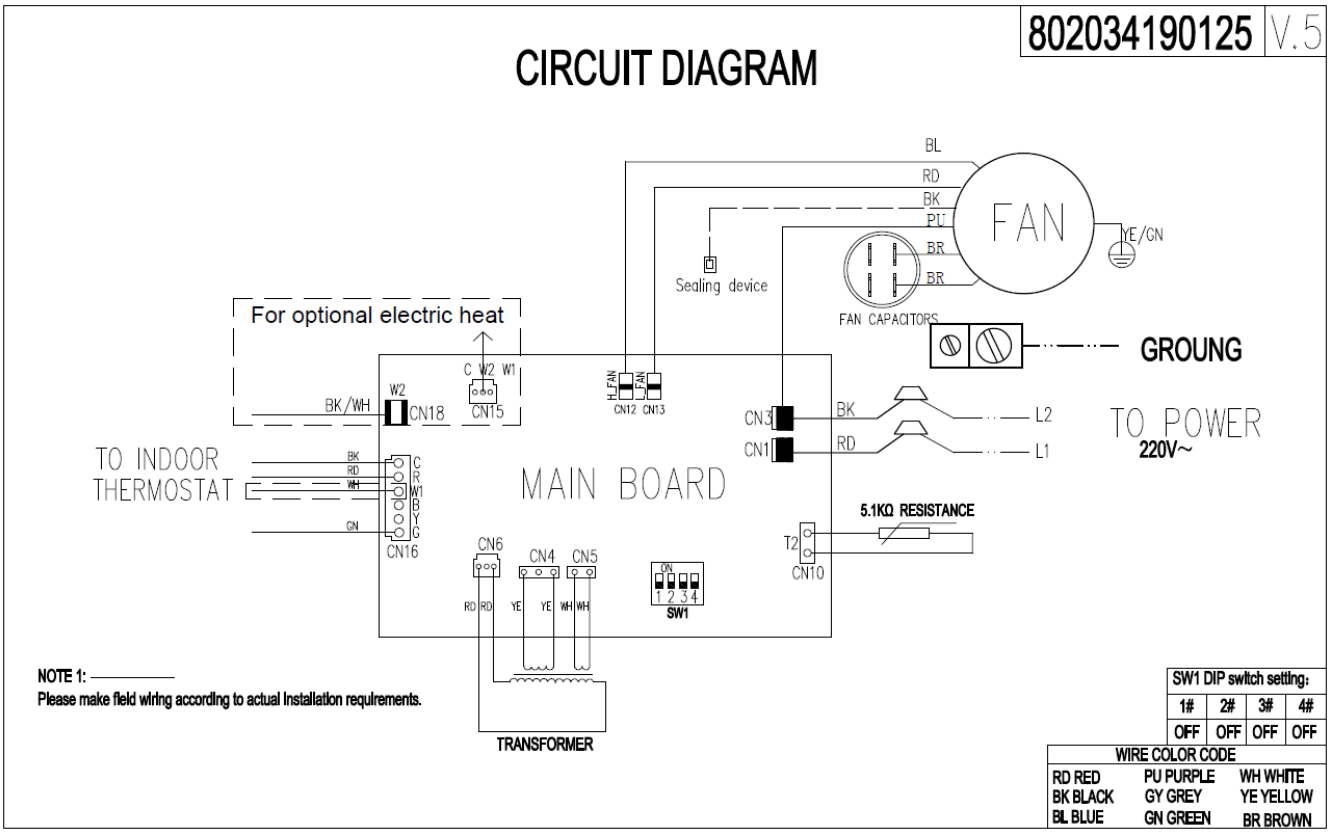


4. Wiring Diagrams

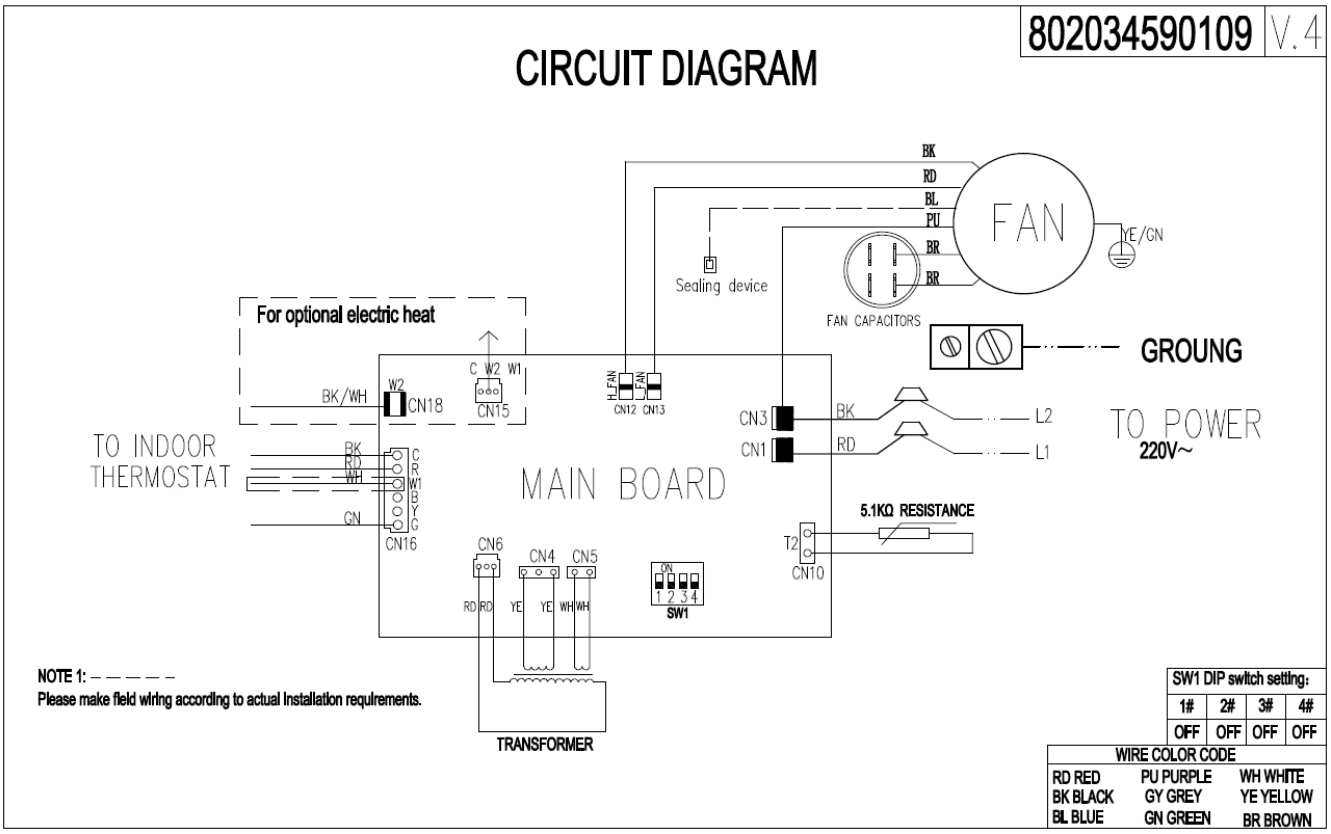
18K/24K/30K/36K/42K



48K



60K


802034590109 V.4
CIRCUIT DIAGRAM
BK
RD
BL
PU
BR
BR
FAN
YE/GN
Sealing device
FAN CAPACITORS
GROUNG
For optional electric heat
C W2 W1
BK/WH
W2
CN18
CN15
H.FAN
L.FAN
CN12 CN13
CN3
CN1
BK
RD
L2
L1
TO POWER
220V~
TO INDOOR
THERMOSTAT
BK
RD
WH
GN
C
R
W1
B
Y
G
CN16
MAIN BOARD
5.1KΩ RESISTANCE
T2
CN10
CN6
CN4
CN5
RD RD YE YE WH WH
ON
1 2 3 4
SW1
TRANSFORMER
NOTE 1: – – – – –
Please make field wiring according to actual Installation requirements.
SW1 DIP switch setting:
1# 2# 3# 4#
OFF OFF OFF OFF
WIRE COLOR CODE
RD RED
PU PURPLE
WH WHITE
BK BLACK
GY GREY
YE YELLOW
BL BLUE
GN GREEN
BR BROWN

5. Electric Characteristics

Model	Indoor Units				Indoor Fan Motor
	Hz	Voltage	Min.	Max.	kW
SEER 14 Cooling Only					
CTA14C018A	60	208-230V	198V	242V	0.18
CTA14C024A	60	208-230V	198V	242V	0.21
CTA14C030A	60	208-230V	198V	242V	0.29
CTA14C036A	60	208-230V	198V	242V	0.40
CTA14C042A	60	208-230V	198V	242V	0.46
CTA14C046A	60	208-230V	198V	242V	0.58
CTA14C060A	60	208-230V	198V	242V	0.58

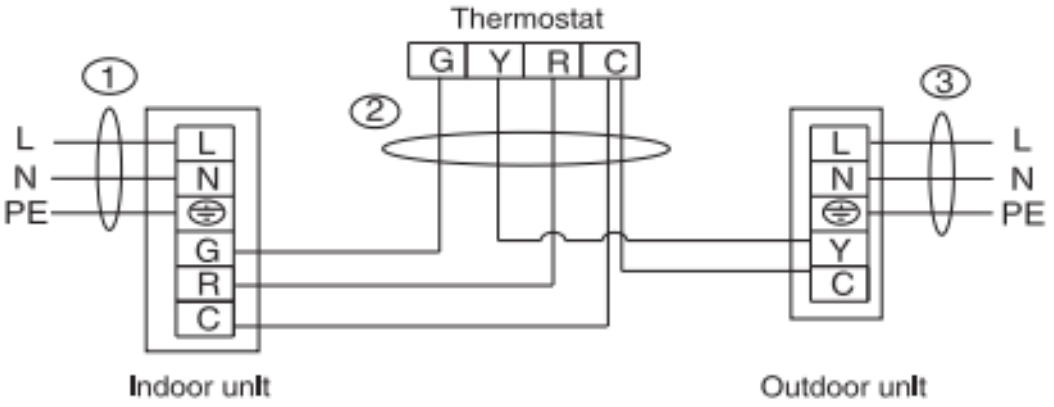
6. The Specification of Wiring

Note:
The cross-section areas of wires or lines should not be less than the corresponding ones listed in the table below;Besides, if the power wires is quite long from the unit, please choose the windings with larger cross-section area to guarantee the normal power supply.

