

Commercial Air Conditioning

SERVICE MANUAL



AP48KN1EAA(H)



1U48IN1EAB

Feature:

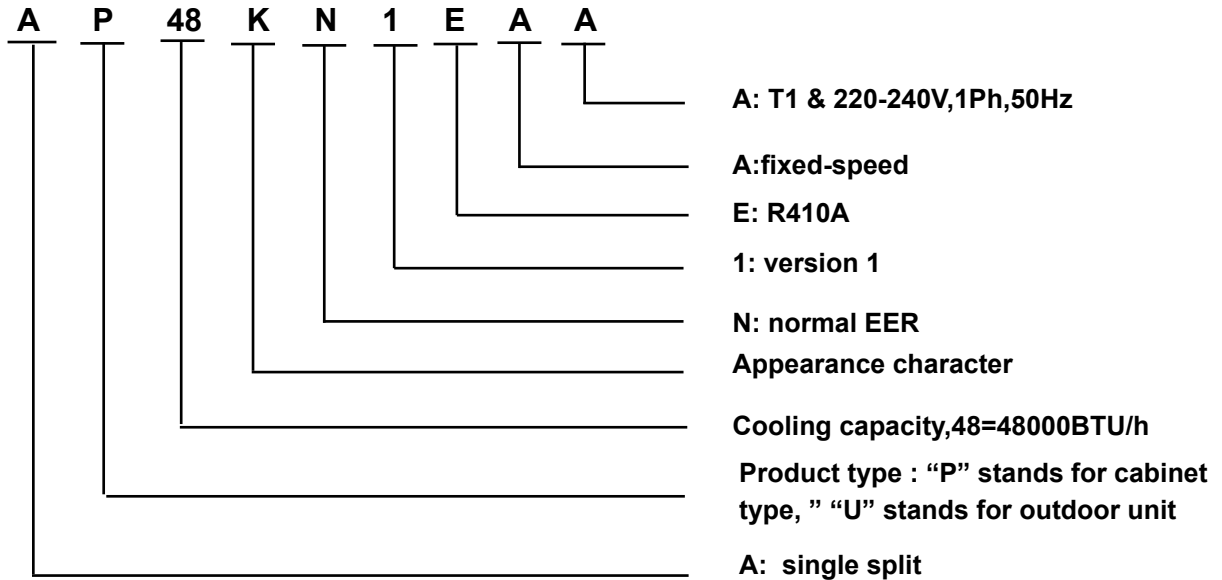
- High Reliability
- Double fan outdoor unit
- Long Pipe Length & High Height Drop

Content

1. DESCRIPTION OF PRODUCTS & FEATURES.....	1
2. Specification.....	2
3. Dimension.....	4
4. Piping diagram.....	5
5. Installation.....	6
6. Noise level.....	22
7. Wiring diagram.....	23
8. PCB photo.....	25
9. Electric control functions.....	27
10. Failure code.....	39
11. Troubleshooting.....	40
12. Sensor characteristic.....	48

1. DESCRIPTION OF PRODUCTS & FEATURES

1.1. Products code explanation



1.2 Product features

•High Efficiency , Energy Saving:

High EER compressor: EER up to 2.85, High efficiency fan

•Double fan outdoor unit

The air conditioner adopts two stepping motors to combine vertical and horizontal auto-swing to circulate cool/warm air to every corner of the room

•Long Pipe Length & High Height Drop

Piping Length 30m, Height drop 20m(Heat pump)

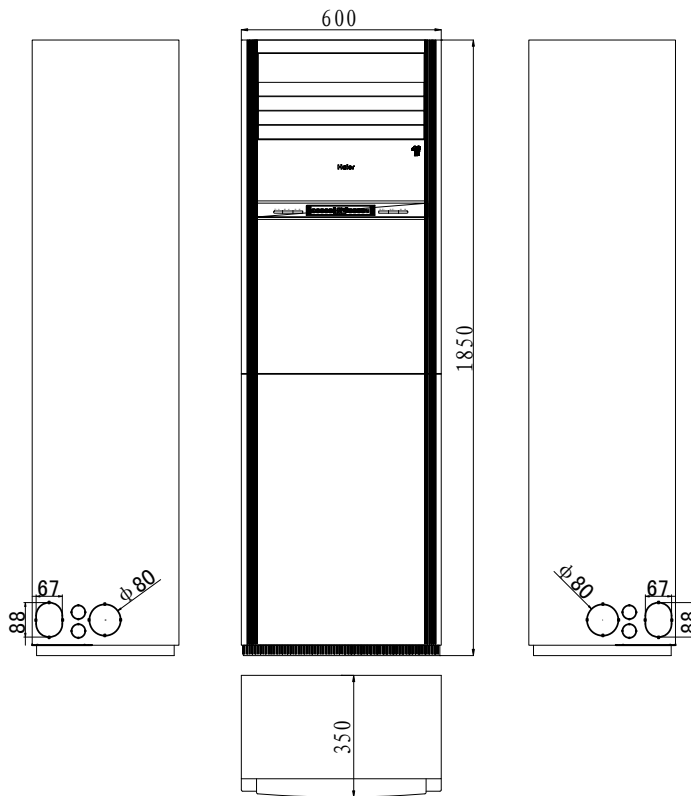
2. Specification

Item	Model	1U48IN1EAB/AP48KN1EAA (H)		
Function		cooling	heating	
Capacity	BTU/h	48000	51500	
Capacity	kW	14.1	15.1	
Sensible heat ratio				
Rated power input	KW	4.9	5.1	
Max. power input	KW	6.2	8.6	
EER or COP	W/W	2.85	2.95	
Dehumidifying capacity	10 ⁻³ ×m ³ /h	5		
Power cable	section	5G×4.0mm ²		
Signal cable	section	4G×2.5mm ²		
Connecting cable	section	4G×2.5mm ²		
Wired control cable (for wired control unit)	section	/	/	
Power source	N, V, Hz	3, 380~415,50		
Rated /Max. Running current	A / A	9.0A/11.2A	9.2A/23.6A	
Start Current	A	62		
Class of anti electric shock		CLASS I		
Circuit breaker	A	30		
Max. operating pressure of heat side	Mpa	4.15	4.15	
Max. operating pressure of cold side	Mpa	4.15	4.15	
Indoor unit	Unit model (color)		AP48KN1EAA (H)	
	Fan	Type × Number	centrifugal*1	
		Speed(H-M-L)	r/min	430/400/370
		Fan motor output power	kW	0.09
		Air-flow(H-M-L)	m ³ /h	1800
	Heat exchanger	Type / Diameter	mm	inner grooved pipe/φ7
		Total Area	m ²	0.45
		Temp. scope	°C	/
	Dimension	External (L×W×H)	mm×mm×mm	1850/600/350
		Package (L×W×H)	mm×mm×mm	1980/660/420
	Air sending angle		/	
	Drainage pipe (material , I.D./O.D.)	mm	PVC 16/20	
	Control type (Remote /wired /model)		Remote	
	Fresh air hole dimension	mm	/	
	Outlet distribution hole dimension	mm	/	
	Electricity Heater	kW	3	
Noise level (H-M-L)	dB(A)	51/48/44		
Weight (Net / Shipping)	kg / kg	60/71		

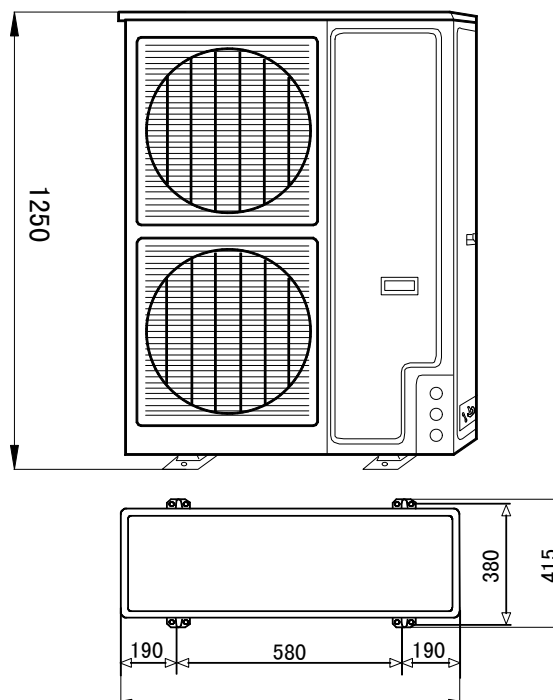
Outdoor unit	Unit model (color)			1U48IN1EAB
	Compressor	Model / Manufacture		ATE518SC3Q9RKA/Shanghai Hitachi Electrical Appliances Co.,Ltd
		Oil model		α68HES-H
		Oil type		α68HES-H
		Oil charging		1600ml
		Type		Rotary
		Protection type		Inner thermal protection
		Starting method		direct start
	Fan	Type × Number		axial×2
		Speed	r/min	840±30/520±40
		Fan motor output power	kW	0.07
		Air-flow(H-M-L)	m³/h	6500
	Heat exchanger	Type / Diameter		TP2U/φ9.52
		Row / Fin pitch		2/1.75
	Dimension	External (L×W×H)		mm×mm×mm 960×340×1250
		Package (L×W×H)		mm×mm×mm 1095×410×1400
	Drainage pipe (material , I.D./O.D.)		mm	none
	Refrigerant control method		mm/mm	capillary
	Defrosting			auto
	Volume of Accumulator		L	3
Noise level		dB(A)	58	
Type of Four way valve			DSF-20	
material of reduce noise			XPE	
crankcase heater power		W	40	
PIPING	Refrigerant	Type / Charge	g	R410A/3400
		Recharge quantity	g/m	65
	Pipe	Liquid	mm	φ9.52
		Gas	mm	φ19.05
	Connecting Method			Flared
	Between I.D & O.D	MAX.Drop	m	20
MAX.Piping length		m	30	
<p>Norminal condition: indoor temperature (cooling): 27℃ DB/19℃ WB, indoor temperature (heating): 20℃ DB Outdoor temperature(cooling): 35℃ DB/24℃ WB, outdoor temperature(heating): 7℃ DB/6℃ WB The noise level will be measured in the third octave band limited values, using a Real Time Analyser calibrated sound intensity meter. It is a sound pressure noise level. The detailed method please refer to the following information:</p>				

3. Dimension

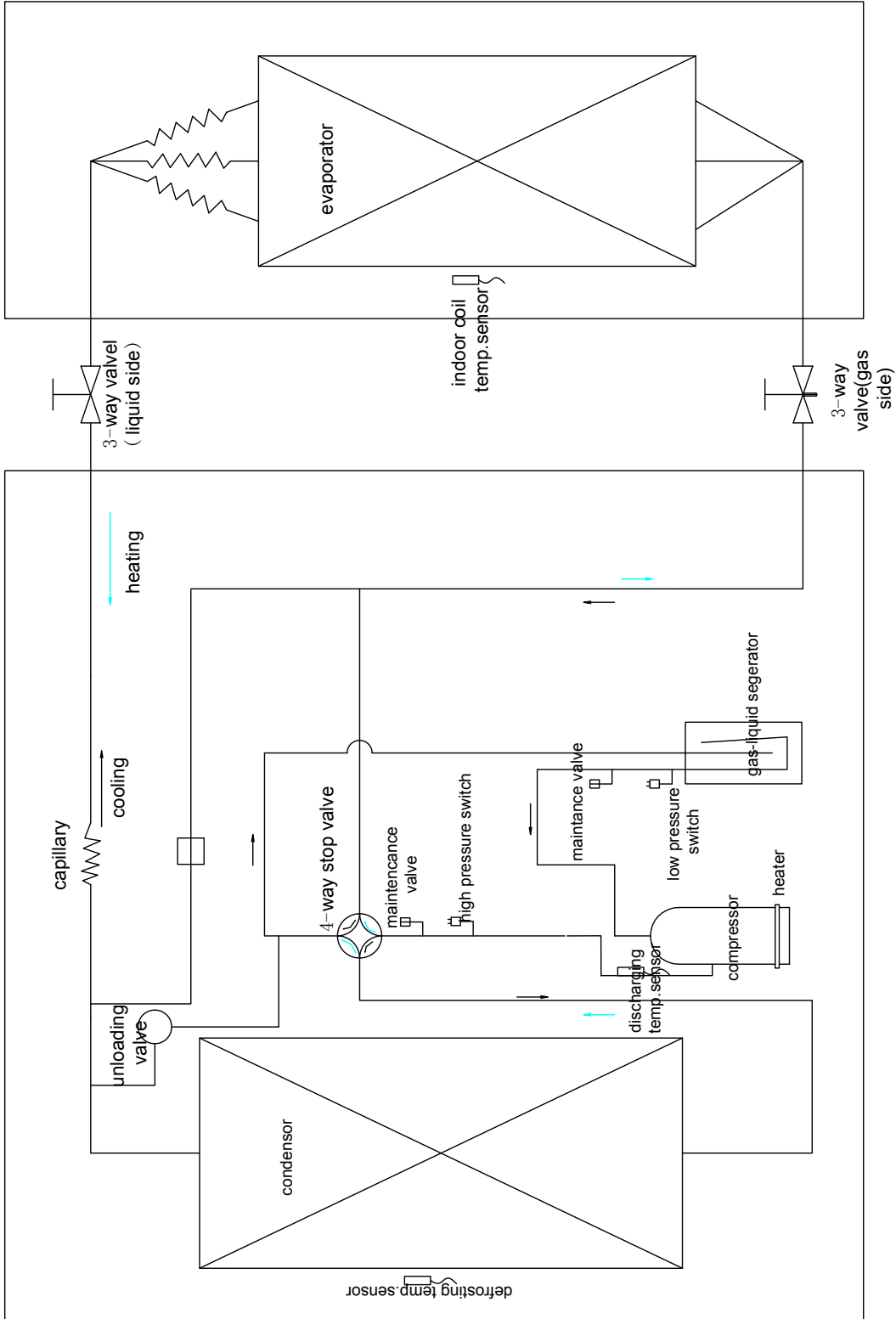
Indoor unit: AP48KN1EAA(H)