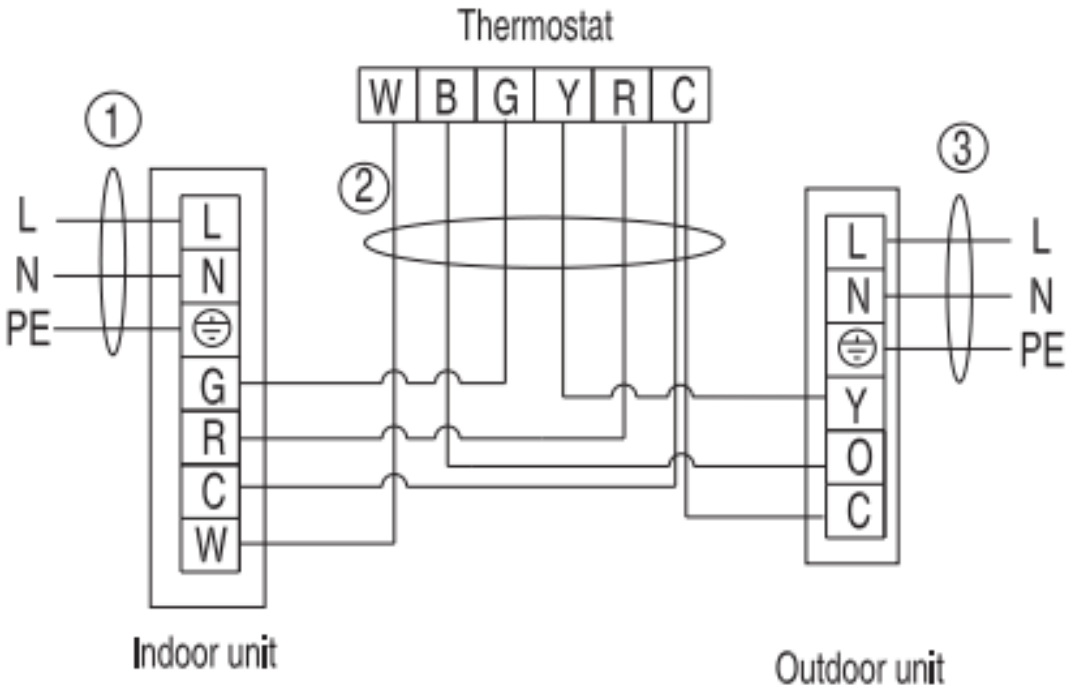
Model	Type	Indoor power wiress	Thermostat communication wiress		Outdoor power wiress
			Indoor	Outdoor	
18 K series (single phase)	Cooling only	3*1.0mm²	3*0.75mm²	2*0.75mm²	3*1.0mm²
24 K series (single phase)	Cooling only		3*0.75mm²	2*0.75mm²	3*2.5mm²
30 K series (single phase)	Cooling only		3*0.75mm²	2*0.75mm²	
36 K series (single phase)	Cooling only		3*0.75mm²	2*0.75mm²	
42 K series (single phase)	Cooling only		3*0.75mm²	2*0.75mm²	3*4mm²
48 K series (single phase)	Cooling only		3*0.75mm²	2*0.75mm²	
60 K series (single phase)	Cooling only		3*0.75mm²	2*0.75mm²	

7. Field Wiring

1. To avoid the electrical shock, please connect the air conditioner with the ground lug. The main power plug in the air conditioner has been joined with the ground wiring, please don't change it freely.
2. The power socket is used as the air conditioner specially.
3. Don't pull the power wiring hard.
4. When connecting the air conditioner with the ground, observe the local codes.
5. If necessary, use the power fuse or the circuit, breaker or the corresponding scale ampere.



Applicable for 18k, 24k, 30k, 36k, 42k, 48k, 60k cooling only type



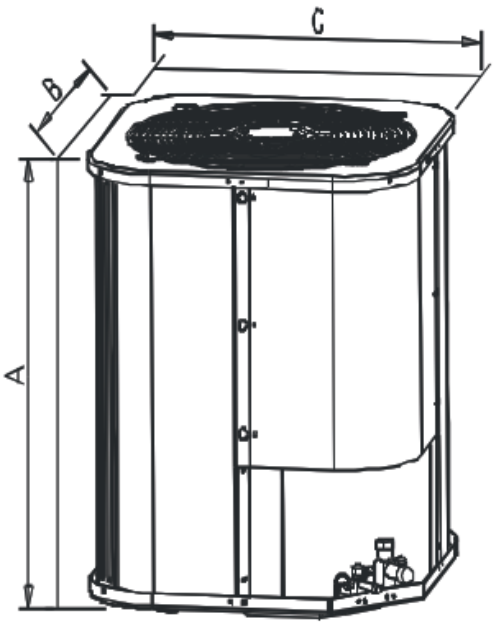
Applicable for 18k, 24k, 30k, 36k, 42k, 48k, 60k cooling & heating type

Part 3 Outdoor Unit

1. Dimension

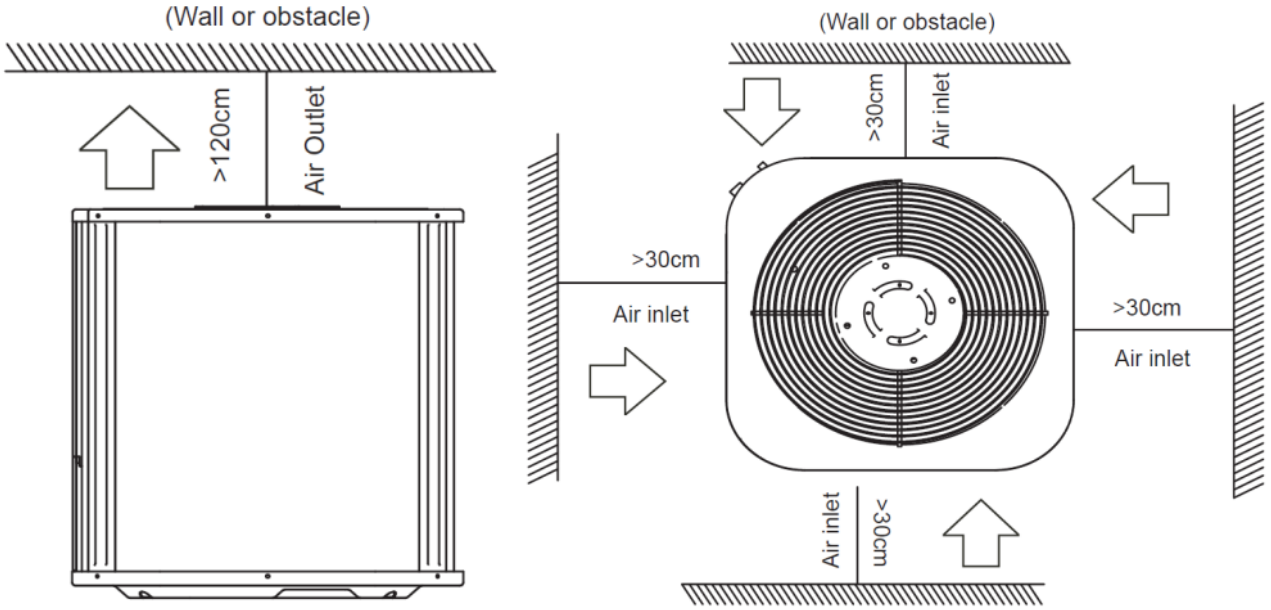
All dimensions are in mm. They are subject to change without notice. Certified dimensions will be provided upon request.

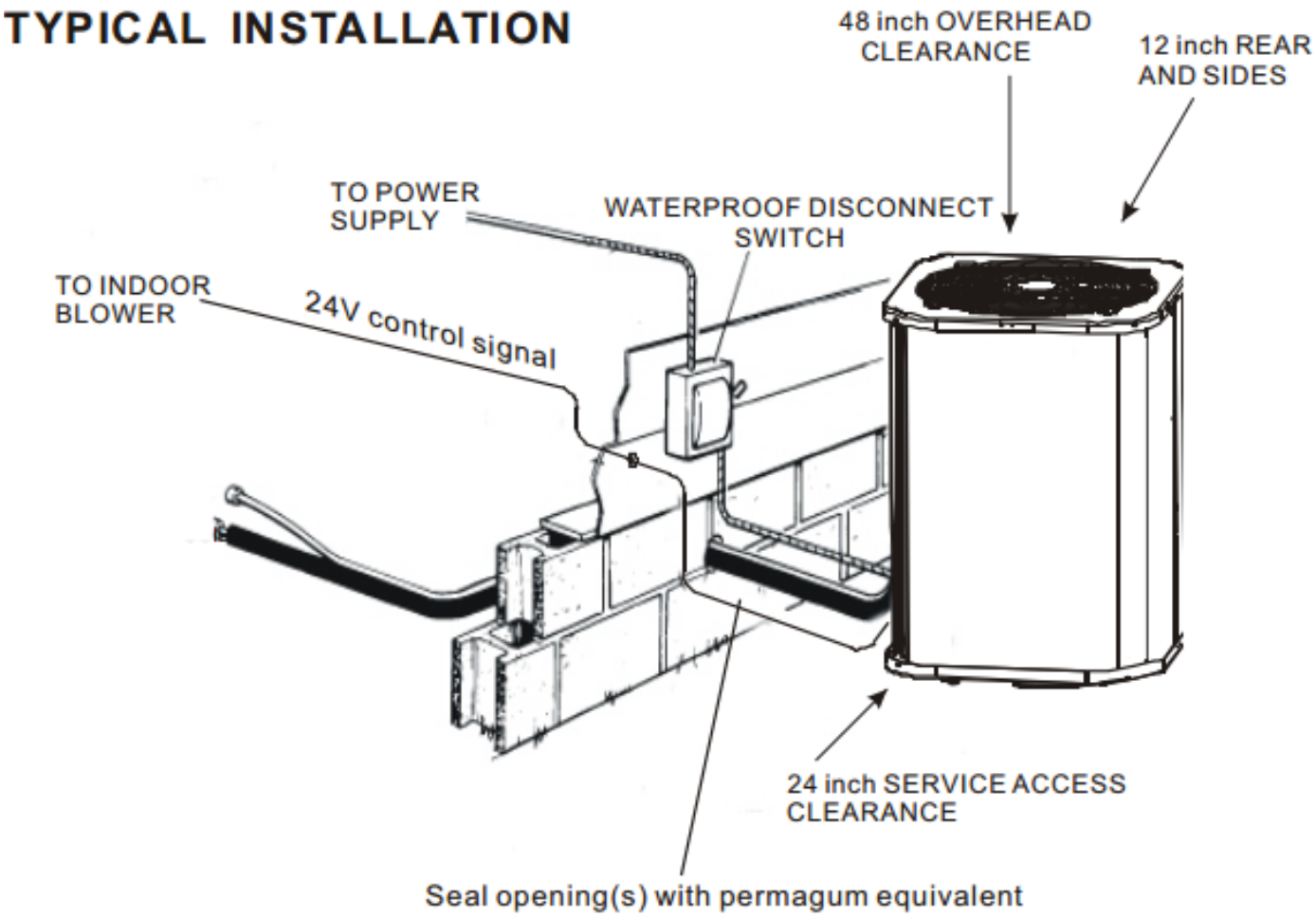
Unit Model	Dimensions(mm)			Refrigerant Connection Line Size(mm)			
	A	B	C	Liquid(Φ)		Vapor(?)	
				LF	RF	LF	RF
18	633	554	554	9.52		19.05	
24(30)	633	554	554				
30	633	554	554				
36	633	740	740				
42	835	740	740				
48	835	740	740			22	
60	835	740	740				



NOTE: LF means cooling only model; RF means heat pump model.