Indoor unit: 1U48IN1EAB



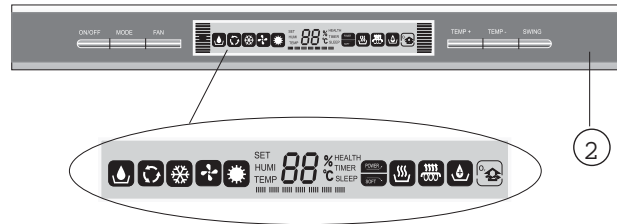
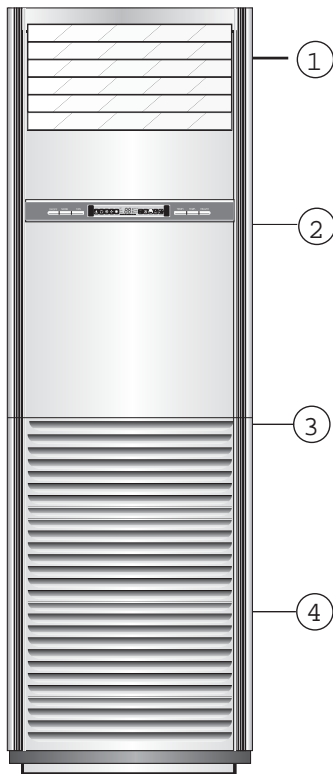
4. Piping diagram



5. Installation

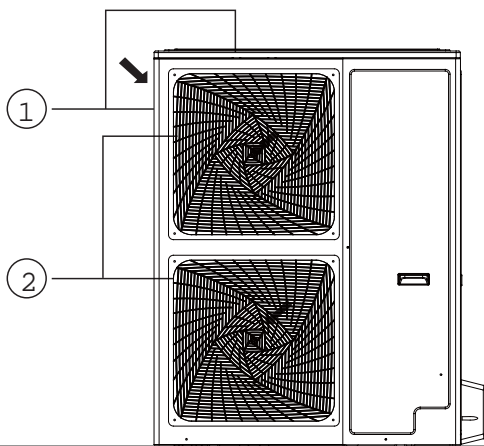
Parts

Indoor unit



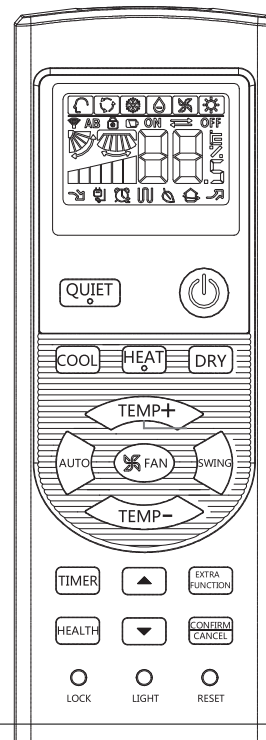
- ① Outlet grill
- ② Operation panel
- ③ Inlet grill
- ④ Air filter [inside the unit]

Outdoor unit



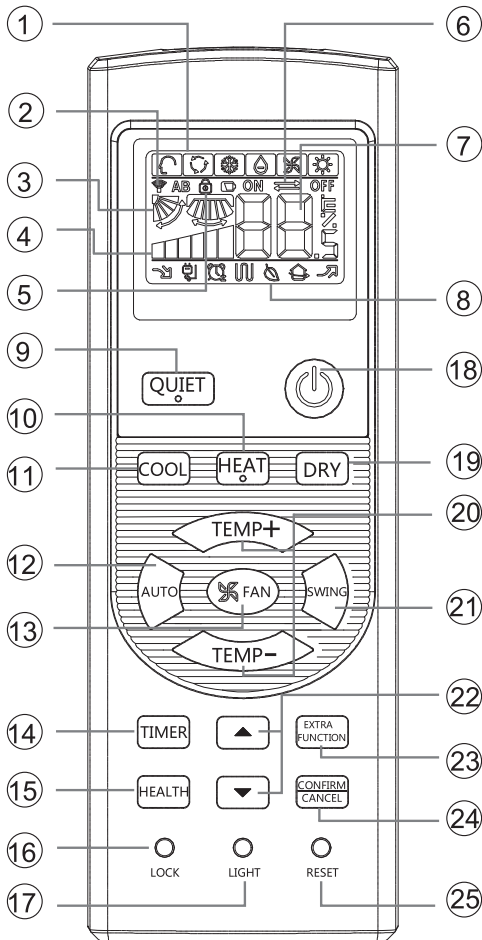
- ① Inlet grill
- ② Outlet grill

Remote controller

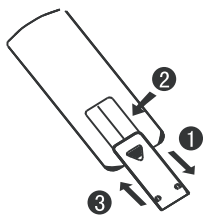


Parts

Remote controller



Loading of the battery



1. Remove the battery cover;
2. Load the batteries as illustrated.
3. Be sure that the loading is in line with the "+" and "-";
4. Load the battery, then put on the cover again.

Note:

- The distance between the signal transmission head and the receiver hole should be within 7m without any obstacle as well.

- When electronic-started type fluorescent lamp or change-over type fluorescent lamp or wireless telephone is installed in the room, the receiver is apt to be disturbed in receiving the signals, so the distance to the indoor unit should be shorter.
- Full display or unclear display during operation indicates the batteries have been used up. Please change batteries.
- If the remote controller can't run normally during operation, please remove the batteries and reload several minutes later.

Hint:

Remove the batteries in case won't be in use for a long period. If there is any display after taking-out, just press reset key.

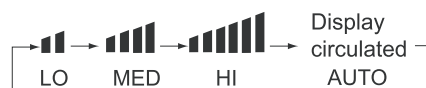
1. Mode display

Operation mode	AUTO	COOL	DRY	HEAT	FAN
Remote controller					

2. Signal sending display

3. SWING display

4. FAN SPEED display



5. LOCK display

6. TIMER OFF display

TIMER ON display

7. TEMP display

8. Additional functions display

Operation mode	QUIET	SLEEP	Supplemented electrical heating	HEALTH	TURBO
Remote controller					

9. QUIET button

10. HEAT button

11. COOL button

12. AUTO button

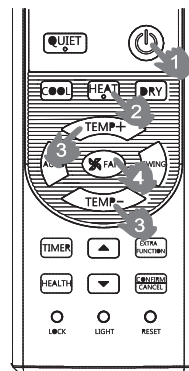
13. FAN button

14. TIMER button

Parts

- 15. HEALTH button
- 16. LOCK button
Used to lock buttons and LCD display
- 17. LIGHT button
Control the lightening and extinguishing of the indoor LED display board.
- 18. POWER ON/OFF button
- 19. DRY button
- 20. TEMP button
- 21. SWING button
- 22. HOUR button
- 23. EXTRA FUNCTION button
Function: Fan only function, health airflow upwards and downwards sending function, sleep function, air-refresh (reserved function), Fahrenheit Celsius conversion
Power setting function
left and right swing function, 10°C heating function and supplemented electrical heating function (setting only in AUTO and HEAT mode)
- 24. CANCEL/CONFIRM button
Function: Setting and cancel to the timer and other additional functions.
- 25. RESET button
When the remote controller appears abnormal, use a sharp pointed article to press this button to reset the remote.

Base Operation



1. Unit start
Press ON/OFF on the remote controller, unit starts.
2. Select operation mode
COOL button: Cooling mode
HEAT button: Heating mode
DRY button: Dehumidify mode
3. Select temp. setting
Press TEMP+/TEMP- button

TEMP+ Every time the button is pressed, temp. setting increase 1°C, if kept depressed, it will increase rapidly

TEMP- Every time the button is pressed, temp. setting decrease 1°C, if kept depressed, it will decrease rapidly Select a desired temperature.

4. Fan speed selection

Press FAN button. For each press, fan speed changes as follows:

Remote controller:





Air conditioner is running under displayed fan speed. When FAN is set to AUTO, the air conditioner automatically adjusts the fan speed according to room temperature.

Operation Mode	Remote Controller	Note
AUTO		Under the mode of auto operation, air conditioner will automatically select Cool or Heat operation according to room temperature. When FAN is set to AUTO the air conditioner automatically adjusts the fan speed according to room temperature.
COOL		
DRY		In DRY mode , when room temperature becomes lower than temp.setting+2°C, unit will run intermittently at LOW speed regardless of FAN setting.
HEAT		In HEAT mode, warm air will blow out after a short period of the time due to cold-draft prevention function. When FAN is set to AUTO, the air conditioner automatically adjusts the fan speed according to room temperature.
FAN		In FAN operation mode , the unit will not operate in COOL or HEAT mode but only in FAN mode, AUTO is not available in FAN mode. And temp. setting is disabled. In FAN mode,sleep operation is not available.

Operation

Sleep Operation

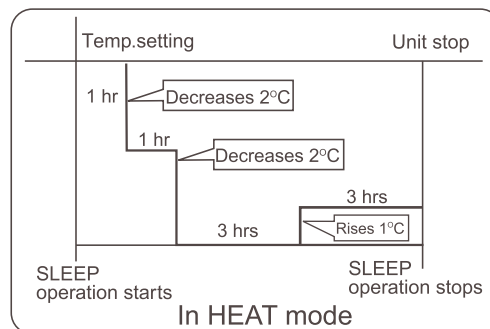
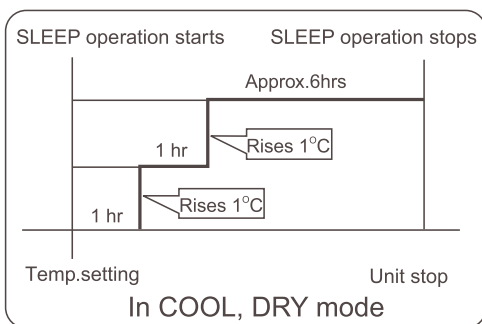
Press button **EXTRA FUNCTION** to enter additional options, when cycle display to  ,  will flash. And then press **CONFIRM/CANCEL** enter to sleep function.



Operation Mode

1. In COOL, DRY mode

1 hours after SLEEP mode starts, temp. will become 1°C higher than temp. setting. After another 1 hours, temp. rises by 1°C further. The unit will run for further 6 hours then stops. Temp. is higher than temp. setting so that room temperature won't be too low for your sleep.



2. In HEAT mode

1 hours after SLEEP mode starts, temp will become 2°C lower than temp. setting. After another 1 hours, temp decrease by 2°C further. After more another 3 hours, temp. rises by 1°C further. The unit will run for further 3 hours then stops. Temp. is lower than temp. setting so that room temperature won't be too high for your sleep.

3. In AUTO mode

The unit operates in corresponding sleep mode adapted to the automatically selected operation mode.

4. In FAN mode

It has no SLEEP function.

Note:


When TIMER function is set, the sleeping function can't be set up. After the sleeping function is set up, if user resets TIMER function, the sleeping function will be cancelled; the machine will be in the state of timing-on.

POWER/QUIET Operation

1. POWER Operation

Operation

2. QUIET Operation



You can use this function when silence is needed for rest or reading. Press QUIET button, the remote controller will show , and then achieve to the quiet function. Press again this QUIET button, the quiet function will be cancelled.

Note:

During POWER operation, in rapid HEAT or COOL mode, the room will show inhomogeneous temperature distribution. Long period QUIET operation will cause effect of not too cool or not too warm.

3. 10°C HEAT function

10°C HEAT function: temp. setting is 10°C in heating mode.

Press  button to enter additional options, when cycle display to "10°C" will flash and then press  enter to 10°C HEAT function.

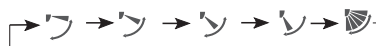
Note:

temp. setting is fixed. If press "TEMP+" or "TEMP-" button, and then 10°C HEAT function is cancelled.

AIR Flow Direction Adjustment

1. Status display of air flow




COOL/DRY:

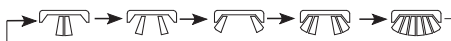




HEAT:



2. Left and right air flow adjustment (available only for convertible unit)

Press button  to select auxiliary function, the LCD will display  in cycle, press  to confirm. Enter left and right air flow adjustment, please press button SWING to adjust the air flow angle.

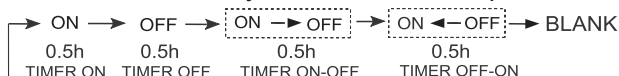


Note:   both of the two positions are null.

Timer On/Off On-Off Operation

1. After unit starts, select your desired operation mode.

2. Press TIMER button to change TIMER mode. Every time the button is pressed, display changes as follows: Remote controller:




Then select your desired TIMER mode (TIMER ON or TIMER OFF or TIMER ON-OFF). "ON "or " OFF" will flash.

Operation

3. Press ▲ / ▼ button to set time.

- ▲ Press the button for each time, setting time in the first 12 hours increased by 0.5 hour every time, after 12 hours, increased by 1 hour every time.
- ▼ Press the button for each time, setting time in the first 12 hours decreased by 0.5 hour every time, after 12 hours, decreased by 1 hour every time.
It can be adjusted within 24 hours.

4. Confirm timer setting

After adjust the time, press  button and confirm the time ON or OFF button will not flash any more.

5. Cancel timer setting

Press the timer button by times until the time display eliminated.

Hints:

After replacing batteries or a power failure happens, time setting should be reset.



According to the Time setting sequence of TIMER ON or TIMER OFF, either Start-Stop or Stop-Start can be achieved.

Healthy airflow Operation

1. Press  to starting



Setting the comfort work conditions.

2. The setting of healthy airflow function

Press  button to enter additional options, Press this button continuously, the louvers location will cycle between in the following three locations, to choose the swing location what you needed, and then press  button to confirm.





3. The cancel of the healthy airflow function

Press  button to enter additional options, Press this button continuously, the louvers location will cycle between in the following three locations again, and then press  button to cancel.

Notice: Do not direct the flap by hand. Otherwise, the grille will run incorrectly. If the grille is not run correctly, stop for a minute and then start, adjusting by remote controller.

Note:

1. After setting the healthy airflow function, the position grill is fixed.
2. In heating, it is better to select the  mode.
3. In cooling, it is better to select the  mode.
4. In cooling and dry, using the air conditioner for a long time under the high air humidity, condensate water may occur at the grille .

Operation hints

Unit operation

- Protection devices inside the unit will activate to stop unit operation, when ambient temp. is extremely low or high.
- When unit is running under high humidity in cooling or dehumidifying mode, condensate might appear at outlet grill.

3-min delay protection

- Unit will not restart until 3 min have elapsed for the protection of the unit.

Fan speed changes

- When Fan speed is set at Auto in cooling mode, it will be automatically reduced as room temp. is approaching temp. setting.
- In dry mode, fan speed will change automatically.

Cold draft prevention

- In heating mode, indoor fan will not run for the first 2-5 min. due to cold draft prevention.

Defrosting

- When frost accumulates on heat exchanger in heating mode, unit will start defrosting automatically.
- During defrosting, both indoor and outdoor fan stop.
- After defrosting, unit resumes running.

Use objectively

- Heat pump works by means of absorbing outside heat to warm room air, so outdoor temp. degree will affect unit's heating efficiency.

When problems occur

1. Errors display

Failure description	Code on LCD display
Room temp. sensor abnormal	E1
Indoor coil temp. sensor abnormal	E2
Outdoor temp. sensor abnormal	E3
Outdoor coil temp. sensor or discharge temp. sensor abnormal	E4
The phase sequence of power abnormal or over current malfunction	E5
Outdoor high pressure or low pressure abnormal	E6
The communication between indoor PCB and control board abnormal	E8
The communication between indoor PCB and outdoor PCB abnormal	E9

2. Power supply

- The parameter of power cord is over 5G 4mm².
- The parameter of connect cord is 4G 2.5mm².
- Air conditioner must use an exclusive line (over 30A)
- When installation air conditioner in a wet place, try to use a circuit breaker against current leakage.
- For installation in other places, use circuit breaker as far as possible.
- The breaker of the air conditioner should be all-pole switch ; and the distance between its two contacts should be no less than 3 mm.
- Such means for disconnection must be incorporation in the fixed wiring

3. Charge-over switch.

The charge-over switch is set:

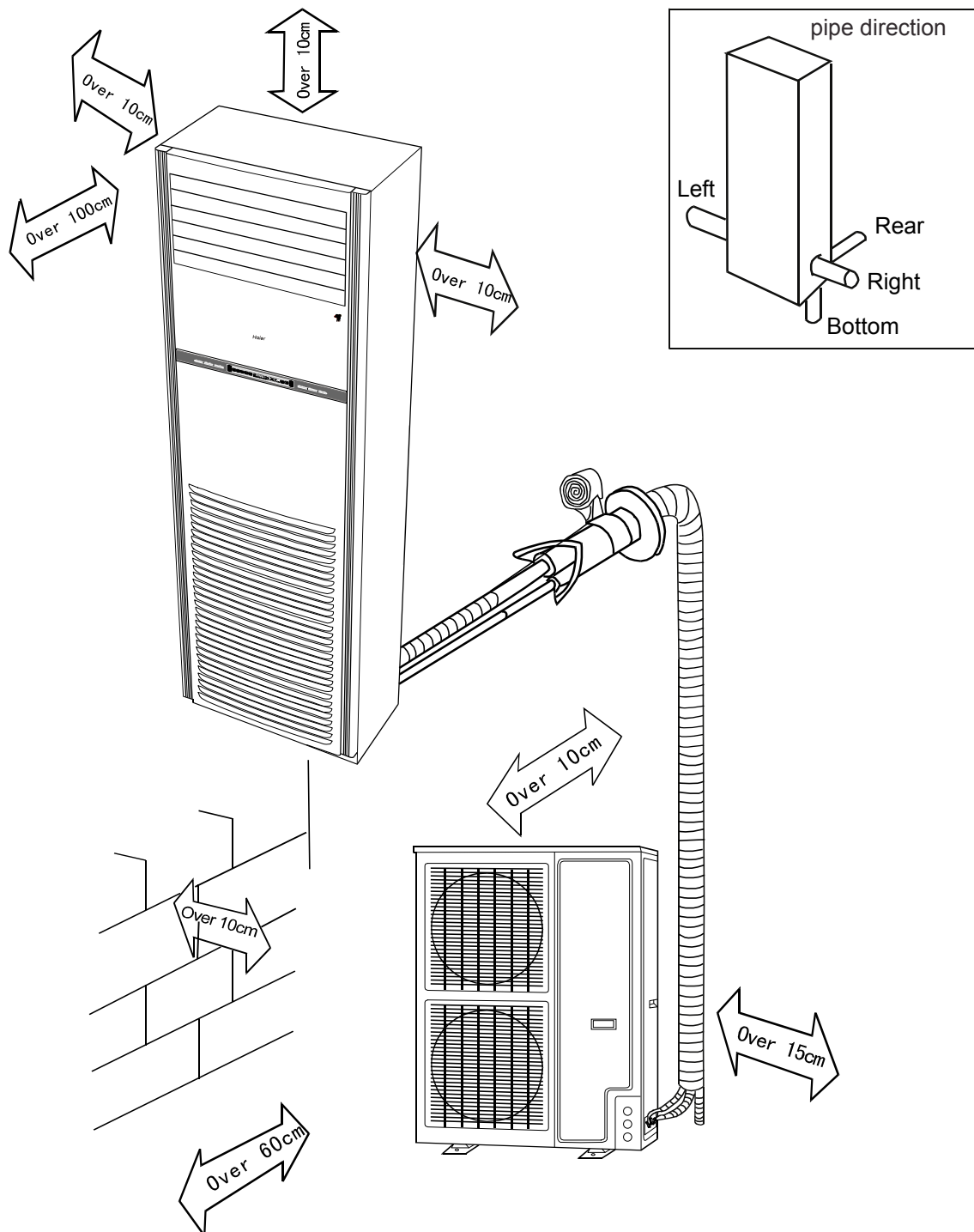
BW1: OFF

BW2: OFF

BW3: ON

BW4: OFF

Indoor & outdoor unit connection



Tools necessary

Tools necessary

1. Screw driver
2. Hacksaw
3. 70mm dia. hole core drill
4. Spanner (dia. 17, 27mm)
5. Spanner (14, 17, 27mm)
6. Pipe cutter
7. Flaring tool
8. Knife
9. Nipper
10. Gas leakage detector or soap water
11. Measuring tape
12. Reamer
13. Refrigerant oil

Standard accessories

Following parts shall be field supplied

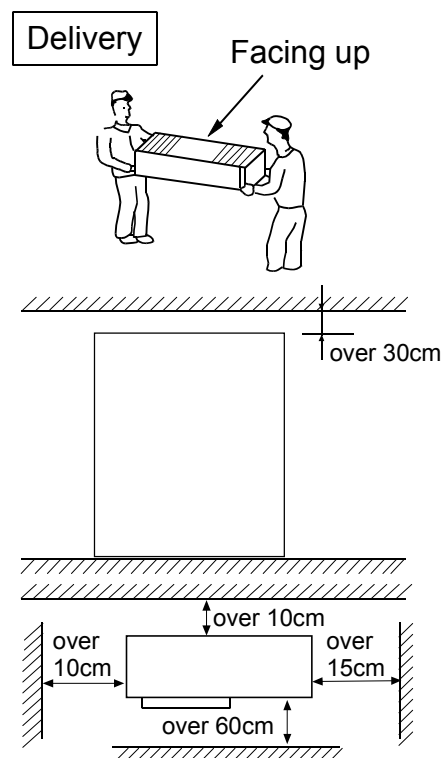
Mark	Parts name
Ⓐ	Adhesive tape
Ⓑ	Pipe clip
Ⓒ	Drain hose

Installation procedures

Display of whole unit

- Try to bring the packed unit to the installation place.
- When it is inevitable to unpack the unit, be careful not to damage the unit. Wrap it with nylon etc.
- After unpacking, be sure to put it with the front side of the unit facing up.

- Note: When delivering, don't hold plastic parts like inlet and outlet grill etc.



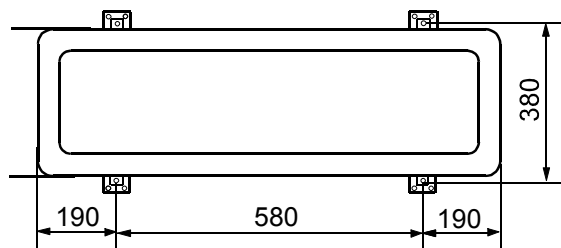
Installation of outdoor unit

Selection of installation place

- Place strong enough to support the unit and will not cause vibration and noise.
- Place where discharged wind and noise doesn't cause a nuisance to the neighbors.
- Place where is less affected by rain or direct sunlight and is sufficiently ventilated, or to install a shield.
- Place with enough space for smooth air flow.

Fixing of the unit

- Fix outdoor unit using M10 bolt to concrete floor horizontally.
- If installed on the wall or on top of a roof, bracket should be fixed securely to resist earthquake or storms.
- Use rubber pad during installation against unit vibration.



Installation dimension of outdoor unit (mm)

Installation procedures

Installation of indoor unit

Selection of installation place

Place where it is easy to route drainage pipe and outdoor piping.

Place away from heat source and with less direct sunlight.

Place where cool and warm air could be delivered evenly to every corner of the room.

Place near power supply socket. Leave enough space around the unit (refer to installation drawings).

Fixing of the unit

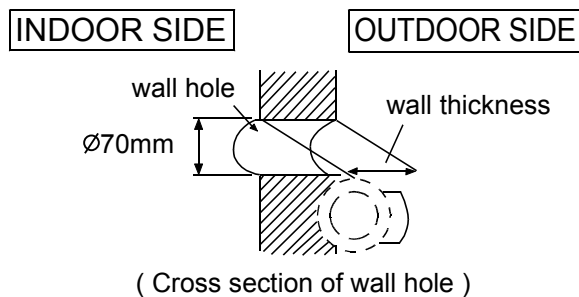
1. Position of the wall hole

Wall hole should be decided according to installation place and piping direction. (refer to installation drawings)

2. Making a wall hole

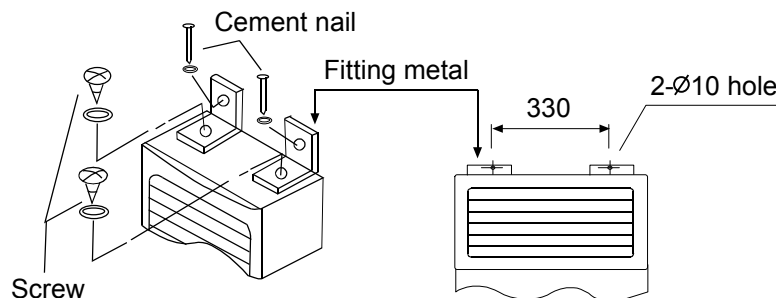
Drill a hole of 70mm dia. with a little slope towards outside.