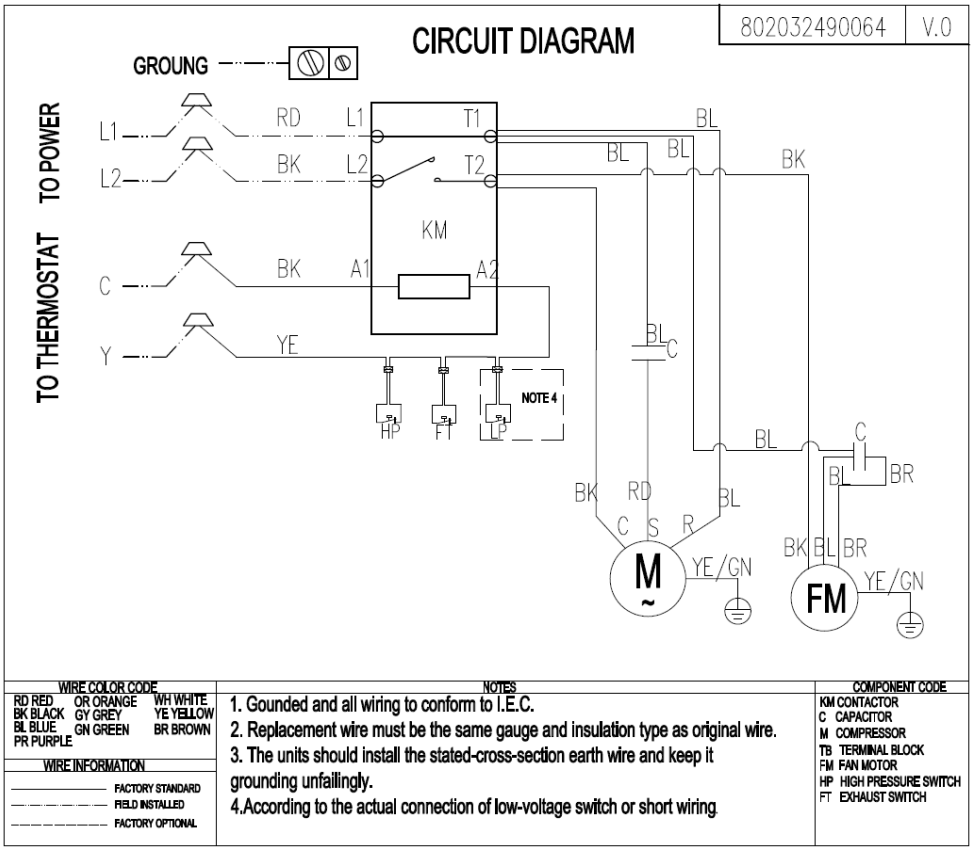
2. Service Space





3. Wiring Diagrams

SEER 14 Cooling only

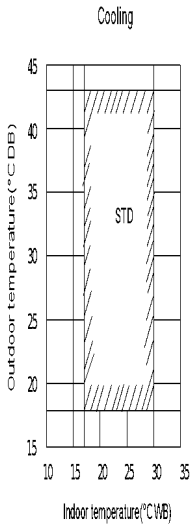


4. Electric Characteristics

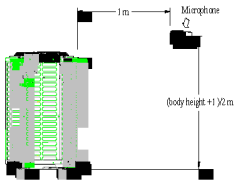
Model	Outdoor Unit				
	Hz	Voltage	Min.	Max.	Outdoor motor (kw)
CTV14CN018A	60	208~230V	198V	242V	0.15
CTV14CN024A	60	208~230V	198V	242V	0.18
CTV14CN030A	60	208~230V	198V	242V	0.21
CTV14CN036A	60	208~230V	198V	242V	0.21
CTV14CN042A	60	208~230V	198V	242V	0.21
CTV14CN046A	60	208~230V	198V	242V	0.51
CTV14CN060A	60	208~230V	198V	242V	0.51

5. Operation Limits

Operation mode	Outdoor temperature(℃)	Room temperature(℃)
Cooling operation	18~43	17~30



6. Sound Levels

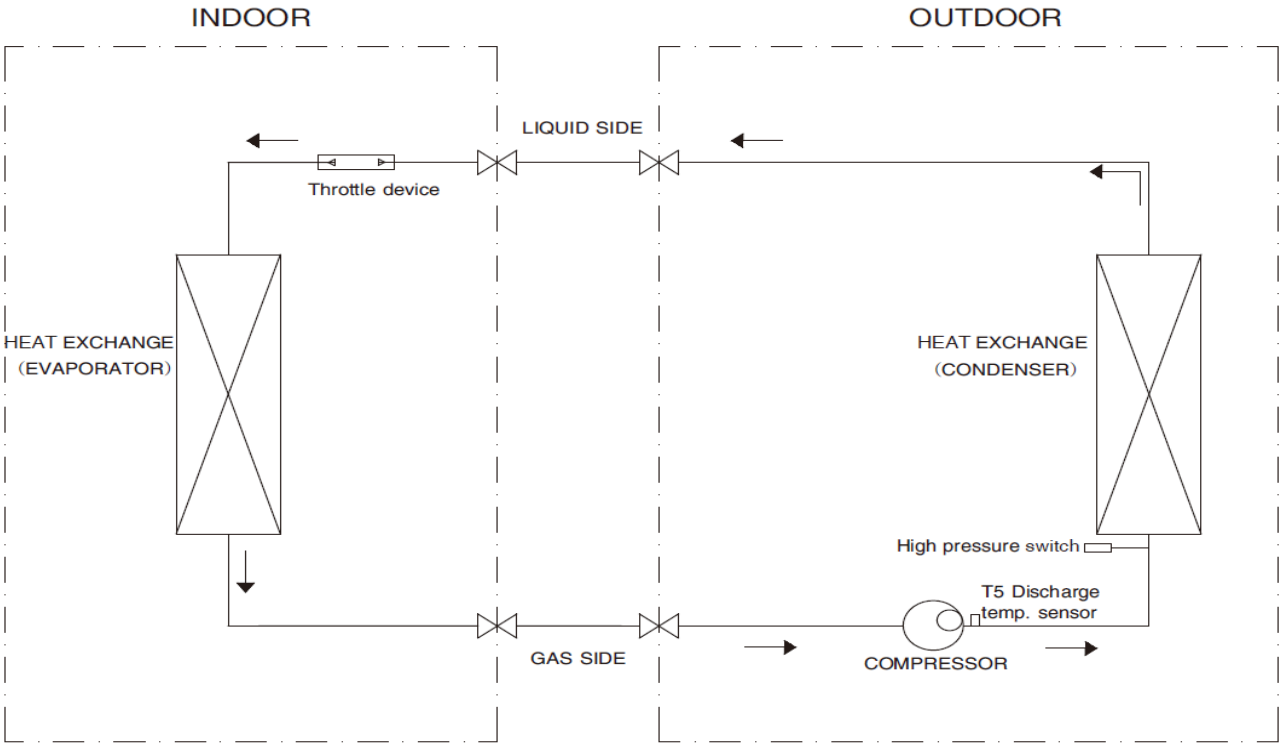


Model	Noise level dB(A)
CTA14C018A	57
CTA14C024A	56
CTA14C030A	60
CTA14C036A	60
CTA14C042A	60
CTA14C046A	63
CTA14C060A	63

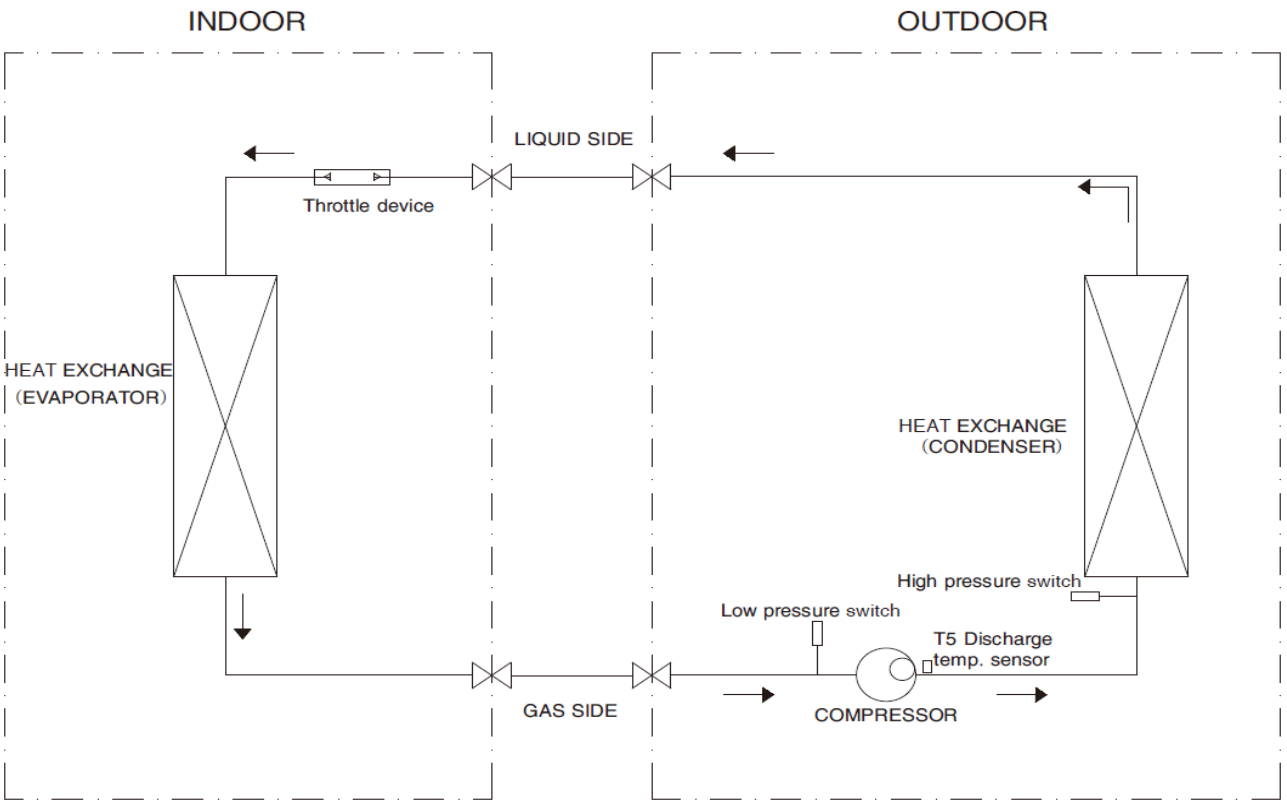
Note: Sound level is measured at a point 1 m in front of the unit, at a height of (Unit body height +1)/2 m.

7. Refrigerate diagram

Applicable for 18K,24K,30K,36K cooling only type



Applicable for 42K,48K, 60K cooling only type



Part 4 Installation

1. Precaution on Installation

1.1. Measure the necessary length of the connecting pipe, and make it by the following way.

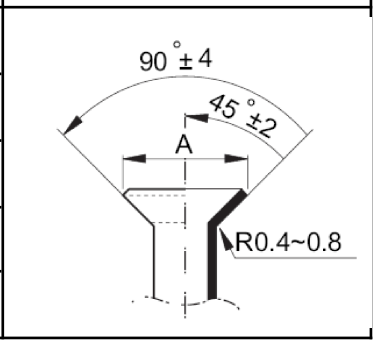
a. Connect the indoor unit at first, then the outdoor unit.

Bend the tubing in proper way. Do not harm them.

CAUTIONS:

- Daub the surfaces of the flare pipe and the joint nuts with frozen oil, and wrench it for 3~4 rounds
- With hands before fasten the flare nuts.

Be sure to use two wrenches simultaneously when you connect or disconnect the pipes.