Install piping hole cover and seal it with putty after installation.

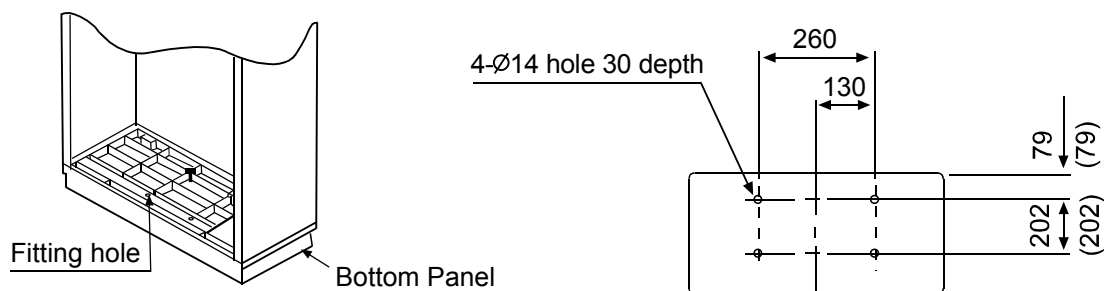


Fixing of indoor unit

With the unit set up vertically, fix the fitting metal to the unit with screws, then fix the fitting metal to the wall with cement nail and washer, as shown below:



Moreover, if want to fix the unit more firmly, you should fix the bottom panel to the ground with concrete bolts, as shown below:



Installation procedures

Piping connection

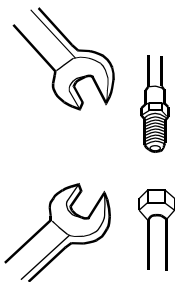
1. Connecting method

Apply refrigerant oil at half union and flare nut.

To bend a pipe, give the roundness as large as possible not to crash the pipe.

When connecting pipe, hold the pipe centre to centre then screw nut on by hand, refer to Fig.

Be careful not to let sundries, such as sands enter the pipe.



Forced fastening without centering may damage the threads and cause a gas leakage.

Pipe dia	Fastening torque
Liquid pipe 9.52mm(3/8")	29.4N·m
Liquid pipe 12.7mm(1/2")	50N·m
Gas pipe 19.05mm(3/4")	117.7N·m

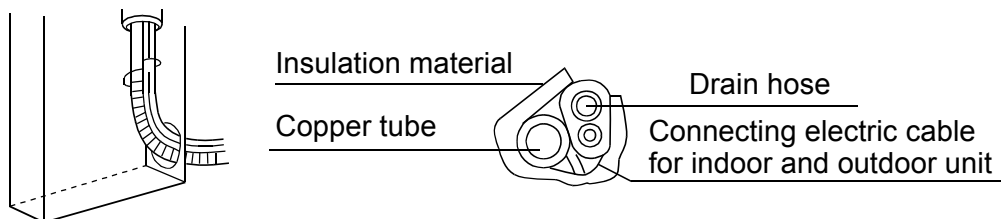
2. Piping connection of indoor unit

Arrangement of piping and drainage pipe



After opening inlet grill, you will see a control box as shown in the Fig. Remove the cover before wiring work.

Cut away, with a hammer or a saw, the lid for piping according to piping direction.



According to the piping method, connect the piping on indoor unit with union of connecting pipe.

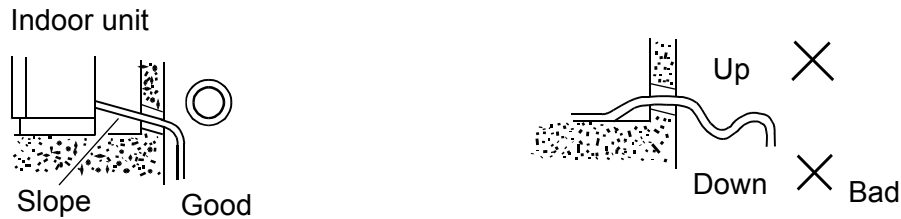
Arrange the piping as per the wall hole and bind drain hose connecting electric cable and piping together with polyethylene tape.

Insert the bound piping connecting electric cable and drain hose through wall hole to connect with outdoor unit.

Installation procedures

Arrangement of drain hose

- Drain hose shall be placed in under place.
- There should be a slope when arrange drain hose. Avoid up and down waves in drain hose.



If humidity is high, drain pipe(especially in room and indoor unit) must be covered with insulation material.

3. Piping connection of outdoor unit.

Connect the connecting pipe and inlet and outlet liquid pipe according to the piping method.

4.Purging method

Discharge the air out of the indoor unit and the refrigerant pipe by vacuumizing

- (1) Fasten all the nuts of the indoor and outdoor pipes to make these parts out of leakage.
- (2) Under the condition of the complete close of the indoor and outdoor valve center (both liquid and gas side),dismount the repair valve cap.Vacuumizing through the charge mouth of the repair valve.
- (3) After vacuumizing fasten the repair valve,and dismount the cap of the big and small stop valve,then loosen the stop valve center completely and fasten the big and small stop valve.

5.Extra charging amount of the refrigerant

When piping is longer than 5 m, charge additional refrigerant specified in this list.

Pipe length	5m	10m	15m	20m	25m	30m
Refrigerant charge (g)	—	375	750	1125	1500	1875

Installation procedures

Electric wiring

Note:

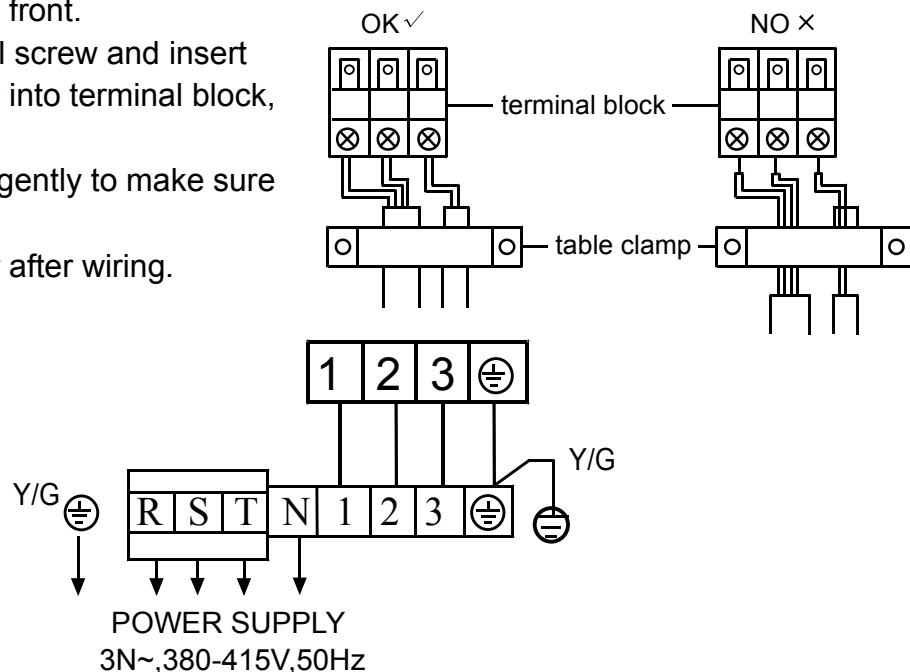
- Electric wiring must be done by qualified person.
- Use copper wire only, the parameter of connecting cable is H07RN-F 4G 0.75mm².
- The power cable should be over 5G 2.5mm².
- The power supply connects from the outdoor unit.
- The connecting cable and power cable are self-provided.

Wiring of indoor unit

- Insert the cable from outside the wall hole where piping already exist.
- Pull it out from front.
- Loosen terminal screws and insert cable end fully into terminal block, then tighten it.
- Pull the cable gently to make sure it is tight.
- Replace cover after wiring.

Wiring of outdoor unit

- Insert the cable from inside the wall hole where piping already exists.
- Pull it out from front.
- Loose terminal screw and insert cable end fully into terminal block, then tighten it.
- Pull the cable gently to make sure it is tight.
- Replace cover after wiring.



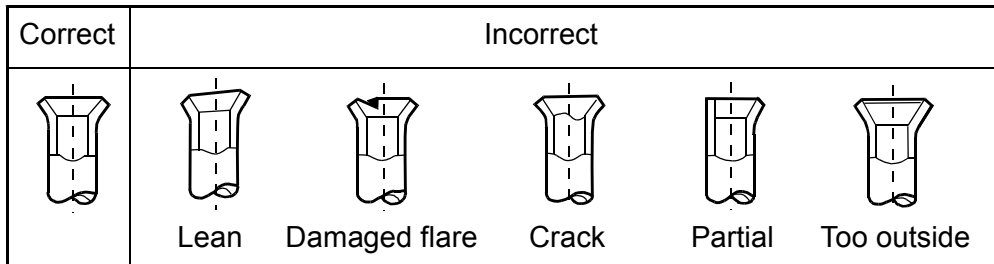
Note:

- When connecting indoor and outdoor wire, check the number on indoor and outdoor terminal blocks. Incorrect wiring may damage air conditioner's controller or cause operation failure.

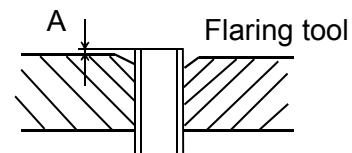
Others

1. Pipe cutting and flaring

- Be sure to carry out deburring after pipe cutting with a pipe cutter.
- Insert flaring tool to make a flare.



	Pipe dia.	Dimension A(mm)
Liquid pipe	Ø9.52mm (3/8")	1.0 ~ 1.8
Liquid pipe	Ø12.7mm (1/2")	1.2 ~ 2.0
Gas pipe	Ø19.05mm (3/4")	1.4 ~ 2.2



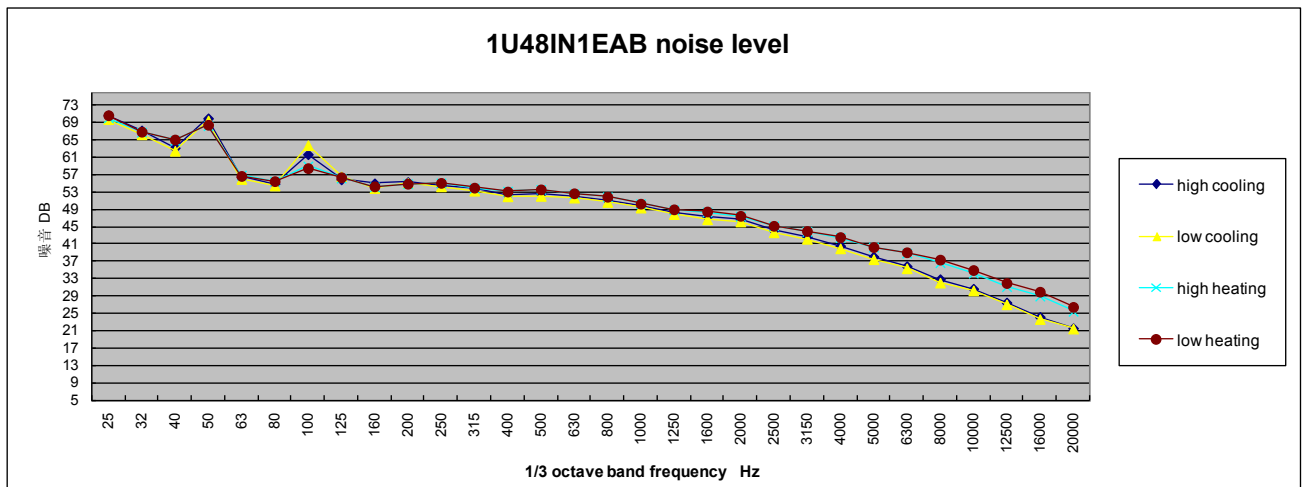
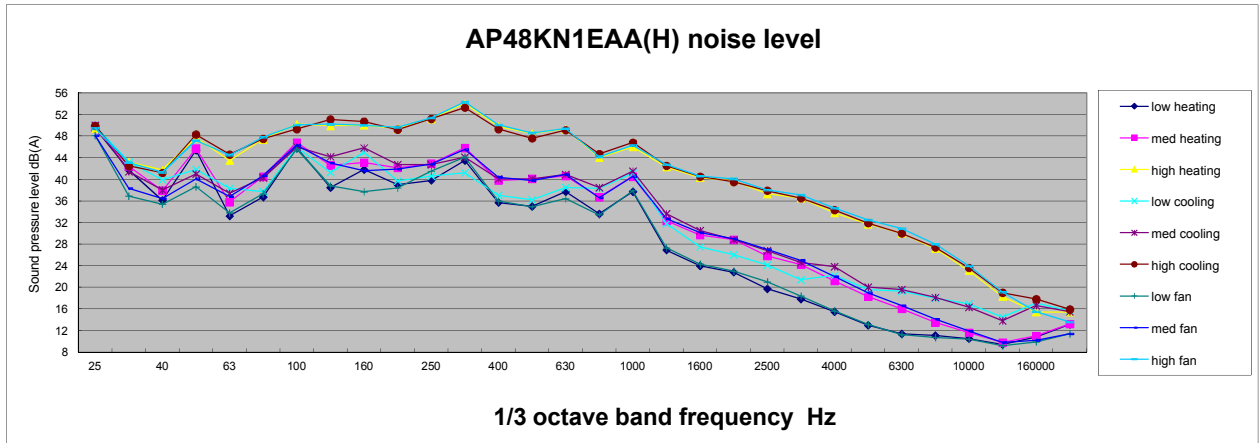
2. Installation inspection and test run:

Please operate unit according to this Manual.