Pipe gauge	Tightening torque	Flare dimension A Min (mm)	Max	Flare shape
Φ6.35	15～16N.m (153～163 kgf.cm)	8.3	8.7	
Φ9.52	25～26N.m (255～265kgf.cm)	12.0	12.4	
Φ12.7	35～36N.m (357～367kgf.cm)	15.4	15.8	
Φ15.9	45～47N.m (459～480 kgf.cm)	18.6	19.1	
Φ19.1	65～67N.m (663～684kgf.cm)	22.9	23.3	

b. The stop value of the outdoor unit should be closed absolutely (as original state). Every time you connect it, first loosen the nuts at the part of stop value, then connect the flare pipe immediately (in 5 minutes). If the nuts have been loosened for a long time, dusts and other impurities may enter the pipe system and may cause malfunction later. So please expel the air out of the pipe with refrigerant before connection.

c. Expel the air after connecting the refrigerant pipe with the indoor unit and the outdoor unit. Then fasten the nuts at the repair-points.

1.2. Locate The Pipe

a. Drill a hole in the wall (suitable just for the size of the wall conduit), then set on the fittings such as the wall conduit and its cover.

b. Bind the connecting pipe and the cables together tightly with binding tapes. Do not let air in, which will cause water leakage by condensation.

c. Pass the bound connecting pipe through the wall conduit from outside. Be careful of the pipe allocation to do no damage to the tubing.

1.3. Connect the pipes.

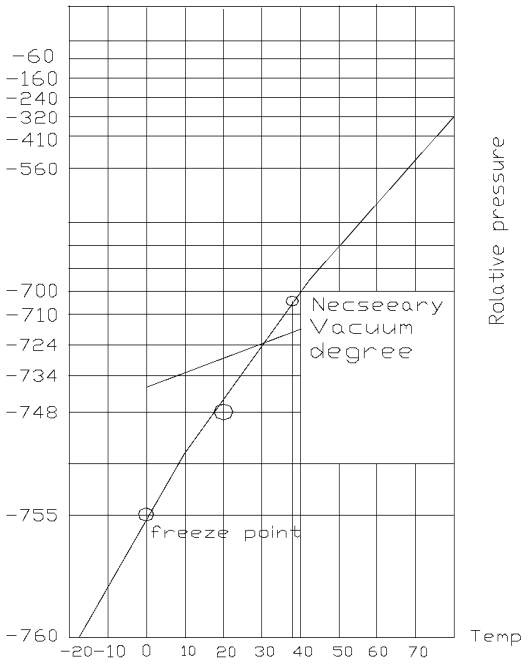
1.4. Then, open the stem of stop values of the outdoor unit to make the refrigerant pipe connecting the indoor unit with the outdoor unit in fluent flow.

1.5. Be sure of no leakage by checking it with leak detector or soap water.

1.6. Cover the joint of the connecting pipe to the indoor unit with the soundproof / insulating sheath (fittings), and bind it well with the tapes to prevent leakage.

2. Vacuum Dry and Leakage Checking

2.1 Vacuum Dry: use vacuum pump to change the moisture (liquid) into steam (gas) in the pipe and discharge it out of the pipe to make the pipe dry. Under one atmospheric pressure, the boiling point of water(steam temperature) is 100℃. Use vacuum pump to make the pressure in the pipe near vacuum state, the boiling point of water falls relatively. When it falls under outdoor temperature, the moisture in the pipe will be vaporized.

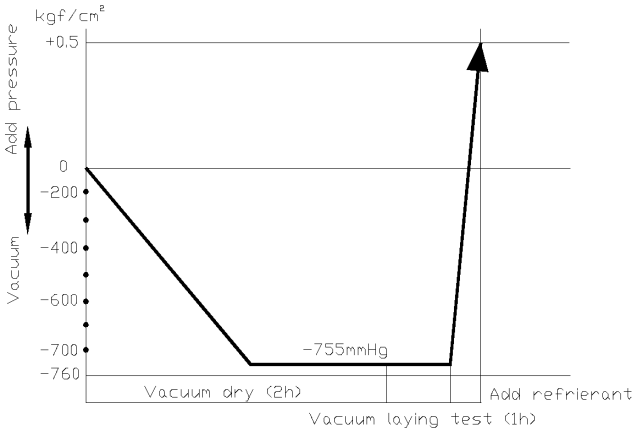


2.2 Vacuum dry procedure

There are two methods of vacuum dry due to different construction environment: common vacuum dry, special vacuum dry.

①. Common vacuum dry procedure

- Vacuum dry (for the first time)---connect the all-purpose detector to the inlet of liquid pipe and gas pipe, and run the vacuum pump more than two hours (the vacuum pump should be below -755mmHg)
- If the pump can't achieve below -755mmHg after pumping 2 hours, moisture or leakage point will still exist in the pipe. At this time, it should be pumped 1 hour more.
- If the pump can't achieve -755mmHg after pumping 3 hours, please check if there are some leakage points.
- Vacuum placement test: place 1 hour when it achieves -755mmHg, pass if the vacuum watch shows no rising. If it rises, it shows there's moisture or leakage point.
- Vacuuming from liquid pipe and gas pipe at the same time.
- Sketch map of common vacuum dry procedure.



②. Special vacuum dry procedure

- This vacuum dry method is used in the following conditions:
- There's moisture when flushing the refrigerant pipe.
- Rainwater may enter into the pipe.
- Vacuum dry for the first time …… 2h pumping

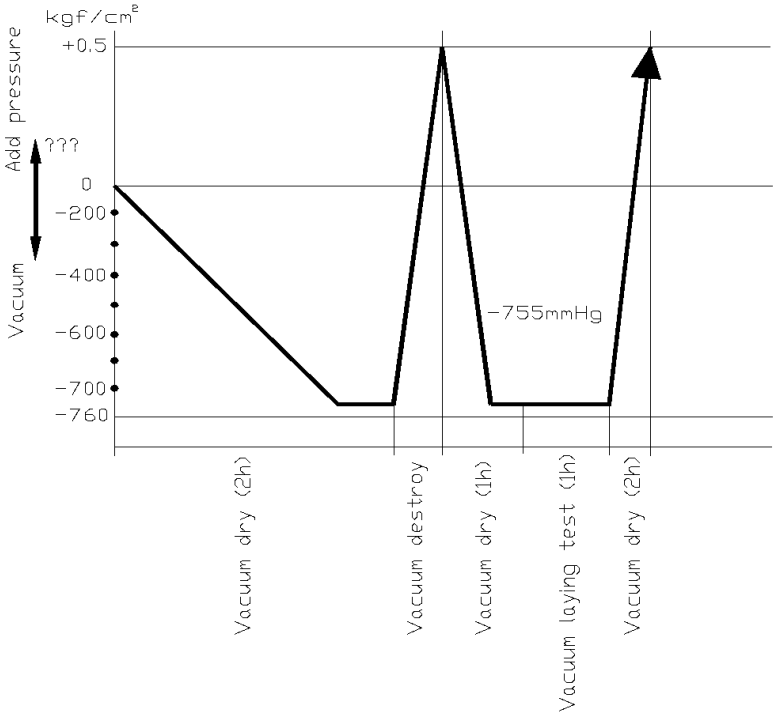
③. Vacuum destroy for the second time …… Fill nitrogen to 0.5Kgf/cm^2
Because nitrogen is for drying gas, it has vacuum drying effect during vacuum destroy. But if the moisture is too much, this method can't dry thoroughly. So, please pay more attention to prevent water entering and forming condensation water.

④. Vacuum dry for the second time……1h pumping

Determinant: Pass if achieving below -755mmHg. If -755mmHg can't be achieved in 2h, repeat procedure ③ and ④.

⑤. Vacuum placing test …… 1h

⑥. Sketch map of special vacuum dry procedure



3. Additional Refrigerant Charge

Caution

● Refrigerant cannot be charged until field wiring has been completed.

● Refrigerant may only be charged after performing the leak test and the vacuum pumping.

● When charging a system, care shall be taken that its maximum permissible charge is never exceeded, in view of the danger of liquid hammer.

● Charging with an unsuitable substance may cause explosions and accidents, so always ensure that the appropriate refrigerant is charged.

● Refrigerant containers shall be opened slowly.

● Always use protective gloves and protect your eyes when charging refrigerant.

The outdoor unit is factory charged with refrigerant. Calculate the added refrigerant according to the diameter and the length of the liquid side pipe of the outdoor unit/indoor unit

R(g) D(mm) / L(m)	φ6.35	Φ9.52	Φ12.7
Less than 5m (One-way)	—	—	—
Added Refrigerant When Over 5m(One-way)	20g/m×(L-5)	40g/m×(L-5)	60g/m×(L-5)

Remark:

R (g): Additional refrigerant to be charged
L (m): The length of the refrigerant pipe (one-way)
D (mm): Liquid side piping

4. Insulation Work

4.1 Insulation material and thickness

4.1.1. Insulation material

Insulation material should adopt the material which is able to endure the pipe's temperature: no less than 70℃ in the high-pressure side, no less than 120℃ in the low-pressure side(For the cooling type machine, no requirements at the low-pressure side.)

◆ Example: Heat pump type----Heat-resistant Polyethylene foam (withstand above 120℃)
Cooling only type----Polyethylene foam (withstand above 100℃)

4.1.2. Thickness choice for insulation material

Insulation material thickness is as follows:

	Pipe diameter (mm)	Adiabatic material thickness
Refrigerant pipe	Φ6.4—Φ25.4	10mm
	Φ28.6—Φ38.1	15mm
Drainage pipe	Inner diameterΦ20—Φ32	6mm

4.2 Refrigerant pipe insulation

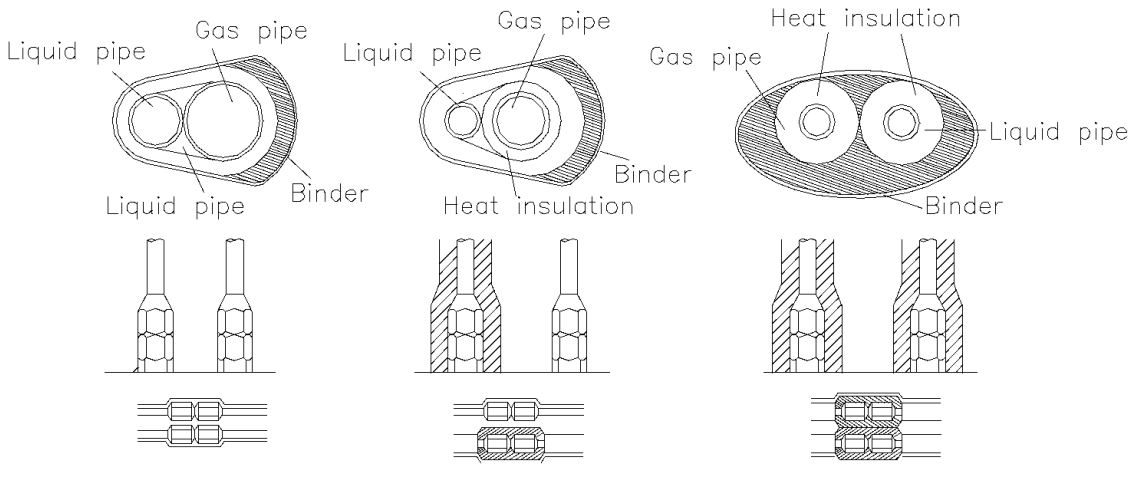
4.2.1. Work Procedure

① Before laying the pipes, the non-jointing parts and non-connection parts should be heat insulated.

② When the gas proof test is eligible, the jointing area, expanding area and the flange area should be heat insulated.

4.2.2. Insulation for non-jointing parts and non-connection parts

wrong	right	
Gas pipe and liquid pipe should not be put together to insulate	Insulate the gas pipe (cooling only)	Insulate the gas pipe and liquid pipe

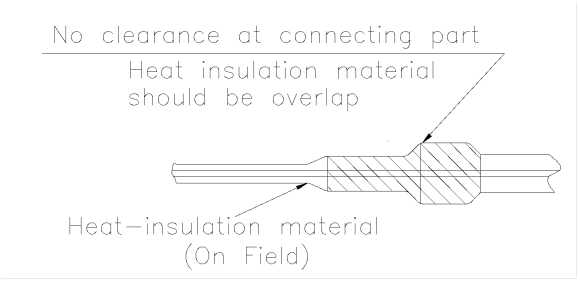


For construction convenience, before laying pipes, use insulation material to insulate the pipes to be deal with, at the same time, at two ends of the pipe, remain some length not to be insulated, in order to be welded and check the leakage after laying the pipes.

4.2.3. Insulate for the jointing area, expanding area and the flange area

① Insulate for the jointing area, expanding area and the flange area should be done after checking leakage of the pipes

② Make sure there's no clearance in the joining part of the accessorial insulation material and local preparative insulation material.



4.3 Drainage pipe insulation

The connection part should be insulated, or else water will be condensing at the non-insulation part.

4.4 Note

5.4.1 The jointing area, expanding area and the flange area should be heat insulated after passing the pressure test.

4.4.2 The gas and liquid pipe should be heat insulated individually, the connecting part should be heat insulated individually.

4.4.3 Use the attached heat-insulation material to insulate the pipe connections (pipes' tie-in ,expand nut) of the indoor unit.

5.Test Operation

(1) The test operation must be carried out after the entire installation has been completed.
(2) Please confirm the following points before the test operation.

- The indoor unit and outdoor unit are installed properly.
- Tubing and wiring are correctly completed.
- The refrigerant pipe system is leakage-checked.
- The drainage is unimpeded.
- The ground wiring is connected correctly.
- The length of the tubing and the added stow capacity of the refrigerant have been recorded.
- The power voltage fits the rated voltage of the air conditioner.
- There is no obstacle at the outlet and inlet of the outdoor and indoor units.
- The gas-side and liquid-side stop values are both opened.
- The air conditioner is pre-heated by turning on the power.

(3) According to the user's requirement, install the remote controller when the remote controller's signal can reach the indoor unit smoothly.
(4) Test operation
Set the air conditioner under the mode of "COOLING" with the remote controller, and check the following points.
Indoor unit

- Whether the switch on the remote controller works well.
- Whether the buttons on the remote controller works well.Whether the air flow louver moves normally.
- Whether the room temperature is adjusted well.
- Whether the indicator lights normally.
- Whether the temporary buttons works well.
- Whether the drainage is normal.
- Whether there is vibration or abnormal noise during operation.

Outdoor unit

- Whether there is vibration or abnormal noise during operation.
- Whether the generated wind, noise, or condensed of by the air conditioner have influenced your neighborhood.
- Whether any of the refrigerant is leaked.

Part 5 Unit maintenance

1. Fault indicator of indoor unit

The meaning of the fault indicator:

Display mode	Status description
Green light always on	No system alarm and error, normal standby
Red light always on	Evaporator tube temperature sensor(T 2) failure
Green light always on, yellow light flashing	Evaporator high and low temperature protection
Green light flashing	System is in normal operating status

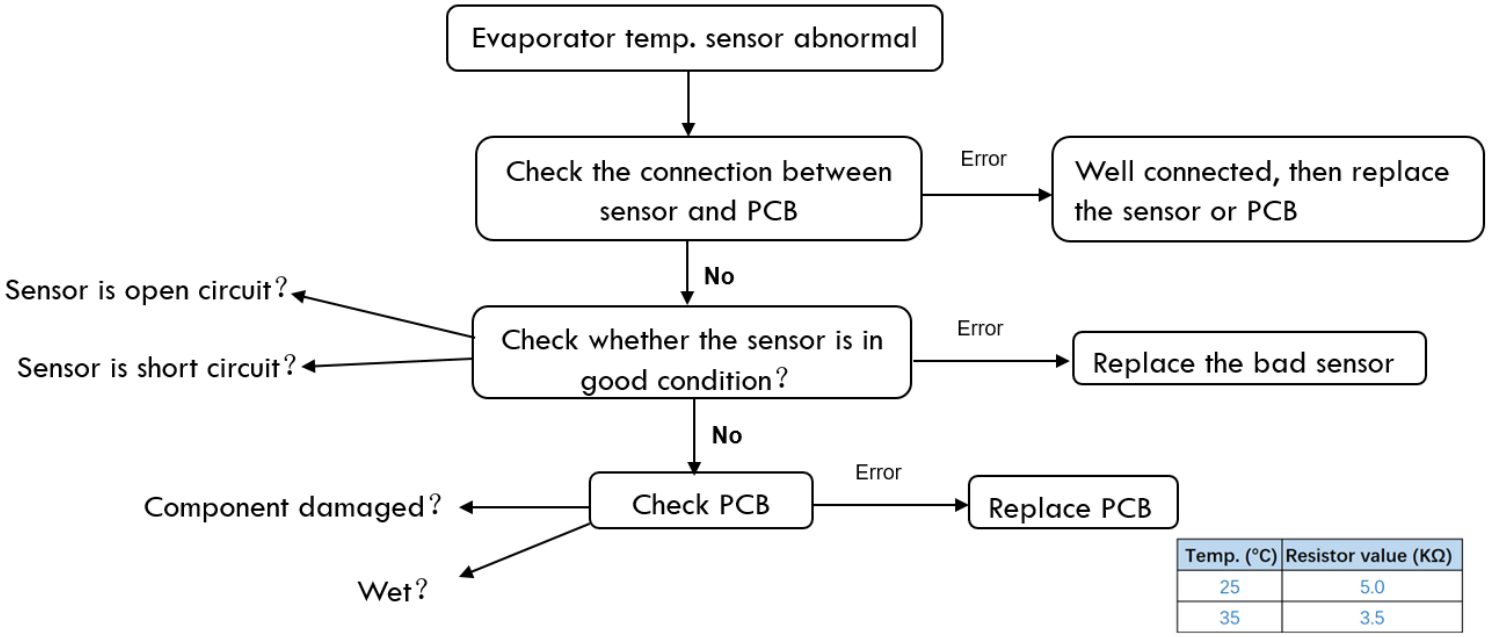
2. Fault indicator of outdoor unit

The meaning of the fault indicator:

Display content		State description
No alarm: Green light flashes Yellow lights	Green light slow flash	Normal standby
	Green light normally on	Normal operation
System Alarm: Green light slow flash Yellow light flashing	(T3)Temperature sensor fault	Yellow light flashes 2 times every 8s
	(T5)Temperature sensor fault	Yellow light flashes 8 times every 8s
	Low pressure alarm	Yellow light flashes 6 times every 8s
	High pressure alarm	Yellow light flashes 1 times every 8s
	(T3)High temperature protection	Yellow light flashes 9 times every 8s
	High exhaust temperature protection	Yellow light flashes 5 times every 8s
System lock: Green light go out Yellow light normally on	3 high/low voltage protection in 20 minutes	It needs to be reenergized and it needs to work
	Exhaust temperature is too high for 3 times within 20 minutes	
	T3 high temperature protection 3 times within 20 minutes	