Items to be checked during test run. Please made a "✓" in "□"

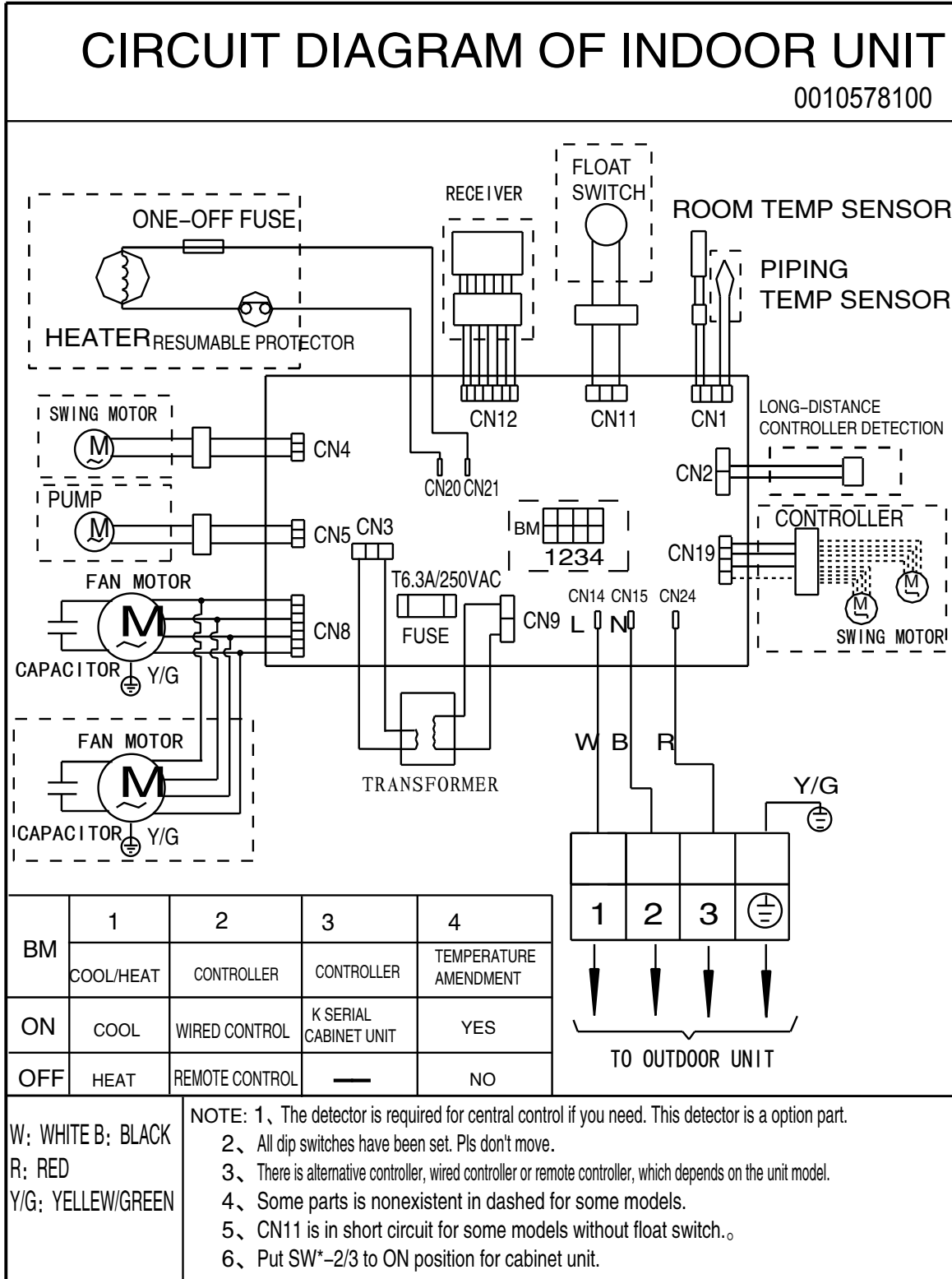
- Are there any gas leakage?
- How is insulation at piping connection carried out?
- Are electric wires of indoor and outdoor unit firmly inserted into terminal block?
- Is electric wiring of indoor and outdoor securely fixed?
- Is drainage securely carried out?
- Is earth line (grounding) securely connected?
- Is power supply voltage abided by the code?
- Is there any noise?
- Is control display normal?
- Is cooling operation normal?
- Is room temp. regulator normal?

6. Noise level

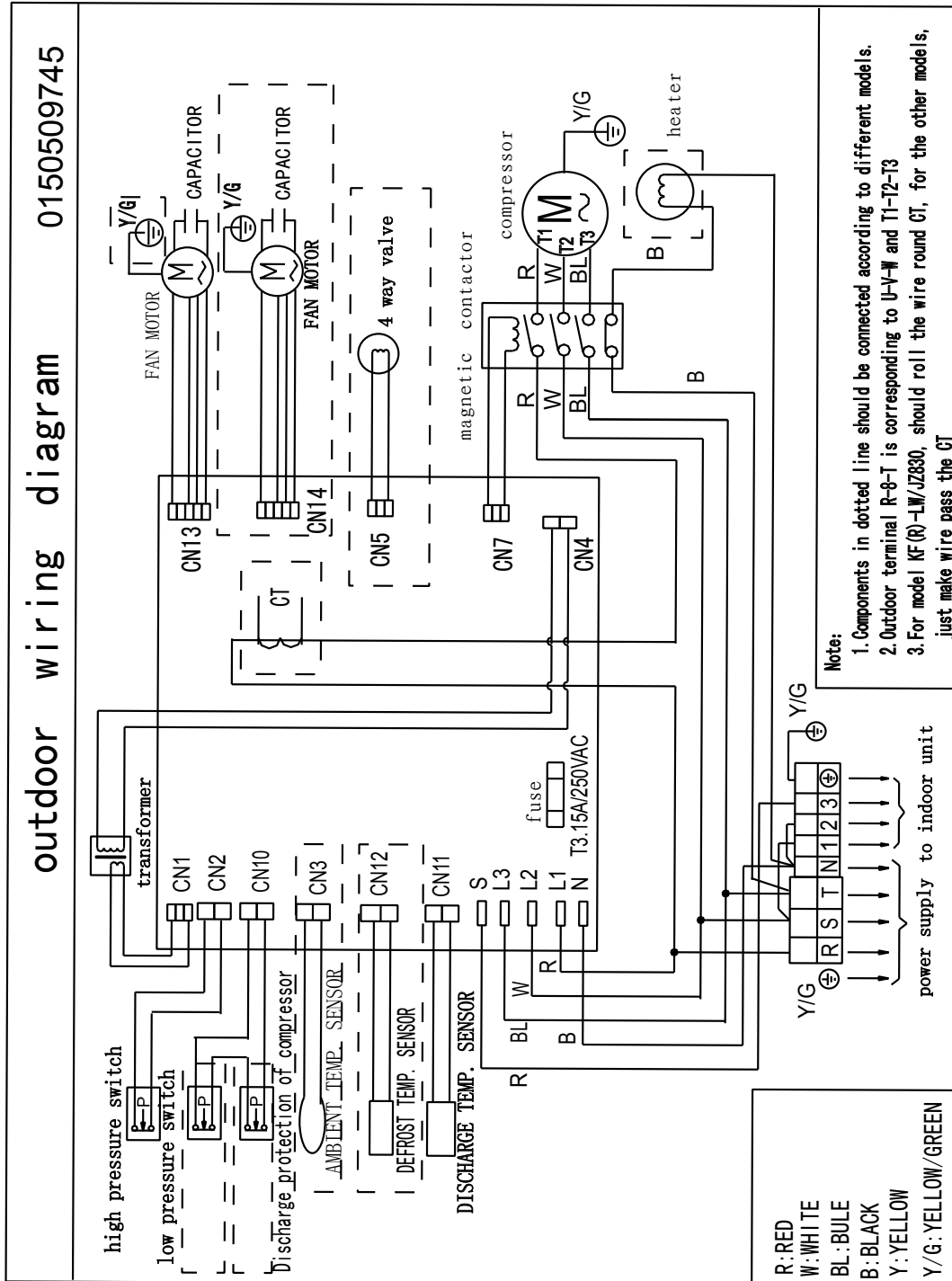


7. Wiring diagram

AP48KN1EAA(H)