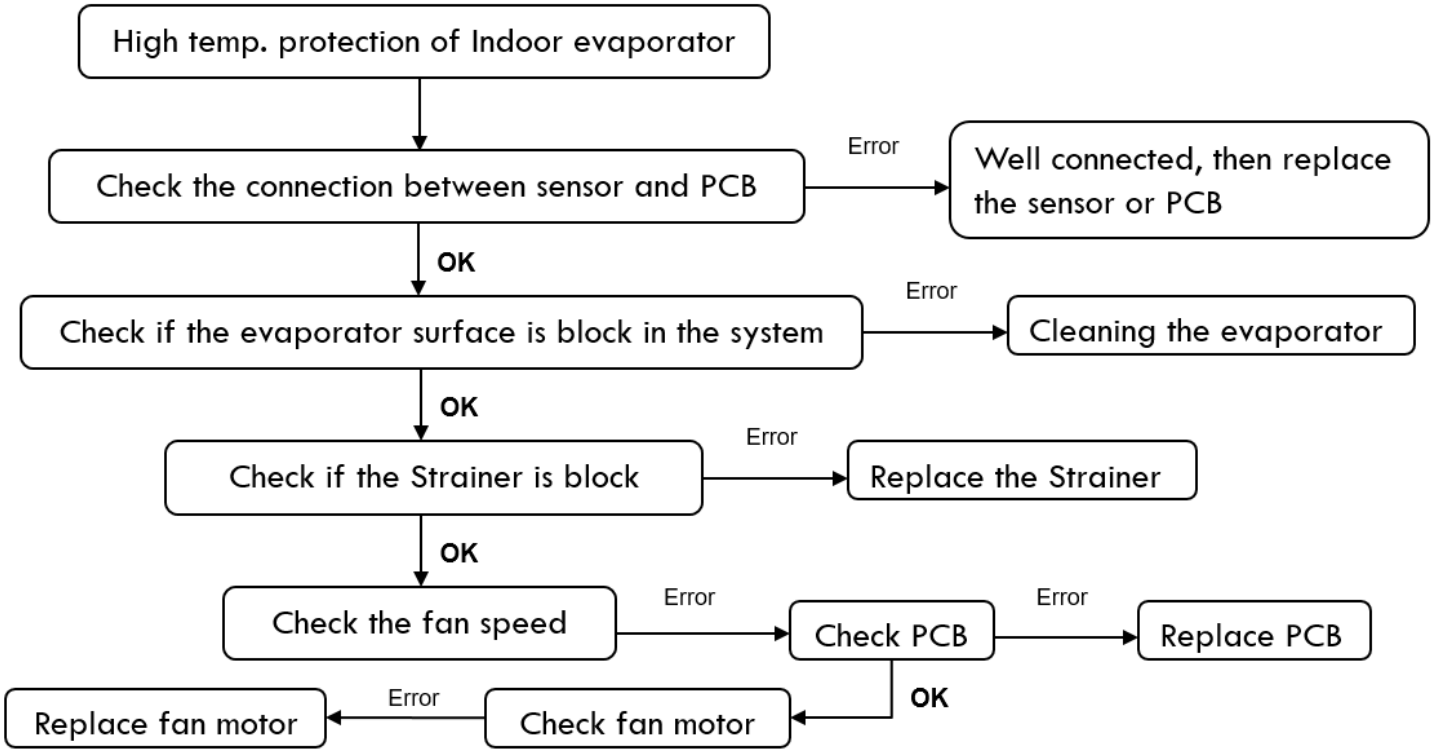
3. Flow chart of troubleshooting

3.1 Evaporator temperature sensor fault

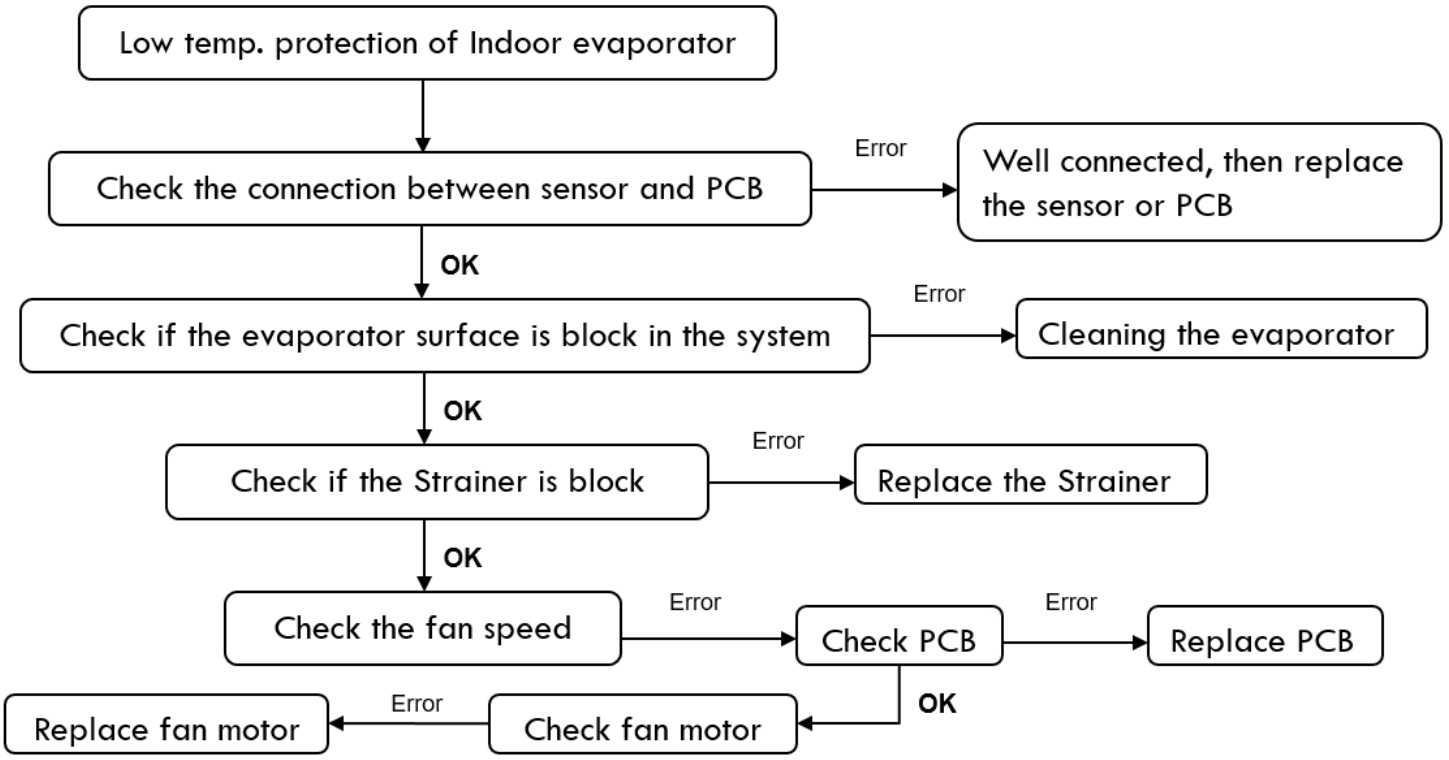


Temp. (°C)	Resistor value (KΩ)
25	5.0
35	3.5

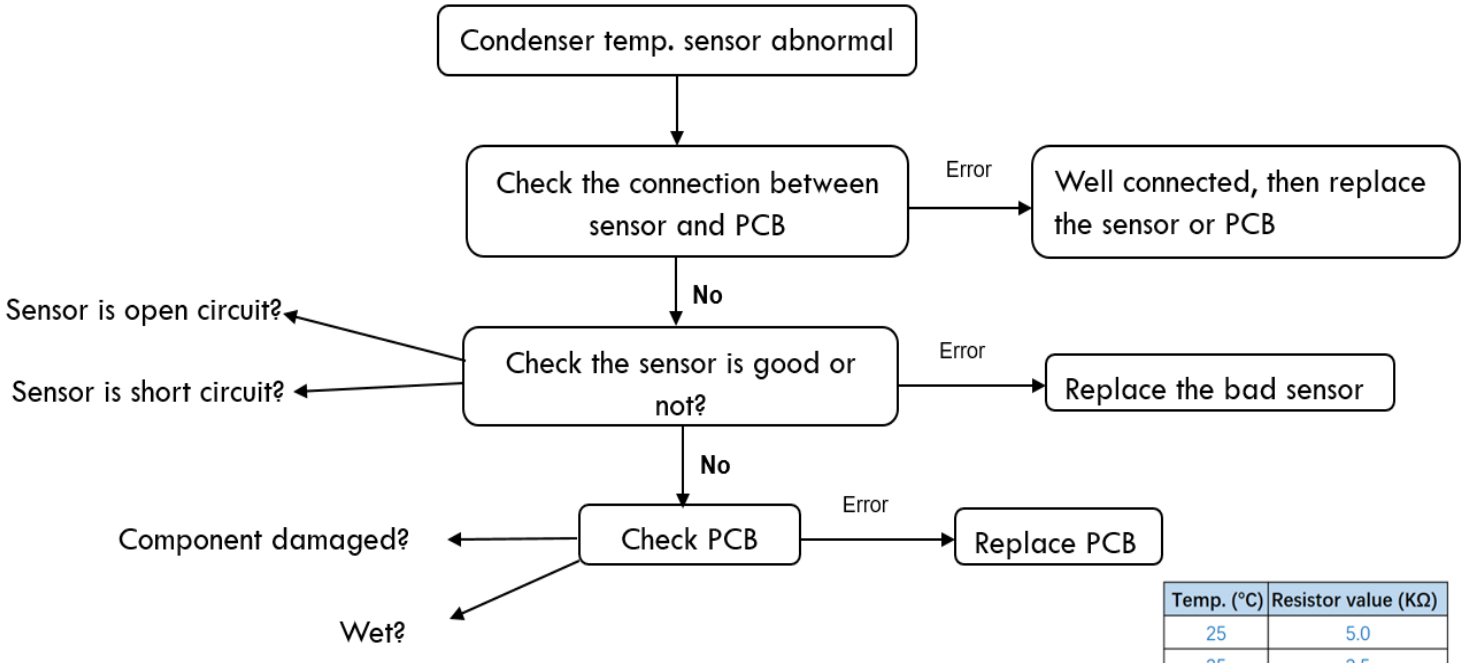
3.2 Evaporator high temperature protection(For heating mode)



3.3 Evaporator low temperature protection (For cooling mode)

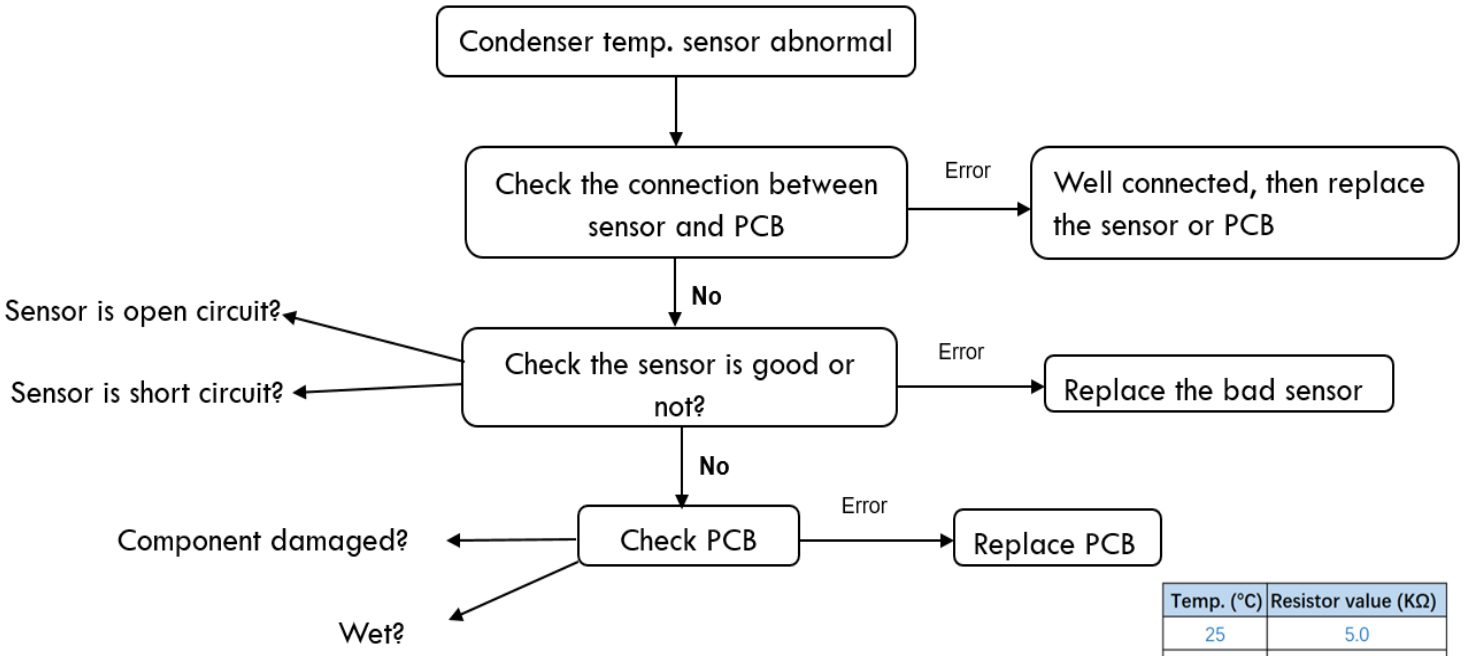


3.4 T3 Condenser Temperature sensor fault



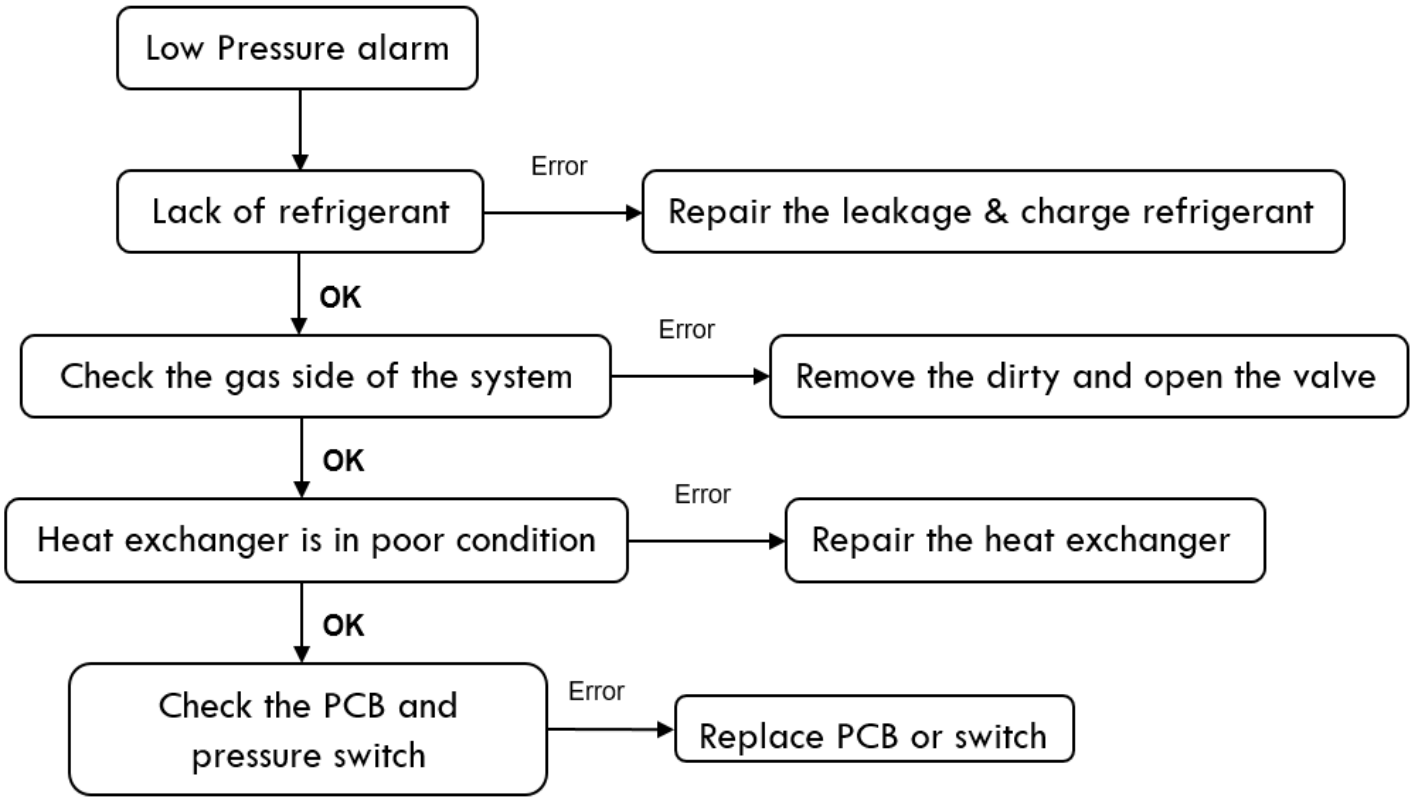
Temp. (°C)	Resistor value (KΩ)
25	5.0
35	3.5