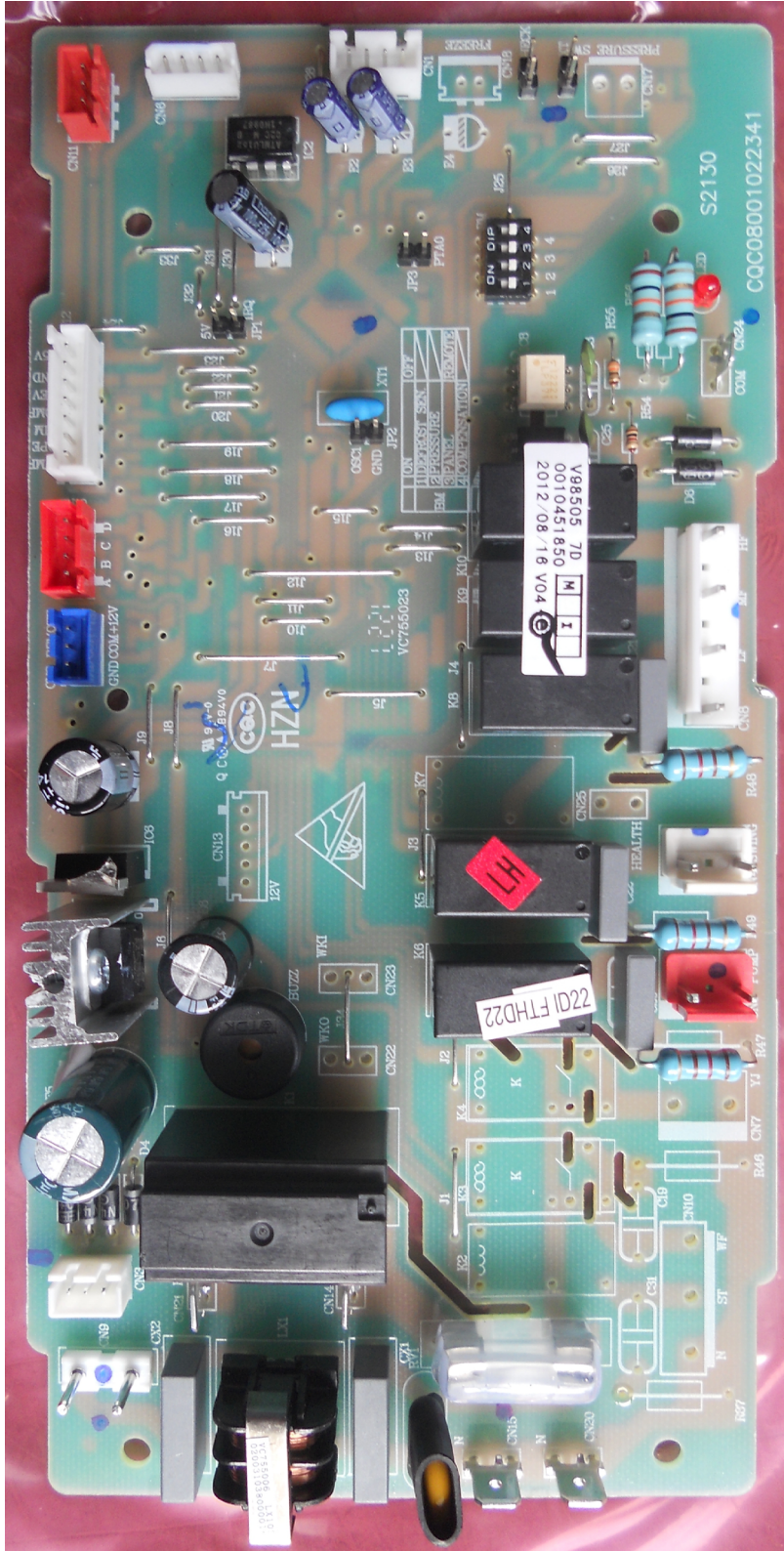


1U48IN1EAB

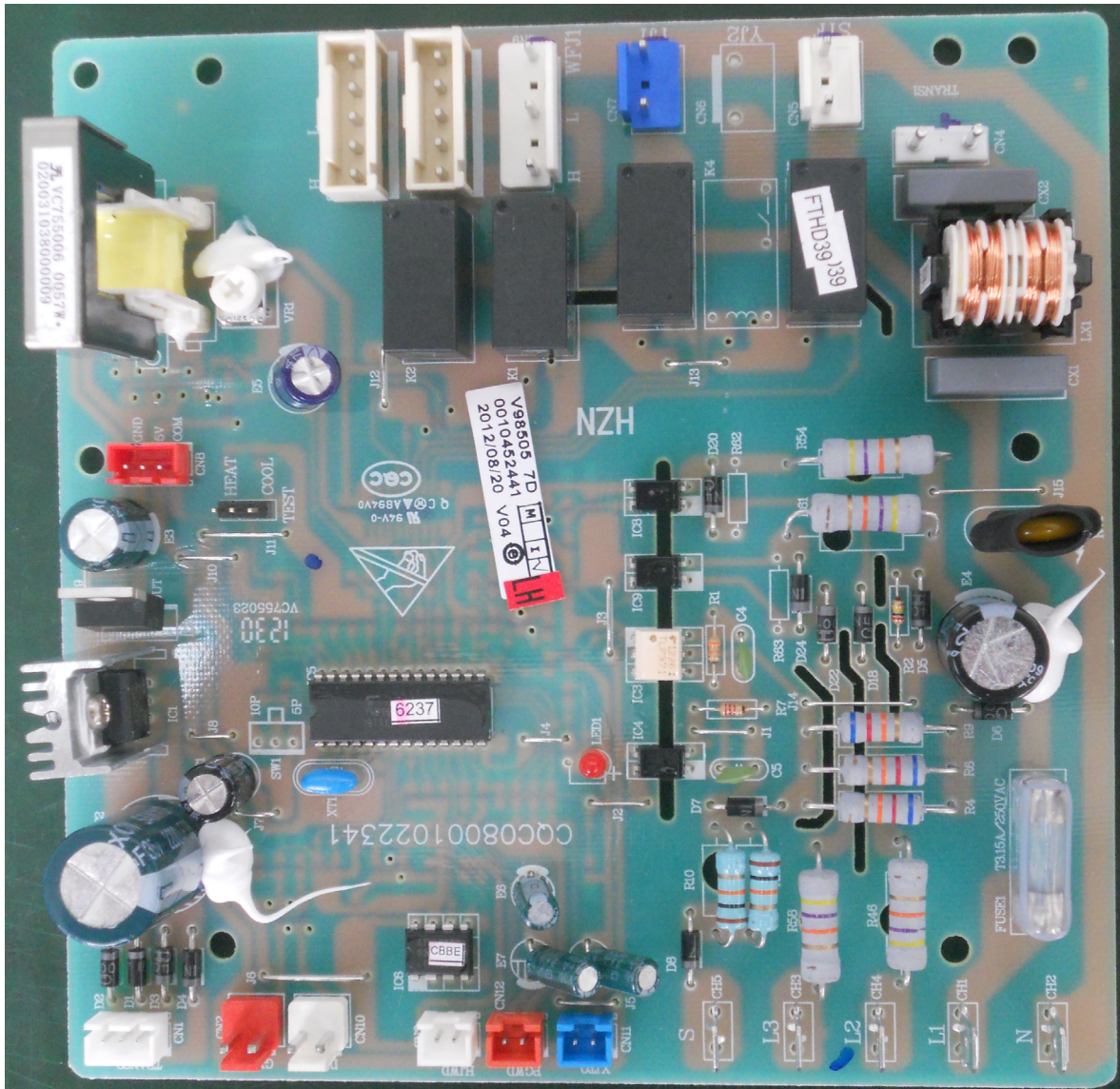


8. PCB photo

Indoor PCB 0010451850



Outdoor PCB 0010452441



9. Electric control functions

9.1 For indoor unit

1. Communication control

1.1 Remote receive function, with remote controller YR-H005.

1.2 Long-distance communication, the long-distance control function is pre-set

1.3 Wired controller communication, the wired controller can be used for communication by dip-switch selection. The display board is not available when use wired controller.

Select one control type between wired and remote control, long-distance control can be used with wire/remote control.

2. Function description

2.1 The running mode includes AUTO, COOL, DRY, FAN and HEAT; can set the compulsory cooling function; AUTO/HIGH/MID/LOW 3-speed for indoor motor; can set the TIMER ON, TIMER OFF, TIMER ON/OFF and SLEEP function; auto-check water level and control the water drainage of water pump; the swing is controlled by stepping motor; 4-minute protection for compressor; anti-overload protection, anti-freeze protection, temperature cutoff protection and bad-sensor protection; communication failure detect function; check indoor ambient temperature and indoor coil temperature; can be controlled by central controller(It is reserved)

2.2 LED indication: when the unit is switched on by the controller, the POWER LED will be ON, when being switched off; the POWER LED will be OFF. When the compressor is running, the compressor LED will be on; when it stops, this LED will be off. If the controller is in TIMER and SLEEP mode, the TIMER LED will be on; if it is not in TIMER and SLEEP mode, the TIMER LED will be off.

2.3 Temperature compensation 4°C control: Select by the dip switch on indoor PCB.

2.4 There is set temperature in AUTO mode as default.

2.5 Tr stands for room temperature; Ts stands for set temperature; Tg stands for indoor coil temperature; Tc stands for defrosting temperature; t stands for compensation temperature; ΔT stands for temperature difference.

2.6 $\Delta T = T_r - T_s + t$ ($t=0$ in cooling mode).

2.7 $\Delta T = T_s - T_r + t$ (t =compensation value, with compensation in heating mode; $t=0$, without compensation in heating mode).

3. Mode control

3.1 Indoor AUTO FAN control

(1) If the unit enters AUTO FAN for the first time, when $\Delta T > 2$, select high speed; when $\Delta T \leq 0$, select low speed; Or it will select med speed. (The conversion temperature difference is 1 degree).

(2) If the present fan speed is AUTO HIGH, when $\Delta T < 2$, fan speed will change to AUTO MED.

(3) If the present fan speed is AUTO MED, when $\Delta T < 0$, fan speed will change to AUTO LOW; when $\Delta T > 3$, fan speed will change to AUTO HIGH.

(4) If the present fan speed is AUTO LOW, when $\Delta T > 1$, fan speed will change to AUTO MED.

(5) Fan speed conversion in AUTO FAN mode: the conversion will delay for 3 minutes from HIGH to LOW, and no delay from LOW to HIGH.

(6) When the fan speed is HIGH/LOW/MED, on the condition that the protection does not act, the unit will run at the set fan speed; when the protection acts, for the sake of the normal operation, the fan speed will be forced to conversion; in Dry mode, fan motor will be changed as request.

3.2 AUTO mode control

(1) When entering AUTO for the first time, the unit will select the running mode due to the below conditions, then perform the selected mode.

$T_r \geq T_s - 3^\circ\text{C}$ select COOL mode (includes FAN mode)

$T_r < T_s - 3^\circ\text{C}$ select HEAT or FAN mode

(2) After entering the AUTO mode, the mode can change over among COOL, HEAT or FAN modes according to the indoor ambient temperature (conversion temperature difference is $\pm 3^\circ\text{C}$).

(3) If the unit is in COOL mode, when it arrives compressor-stop temperature, the compressor will stop; after compressor stops for 15 minutes, the unit will check the room temperature, if $T_r < T_s - 3^\circ\text{C}$, the unit will enter HEAT or FAN mode, or the unit will still be in COOL mode;

(4) For the heat pump unit, if the unit is in HEAT mode at present, when it arrives compressor-stop temperature, the compressor will stop; after the compressor stops for 15 minutes, the unit will check the room temperature, if $T_r > T_s + 3^\circ\text{C}$, the unit will enter COOL mode, or it will still be in HEAT mode.

(5) For cooling only unit, if the unit is at FAN mode, if $T_r > T_s + 3^\circ\text{C}$, the unit will enter COOL mode.

(6) When the unit is in HEAT mode, if indoor heat exchanger temperature rises up to over 63°C , the unit will change into COOL mode. And within 1 hour, the heat exchanger temperature will not be limited, the heating operation will stop temporarily. 1 hour later, the unit will select the proper mode due to the above condition.

3.3 COOL mode control

(1) 4-way valve being powered off, compressor run/stop will depends on the temperature difference between the room temperature at present and the set temperature.

(2) In cooling mode, every time the compressor starts up(thermostat ON), within 6 minutes, the compressor will not be limited by the temperature sensor, but the set temperature change, shutoff signal and protection action will not be limited by 6-minute protection, and the compressor can stop immediately.

(3) $\Delta T \geq 1$ compressor will run; $\Delta T \leq -1$ compressor will stop; $-1 < \Delta T < 1$ compressor will stay in original state.

(4) Anti-freeze protection (invalid in compulsory operation, trial running, heating mode)

Indoor coil temperature $T_g \geq 15^\circ\text{C}$, outdoor motor run in compulsory HIGH and resume to normal HIGH when $T_g < 13^\circ\text{C}$. Indoor coil temperature $T_g < 5^\circ\text{C}$, outdoor motor run in compulsory LOW and resume to normal HIGH when $T_g > 7^\circ\text{C}$. Outdoor motor run in normal HIGH when $5^\circ\text{C} \leq T_g < 15^\circ\text{C}$. When the unit has run for over 6 minutes after compressor starts up, if indoor coil temperature $T_g < 1^\circ\text{C}$ and lasts for 1 minute, the compressor and the outdoor motor will stop, and the unit will change to FAN mode; 9 minutes later after compressor stops and when indoor coil temperature rises to 10°C , the unit will resume to COOL mode, the compressor and the outdoor motor will run again.

(5) Temperature cutoff protection

In cooling mode, the unit will check indoor coil temperature every time the compressor start and has run for 5 minutes, when indoor coil temperature $T_g > T_r + 5$, the unit will stop and 3 minutes later restart up; if the temperature cutoff occurs for 3 times continuously, the unit will stop and alarm.

3.4 DRY mode control

(1) When the unit enters DRY mode for the first time, the compressor, outdoor motor and indoor motor will perform according to the below conditions:

$\Delta T > 2$, the compressor and the outdoor motor will run continuously, indoor motor will run at the set speed, this area is defined as Area A;

$0 \leq \Delta T \leq 2$, the compressor and the outdoor motor will always run for 10 minutes and then stop for 6 minutes, indoor motor will be LOW speed, this area is defined as Area B;

$\Delta T < 0$, the compressor and the outdoor motor will stop, indoor motor will run at Low speed, this area is defined as Area C.

(2) After the unit is running in DRY mode, the system will change over among Area A, Area B, and Area C (the conversion temperature difference $\pm 1^\circ\text{C}$)

If the system is in Area A, when $\Delta T < 1$, change to Area B; If the system is in Area C, when $\Delta T > 1$, change to Area B; If the system is in Area B, when $\Delta T > 3$, change to Area A; When $\Delta T < -1$, change to Area C.

3.5 FAN mode control

The compressor and the outdoor motor will stop running, indoor motor can be set at high/med/low speed, the fan blade can swing or stay at one position. In this mode, you can set the TIMER and SLEEP function.

3.6 HEAT mode control

(1) 4-way valve control

a. 4-way valve being electrified after compressor has started for 3 seconds when heating for the first time, then the 4-way valve will be electrified before compressor start;

b. Only in COOL / DRY/ FAN (not heating) mode, 4-way valve and compressor will power off at the same time, the 4-way valve keeps being powered when shutoff, thermostat OFF and compressor stop.

Note: 4-way valve control is realized by outdoor unit for the unit with outdoor PCB, not concurrent completely.

(2) In heating mode, for every time the compressor startup (thermostat ON), within 6 minutes, the 4-way valve will not be limited by the temperature sensor, but for the set temperature change, shutoff signal and the protection, the compressor can stop immediately without 6-minute limitation.