3.5 T5 discharge temperature sensor fault

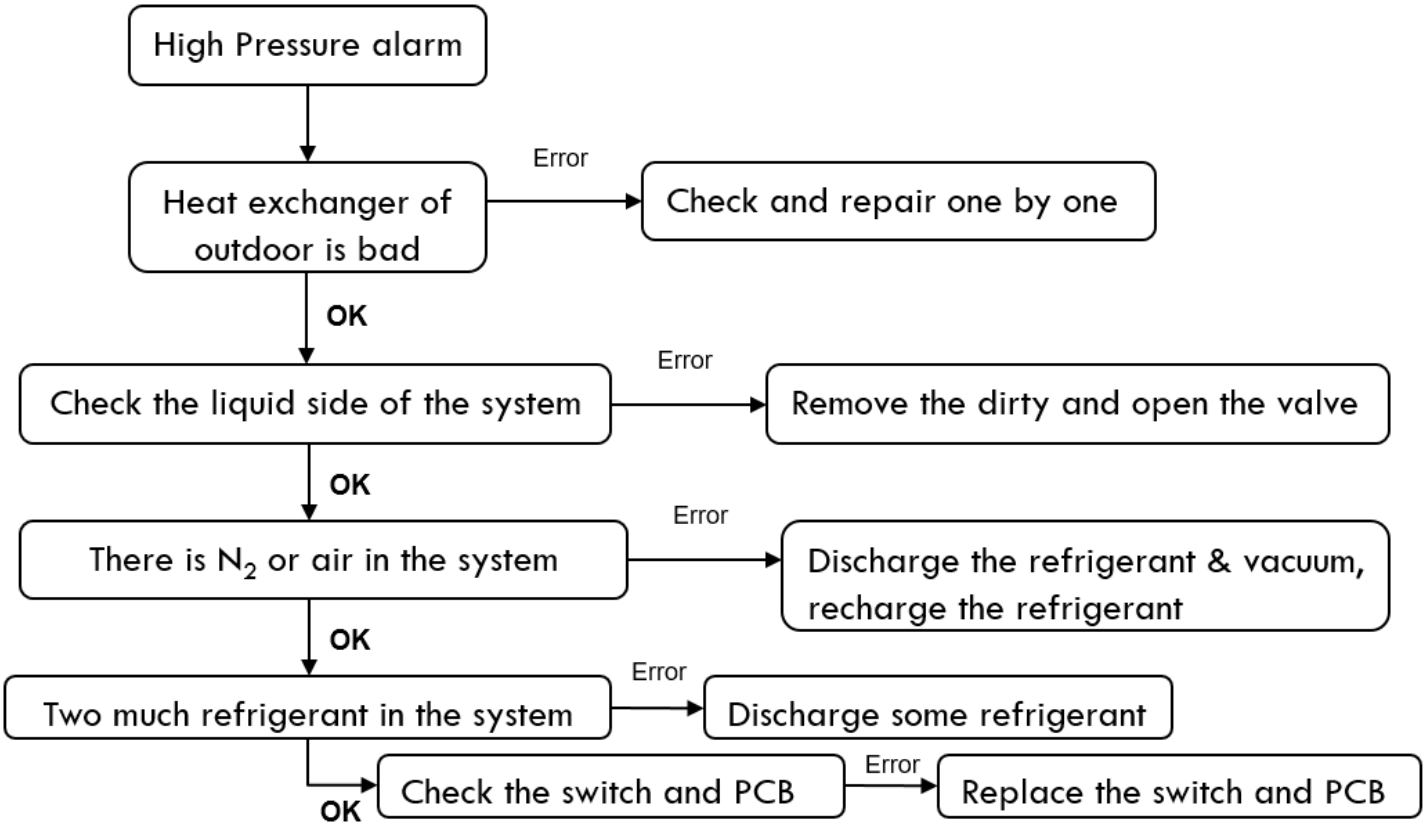


Temp. (°C)	Resistor value (KΩ)
25	5.0
35	3.5

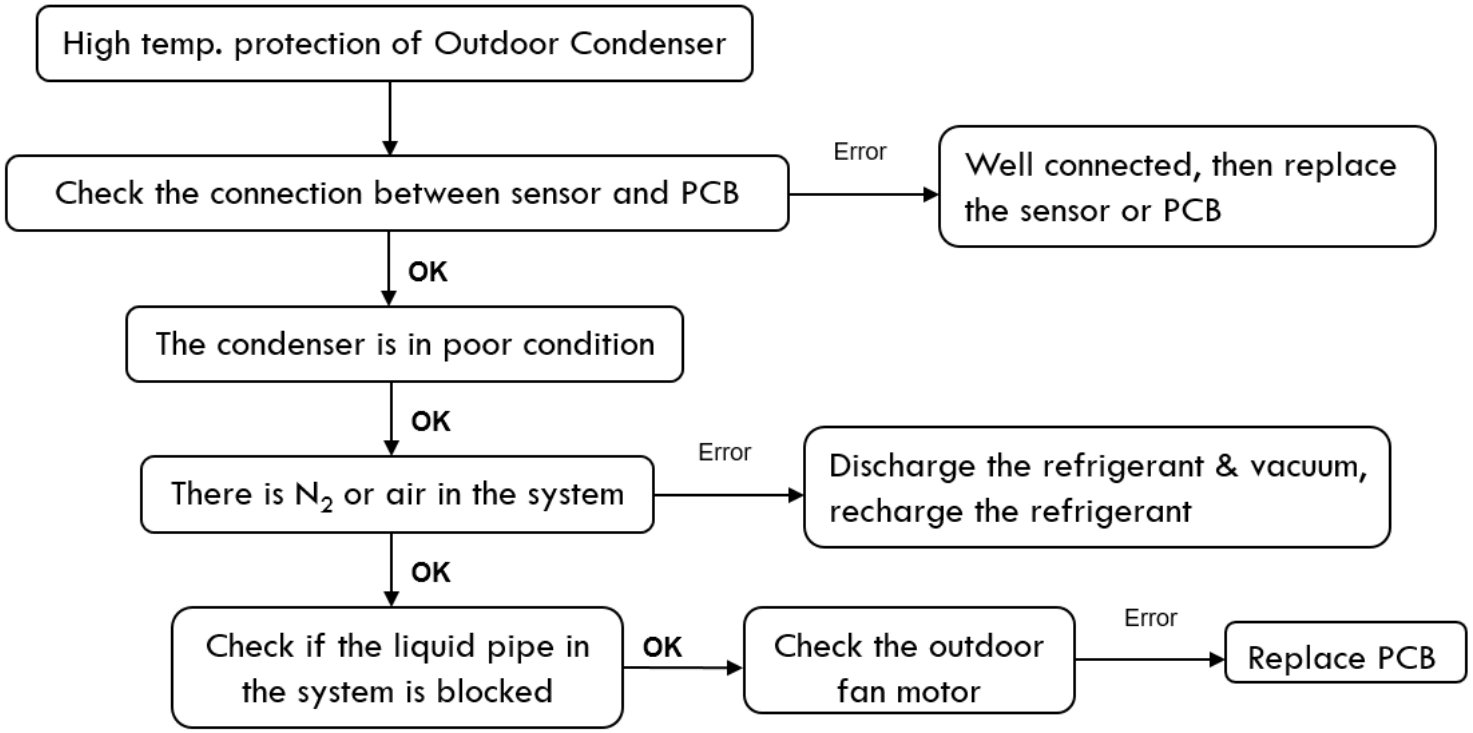
3.6 Low pressure alarm



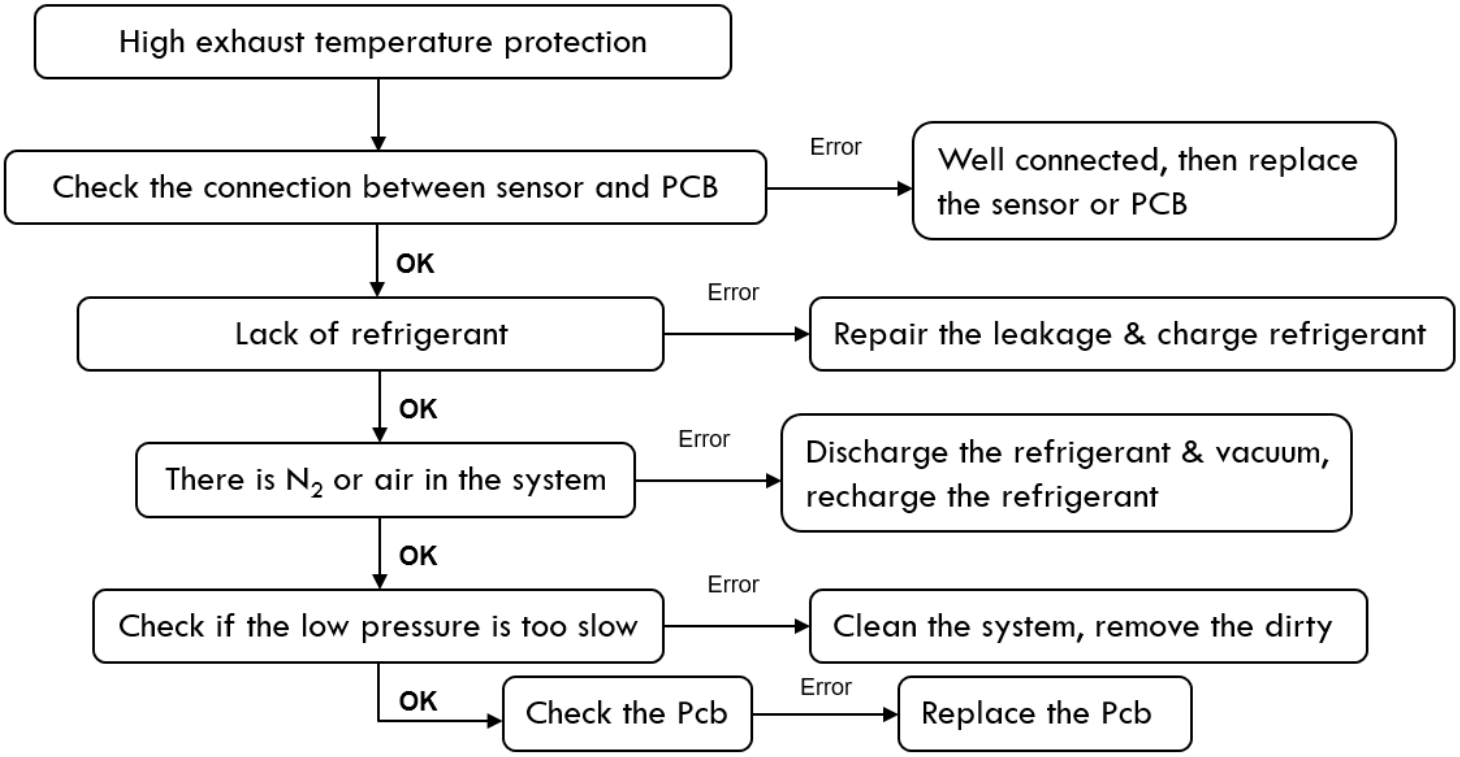
3.7 High pressure alarm



3.8 T3 High temperature protection

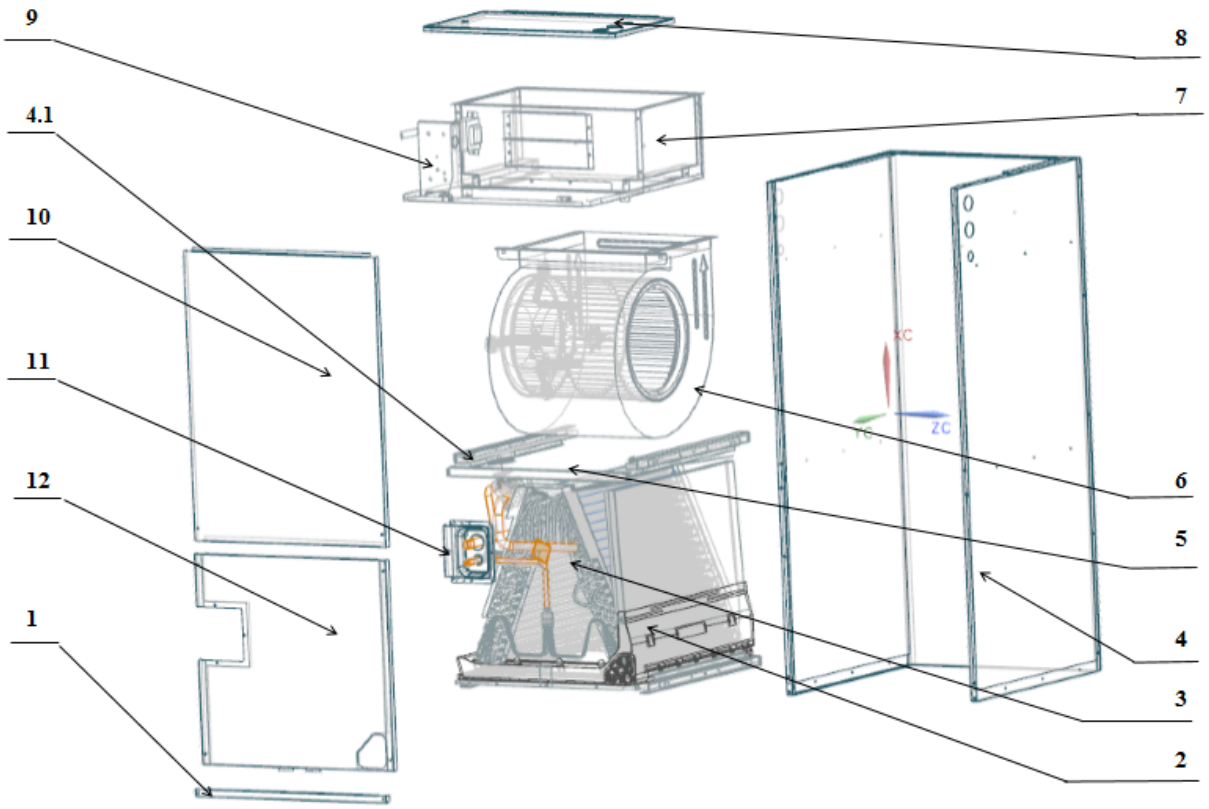


3.9 High exhaust temperature protection



4. Exploded views and part list

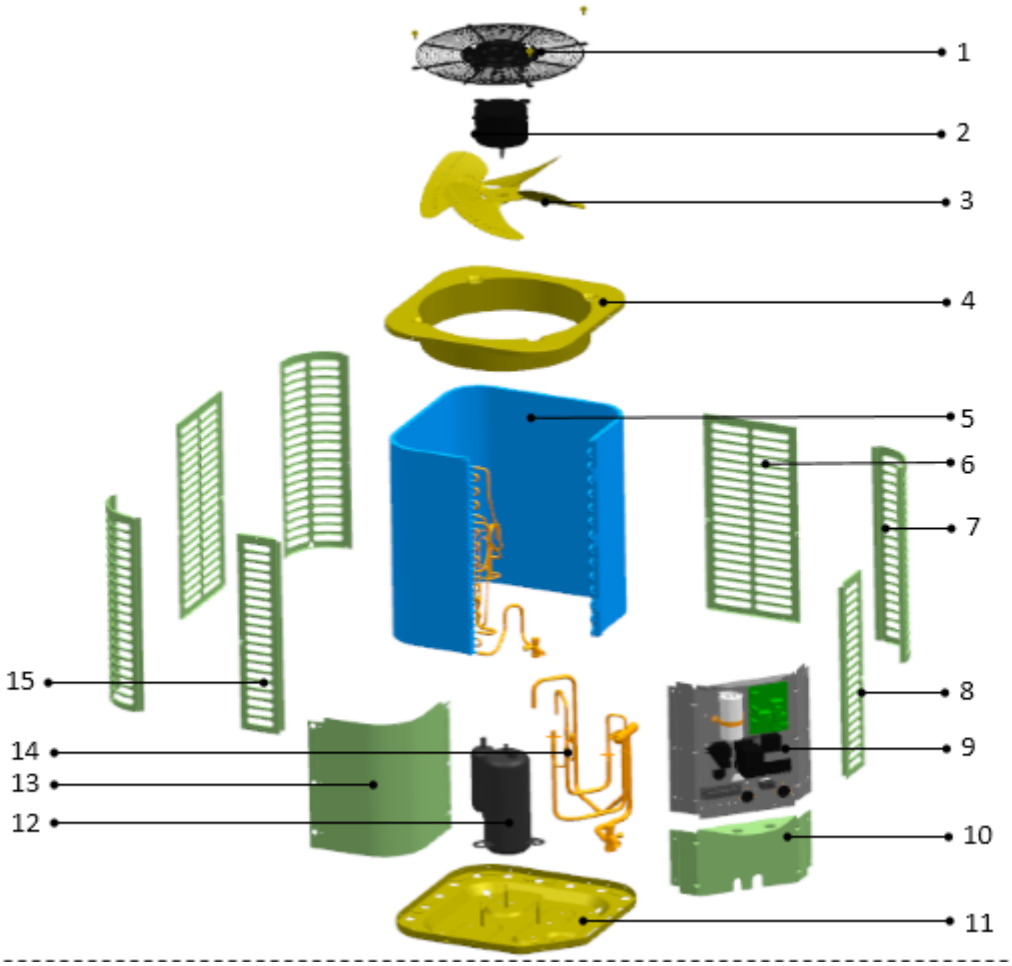
Air Handler Indoor unit



No.	Part Name	Quantity	No.	Part Name	Quantity
1	Filter Cover plate	1	4.1	Water pan supporter assembly	4
2	Water pan components	1	5	Supporter	2
2.1	Water pan# 1	1	6.1	Right Volute Wind Wheel	1
2.2	Water pan# 2	1	6.2	Indoor Motor	1
2.3	Water pan fixed block	1	7	Fan Motor Fixing plate assembly	1
2.4	Water pan brace	2	7.1	Fan Motor Fixing plate	1
3	Evaporator parts	1	7.2	Wind Wheel Fixed Block	2
3.0	Evaporator assembly	1	7.3	Fixed plate on air duct	1
3.1	Air header Assembly	1	7.4	Stator	2
3.2	Diverter Assembly	1	7.5	air duct left stationary plate	1
3.3	Evaporator	2	7.6	air duct right stationary plate	1
3.4	Evaporator Baffle	1	8	Cover of electric control assembly	1
3.5	Evaporator Baffle	1	9	Electronic Control Components	1
3.6	Evaporator Water Baffle #1	2	9.1	Electronic Control Mounting Plate	1
3.7	Evaporator Water Baffle #2	1	9.2	Main Board	1

3.8	Evaporator Water Baffle #3	1	**9.3**	Transformer	1
3.9	Evaporator Fixing Plate #1	1	**10**	Upper side plate assembly	1
3.10	Evaporator Fixing Plate #2	1	**11**	Pipe Cover plate assembly	1
3.11	Evaporator Junction Plate	1	**12**	Lower side plate assembly	1
4	Chassis assembly	1			

Top discharge outdoor unit



No.	Part Name	Quantity	No.	Part Name	Quantity
1	Cover net	1	9	Electronic components	1
2	Outdoor motor	1	9.1	Electric install board weld assembly	1
3	Axial-flow fan	1	9.2	AC Contactor	1
4	Top cover assembly	1	9.3	Fan motor capacitor	1
5	Condenser assembly	1	9.4	Compressor capacitor	1
5.1	Condenser	1	10	Left side panel	1
5.2	Condenser input pipe assembly	1	11	Chassis assembly	1
5.3	Condenser output pipe assembly	1	12	Compressor	1
5.3.1	High-pressure valves weld assembly	1	13	Top panel	1

5.3.1.1	S.TL-ZL-FTF-A02	1	14	Low pressure valve welding components	1
6	Rear side-panel	2	14.1	Block valve body	1
7	Support board	3	14.2	Pressure switch	1
8	Right side panel	1	15	Left side panel	1