(3) $\Delta T \geq 1$ compressor running, indoor motor runs at anti-cold air mode;

$\Delta T \leq -1$ compressor stops, indoor motor runs at blowing remaining heat mode;

$-1 < \Delta T < 1$ compressor retains original state

(4) Overheat protection

In heating mode, compressor has started up and indoor motor has run for over 30 seconds, if indoor coil temperature $T_g > 60^\circ\text{C}$, outdoor motor will stop; if $T_g < 56^\circ\text{C}$, and outdoor motor has stop for 45 seconds, outdoor motor will run again; if $T_g > 68^\circ\text{C}$ lasts 10 seconds, the compressor will stop and indoor motor will run in thermostat OFF. After the compressor stops for 9 minutes and T_g reduces to 48°C , the compressor and the outdoor motor will run again.

(5) Anti-cold air function in heating mode

After entering heating mode, or last defrosting is over, the compressor will start up, if $T_g < 28^\circ\text{C}$ (HW_D2), indoor motor will stop; if 38°C (HW_D1) $> T_g \geq 28^\circ\text{C}$ (HW_D2), indoor motor will run at low speed; if $T_g \geq 38^\circ\text{C}$ (HW_D1) or the compressor has run for over 4 minutes, indoor motor will run at the set speed; once the motor has started up, it will not stop because of T_g reduction.

(6) Blowing remaining heat function

In heating mode, the thermostat is OFF, the compressor stops, indoor motor will run at low speed until $T_g < 28^\circ\text{C}$ (HW_D3) and has run for 50 seconds at least. If T_g always over 28°C (HW_D3), compressor will stop after running for at max. 3 minutes.

(7) Note: in heating mode, “the compressor stops----indoor motor delays to stop” adjust if the pipe blows remaining heat; “the compressor startup----indoor motor delays to start up” adjust if the pipe is anti-cold air; in other conditions, the compressor and the indoor motor are allowable not to be in company. In cooling mode, the motor will run according to the control, not together with the compressor.

(8) Defrosting function in heating mode

In defrosting and when the compressor resumes to running for 3 minutes after defrosting is over, the unit will not adjust the sensor failure.

Manual defrost:

In heating mode, the set temperature 30°C and in high speed, in 5 seconds, press SLEEP button 6 times continuously, then the buzzer will sound 3 times, you can enter the manual defrosting. Send manual defrost to outdoor unit, the indoor unit will control accordingly after received the outdoor defrost signal, the procedure is as the same as the auto defrost; the quit is controlled by outdoor unit.

Auto defrosts:

For the unit with outdoor PCB, please refer to the outdoor control functions.

(9) Auxiliary electric heating function (valid in heating mode or heating state in AUTO mode) Enter condition:

- 1) $\Delta T > 1$
- 2) Thermostat ON and running for 1 minute
- 3) $T_r < 25^\circ\text{C}$
- 4) Indoor motor running
- 5) Electric heating function start signal available
- 6) The system working in heating mode or in heating state of AUTO mode

If the above conditions can all be met, the electric heating function will work.

Quit condition:

- 1) $\Delta T \leq 1$
- 2) Thermostat OFF
- 3) $T_r > 26^\circ\text{C}$
- 4) Indoor motor stops
- 5) Electric heating function start signal not available.
- 6) The system in non-heating operation.
- 7) Coil pipe temp. $> 52^\circ\text{C}$

If one of the above conditions can be met, the electric heater will stop.

(10) Indoor motor compulsory speed control in heating mode: if indoor coil temperature $T_g > 56^\circ\text{C}$, indoor motor LOW speed invalid, change to MIDDLE speed automatically; when $T_g > 60^\circ\text{C}$, indoor motor MIDDLE speed invalid, change to HIGH speed automatically; when T_g below 52°C , resume the original fan speed, outdoor MCU will work in overheat protection due to the temperature value.

3.7 Special functions

(1) CLOCK setting and TIMER function

The unit can set 24-hour TIMER ON/OFF, and the min. unit is 1 minute (the min. unit of set time is concerned with remote controller), after being set, the TIMER lamp of indoor will be on, and after the timer is over, the TIMER lamp will be off.

TIMER ON: RUN LED is off, compressor LED is off, and TIMER LED is on, the unit is in stop state. When timer is over, the unit begins to run, and the timer LED is off. The unit operation begins from receiving the timer signal for the last time. The SLEEP function only can be set before the TIMER ON begins.

TIMER OFF: the unit running, the TIMER LED on, while the timer is over, TIMER LED off, the unit will stop, the sleep can be set, the sleep time will replace the original time of TIMER ON/OFF.

TIMER ON/OFF set at the same time: when the timer on/off is set, the timer LED will be off; the sleep function can be set, the sleep time will replace the original time of TIMER ON/OFF.

(2) SLEEP function (energy saving function at night)

a. Standard sleep function in cooling or dry mode, after running at SLEEP mode for 1 hour, the set temperature will rise 1°C , another 1 hour later, the set temperature will rise another 1°C ; the unit continues running for 6 hours, then the unit will stop.

b. Standard sleep function in heating mode, after running at SLEEP mode for 1 hour, the set temperature reduces 2°C , another 1 hour later, the set temperature will reduce 2°C , and another 3 hours later, the set temperature rises 1°C ; the unit continues running for 3 hours, then the unit will stop.

c. Non-standard SLEEP function: the sleep function can realize 1~8 hours sleep mode when being combined with the TIMER function.

1) When in Auto mode, the unit will make SLEEP operation due to the setting.

2) After setting SLEEP function, the clock can not be adjusted.

3) If sleep time is no more than 8 hours, when the time arrives, the unit will shut off.

4) If SLEEP function is set, the TIMER function can not be set.

(3) Emergency operation

Press emergency button for over 1 second continuously, when loosing it, the buzzer will sound once. Press and will enter emergency operation.

Emergency operation: AUTO cooling state, the set temperature 24°C , indoor motor at high speed, not adjusting the temperature sensor abnormal and the protection, the thermostat ON, 3 minutes later, the compressor starts up, and another 3 minutes later, quit the trial running and enter the normal operation as the setting(resume temperature sensor and protection); Press again, enter the shutoff state.

(4) Compulsory cooling operation

In OFF state, press compulsory button for over 10 seconds continuously, loose it and the buzzer will sound twice, then the unit enters the compulsory cooling operation, or after the panel receives

the compulsory cooling signal from controller, the unit enters the compulsory cooling state, there is no compressor 3-minute protection, the unit will run in cooling mode, and indoor/outdoor motors are in high speed for 5 minutes; in the 5 minutes, the system will not adjust the protection and not be limited by the ambient temperature, 5 minutes later, the unit will enter the normal state. In the compulsory cooling state, you can press any button to quit the state.

(5) Water level inspection and water pump control

a. In COOL (including cooling state of AUTO mode and the compulsory cooling) and DRY mode, as long as the compressor runs, water pump will work; and once the compressor stops, water pump will stop 5 minutes later;

b. In standby state of cooling mode, heating mode and fan mode, after water tank is full, the float switch will disconnect, if the controller detects this signal for 2 seconds, the water pump will begin to work. After the float resets, water pump will continue working and stops 5 minutes later;

c. If the water-full signal is detected for over 5 minutes, the compressor will stop; water pump will work for 5 minutes and stop for 5 minutes, then repeat as a cycle, until the float resets, the water pump will stop 5 minutes later; if water pump has repeated for 4 cycles and the float can not reset, and the unit will alarm water drainage abnormal, and the water pump will continue the cycle.

(6) Time shorting function

If the time shorting port is in short circuit for 2 seconds after conditioner being electrified, the buzzer will sound once and enter time shorting operation, the unit will perform a 1/60 time shorting control.

(7) Auto-restart function

In 5 seconds press the SLEEP button for 10 times, the buzzer sounds 4 times, that is set as auto-restart mode, if shutoff and power again, the system will run in the original state before been shutoff. The following information will be memorized: ON/OFF, running mode (AUTO, HEAT, COOL, DRY, FAN), fan speed (AUTO, MANUAL(HIGH, MED, LOW)), the set temperature (16 °C -30 °C) and HEALTH, while the louver position, TIMER, SLEEP and CLOCK will not be memorized. Press SLEEP button 10 times again, the buzzer will sound 2 times and auto-restart function is cancelled.

(8) Auto check function

Short connect the emergency switch before being electrified, after being electrified, 10 seconds later, it will enter auto-check circuit. Before auto-check, please ensure the input values (sensor, pressure switch) normal, or the buzzer will sound 5 times to show there is abnormal; all the ports will output as the following sequence: run lamp-timer lamp-electric heater-water pump/pump lamp-compressor/compressor lamp-(outdoor motor-4-way valve) –HIGH speed-MED speed-LOW speed-swing-HEALTH ; after the auto-check is finished, the buzzer sounds once.

3.8 System protection

(1) 3-minute protection for compressor startup

After the compressor stops, at least 3 minutes later, the compressor can restart up; if the unit is powered off in running, after being electrified, 3 minutes later, the compressor can restart up. Being electrified for the first time, there is 3-minute delay protection.

(2) Anti-current rush

2 seconds later after compressor is running, outdoor motor can work.

(3) Sensor failure

Indoor ambient temperature sensor: Mainboard checks that the sensor is in open circuit, short circuit or close to short circuit for 2 minutes continuously, the mainboard will confirm that sensor is failure, the system will stop running, alarm occurs; If the signal is resumed, the system will resume automatically. Indoor coil temperature sensor: Mainboard checks that the sensor is in open circuit, short circuit or close to short circuit for 2 minutes continuously, the mainboard will confirm that sensor is failure, the system will stop running, alarm occurs; If the signal is resumed, the system will resume automatically.

Shield indoor coil temperature sensor failure in 3 minutes before compressor start and during defrost procedure (include defrost finish and quit).

3.9 Low pressure switch control

In standby state, detecting the pressure switch off for continued 30s alarm error;

In cooling, the compressor start up and enter pressure signal detecting

In heating, after the compressor start up for 3 minute, enter pressure signal detecting; When defrosting, doesn't detect pressure signal; In 30 minutes, it occurs 3 times, the system will alarm error

Other detecting the low pressure switch off maintain 30s alarm error.

3.10 Fault record query

It can be stored five historical faults in EEPROM, included outdoor fault. Five fault has always been the recent 5 records. Only record the fault that different with the recent fault

Operation:

In cooling mode, press the sleep button 8 times, enter the fault record query, the error code is the recently fault, if the unit is in malfunction state, the error code is the last fault, the display mode is same with the fault indicator. If press the other button of the remote controller, exit the fault record query.

Repeat the operation with remote controller can cancel fault indicator.

9.2 For outdoor unit

1. Outdoor motor control

When the system does not occur overcooling, overheating, and over current protections, the outdoor motor will occur the below changes according to the outdoor ambient temperature and indoor coil temperature.

1.1 General information

Outdoor motor is 2-speed type: high, low and stop.

The fan speed will change unless every step has been run for 45 seconds.

1.2 Cooling mode

(1) Indoor coil temp. $\geq 15^{\circ}\text{C}$, outdoor motor runs at high speed.

(2) Indoor coil temp. $< 5^{\circ}\text{C}$, outdoor motor runs at low speed.

(3) $5^{\circ}\text{C} \leq$ Indoor coil temp. $< 15^{\circ}\text{C}$, outdoor motor will change due to the outdoor ambient temp. Outdoor ambient temp. $> 28^{\circ}\text{C}$, enter high speed; Outdoor ambient temp. $< 26^{\circ}\text{C}$, enter high speed; $26 \leq$ outdoor ambient temp. $\leq 28^{\circ}\text{C}$, keep the current speed.

In running, the system will be controlled as 2°C temperature tolerance; If outdoor ambient temp. $< 26^{\circ}\text{C}$, enter low speed; If outdoor ambient temp. $> 28^{\circ}\text{C}$, enter high speed.

1.3 Heating mode (heat pump model)

(1) Indoor coil temp. $\geq 50^{\circ}\text{C}$, outdoor motor will run at low speed.

(2) Indoor coil temp. $< 40^{\circ}\text{C}$, outdoor motor will run at high speed.

(3) $40^{\circ}\text{C} \leq$ indoor coil temp. $< 50^{\circ}\text{C}$, outdoor motor will change with outdoor ambient temp. Outdoor ambient temp. $< 13^{\circ}\text{C}$, enter high speed; Outdoor ambient temp. $> 15^{\circ}\text{C}$, enter low speed; $13 \leq$ Outdoor ambient temp. $\leq 15^{\circ}\text{C}$, keep the current speed;

In running, the system will be controlled as 2°C temperature tolerance; If outdoor ambient temp. $< 13^{\circ}\text{C}$, enter high speed; If outdoor ambient temp. $> 15^{\circ}\text{C}$, enter low speed.

Every step will run at least 45 seconds, and the motor will start up 2 seconds earlier than compressor.

2. Defrost control

2.1 Defrosting condition

In heating mode, the compressor will run for 30 minutes continuously or run for 45 minutes in all and for over 5 minutes continuously, outdoor motor at least runs for 3 minutes; If the outdoor ambient temperature and outdoor coil temperature can comply with the shadow area in the figure and keep for 1 minute, the defrost will work and send defrost signal to indoor unit, then indoor unit will control indoor motor accordingly.

2.2 Quit condition

Outdoor coil temp. arrives the defrost-end temp. 14°C or the defrost time is over 12 minutes, the defrost will finish and send signal to indoor unit. the frosting shortest time is 2 minutes.

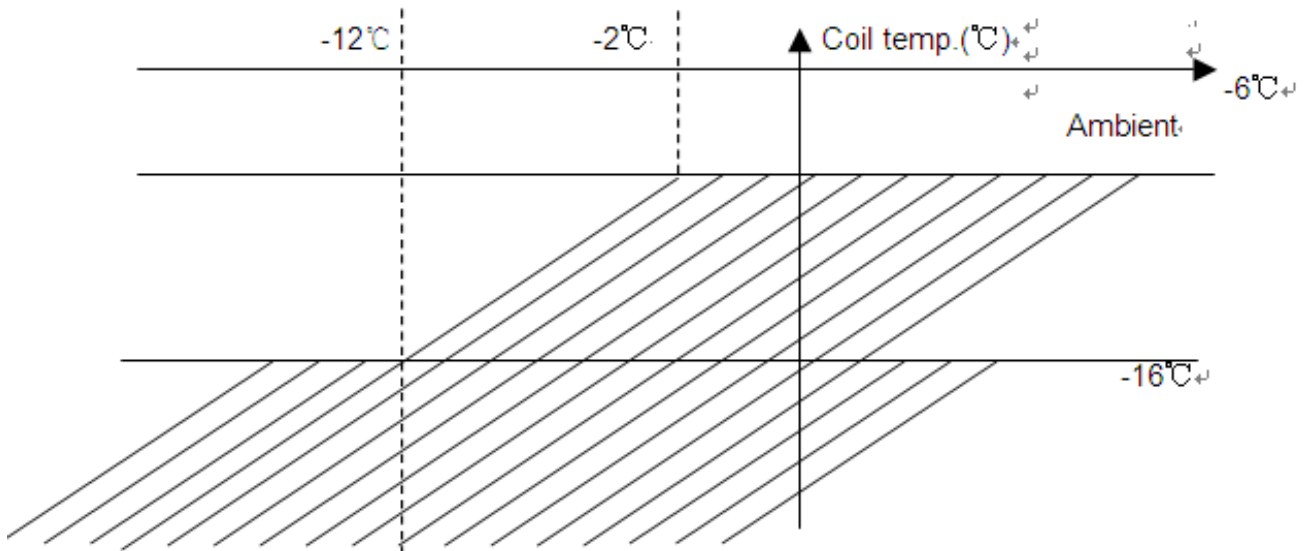
2.3 Defrost operation

Compressor and outdoor motor stop, indoor motor stops meanwhile; 55 seconds later, the reversing valve will close. Another 5 seconds later, compressor starts up.

After defrost is over, compressor stops, outdoor motor runs at high speed; 55 seconds later, the reversing valve will open. Another 5 seconds later, compressor starts up and indoor motor runs at anti-code mode.

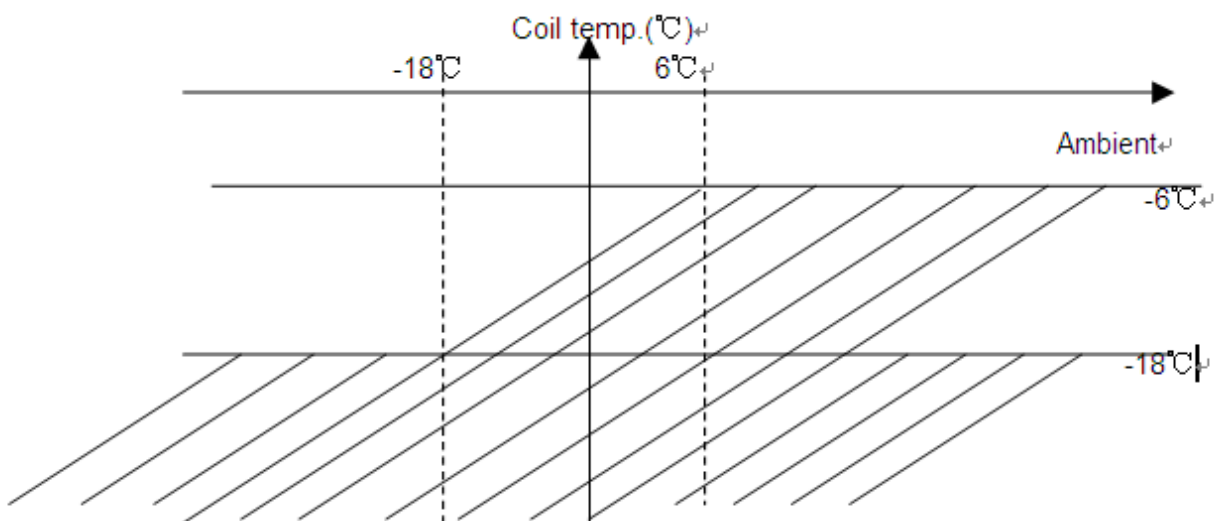
Type 1: Standard defrost

- (1) If $Tr \geq -2^\circ\text{C}$, when $Tp \leq -6^\circ\text{C}$, enter defrost.
- (2) If $-12^\circ\text{C} \leq Tr < -2^\circ\text{C}$, when $Tp \leq -6^\circ\text{C}$, please refer to the following chart.
- (3) No matter the ambient temperature, when $Tp \leq -16^\circ\text{C}$, enter defrost.



Type 2: Non-standard defrost (rectify defrost data by the device)

- (1) If $Tr \geq 6^\circ\text{C}$, when $Tp \leq -6^\circ\text{C}$, enter defrost.
- (2) If $-18^\circ\text{C} \leq Tr < -6^\circ\text{C}$, when $Tp \leq -6^\circ\text{C}$, please refer to the following chart.
- (3) No matter the ambient temperature, when $Tp \leq -18^\circ\text{C}$, enter defrost.



2.4 Manual defrost

Indoor sends defrost signal to outdoor, and the outdoor will receive the defrost signal when compressor is running in heating mode, then enter the defrost process. When outdoor coil temperature arrives the defrost-end point and the defrost time is over 5 minutes, outdoor will send the defrost-end signal to finish the defrosting.

3. Compressor crankcase heater working condition

By the N.C. (normal close) auxiliary point of AC contactor to control, when compressor stops, the heater will work; when compressor works, the heater will stop.

4. System protection function

4.1 Anti-freeze protection

When compressor has run for over 6 minutes, to prevent indoor evaporator freezing (in cooling/dry mode), if indoor coil temp. is below -1 degree for over 1 minutes, compressor and outdoor motor will stop and enter Fan mode. After compressor stops for 9 minutes, and indoor coil temp. rises up to 10 °C , the unit resumes to cooling mode, compressor and outdoor motor will work again.

4.2 Overheat protection

In heating mode, if indoor motor is running and the compressor has run for over 30 seconds, the sensor will check the indoor coil temperature, and send the temp. to outdoor; if indoor coil temp. >T1 (56 °C) , the outdoor motor will enter low speed; If indoor coil temp. < T2 (52 °C) , outdoor motor will enter high speed; if indoor coil temp. >T3 (60 °C) , outdoor motor will stop; if indoor coil temp. < T4 (56 °C) and the outdoor fan stop over 5 seconds, outdoor motor will resume low speed; When indoor PCB receive the signal of outdoor motor stop from outdoor PCB over 2 minutes, if indoor coil temp. >T6 (70 °C) or 10 minutes later indoor coil temp. >T5 (56 °C) , send compressor stop signal to outdoor unit; if indoor coil temp. < 46 °C and the compressor has stopped over 3 minutes, send compressor run signal to outdoor unit, and compressor resume to normal. The outdoor motor is control by outdoor unit.

4.3 Over current protection

(1) In heating mode

After compressor running for 40 seconds, if the current thermostat has measured that system working current is more than 21A and keep it for 5 seconds, outdoor motor will convert into low speed; if working current is less than 18A, it will resume to high speed; if working current is more than 24A and keep it for 5 seconds, outdoor motor will stop; if working current is less than 22A, outdoor will resume to low speed (fan speed conversion frequency must be more than 45 seconds); after compressor running for 40 seconds, if working current is more than 34A and keep it for 5 seconds, compressor will stop and will resume 3 minutes later. If within 30 minutes there are 3 times compressor over current protection, compressor will not start up, meanwhile, LCD will display E5. Only shut off and powered on again, the protection can be cancelled.

(2) Not in heating mode

After compressor running for 5 minutes, if working current is more than 34A and keep it for 5 seconds, compressor will stop and will resume 3 minutes later.

If within 30 minutes there are 3 times compressor over current protection, compressor will not start up, meanwhile, LCD will display E5. Only shut off and powered on again, the protection can be cancelled.

4.4 Power protection

The PCB has set the power protection, zero crossing detecting the L2, L3 order by combined the hardware and software, L1 and N as base phase, L1, L2, L3 as correct phase sequence.

When power on detecting the 3-phase power, the unit will delay 10 second into running

For the power supply (L1, L2, L3) : positive phase, reversed phase, lack phase--- testing immediately after power on

1) Signal detection for more than 5 seconds without any signal, the lack of phase reported failures;Signal recovery, then back to normal.Signal detection phase inverse for more than 5 seconds, then submitted to the phase sequence fault;Signal recovery, then back to normal.(phase sequence can adjustable through hardware selection, adjustable, phase sequence fault output compressor 2 ,close compressor 1, otherwise the vice)

2) After failure, compressor stop, the compressor protection function for 3 minutes.

Power lack L1 ,N or the location N and L2, L3 is wrong, the outside PCB will not be able to work;L1, N position error will be reported to the communication failures E9.

4.5 High/Low Pressure protection (cooling only unit without this function)

The high pressure protection is no blocking time ,once the compressor is running, the system will check the pipe pressure. If pipe pressure is over high, high pressure switch has activated more than 30 seconds, compressor, outdoor motor will stop and 3 minutes later it will resume. If within 30 minutes there are stop phenomenon 3 times because of pressure over high, the compressor will stop and LCD will display E6. only shut off and powered on again, the protection can be cancelled. Detecting the high pressure during in standby and defrosting state, it will alarm error once the signal disconnect over 30 seconds.

Low pressure protection

(1) After compressor running for 3 minutes, if low pressure switch has activated for 15 seconds continuously, compressor will stop and alarm.

(2) Check the low pressure switch when compressor is stop, the compressor will not run if low pressure switch act, low pressure switch has activated more than 30 seconds, LCD will display Low pressure abnormal

(3) In defrosting and in 6 minute after defrost is over , low pressure switch will not be checked.

(4) In heating, compressor run and outdoor motor stop, low pressure switch will be shielded.

(5) Low pressure protection can be resumable when power-off.

4.6 3-minutes protection for compressor

After compressor stops, it cannot be started until 3 minutes later. During the machine's running, if the time not more than 3 minutes after power is off, the compressor cannot be restarted until 3 minutes later after it is powered on again

4.7 Sensor broken down protection

(1) Check if sensor breaks down

After compressor has run for 2 minutes, the unit will check the sensor, Outdoor board checks the sensor in short circuit or in open circuit or near to short/open circuit for 2 minutes continuously, then it will adjust the sensor broken down.

(2) How to deal with it?

If the outdoor ambient temperature sensor and the outdoor coil temperature sensor have broken down, the unit will stop running, and alarm E3, E4, E4 simultaneously. The compressor sensor will detect when the compressor running, 2 minutes later, if $>125^{\circ}\text{C}$, the compressor stop, recover $<95^{\circ}\text{C}$ and stop time over 3 minutes, the compressor can recover running, if it occurs 3 times in 30 minutes, unit stop and alarm E4, cut off the power can recover. If detect the signal short circuit for 2 minutes, unit stop and alarm E4. After compressor running 3 minutes, detect open circuit, if the open circuit signal maintain 2 minutes, unit stop and alarm E4. The discharging sensor failure can recover according to the signal. The outdoor temp. sensor and the outdoor coil pipe temp. sensor used in the fan control and defrosting control.

4.8 Starting current control

Outdoor unit load control: after the outdoor motor running for 2 seconds, main compressor start up, the secondary compressor will run 2 seconds later.

4.9 4-way valve control

The first time for heating, the outdoor fan motor and 4-way valve power on simultaneously, the compressor start up delay 2 seconds. After shutdown or schema transformation, the 4-way valve closed delay 2 minutes 55 seconds.

5. Outdoor PCB test

5.1 There are three pins marked with TEST, please make the two ones near to COOL in short circuit. Outdoor begin to run in cooling mode, that is, compressor run and outdoor motor works at high speed.

5.2 There are three pins marked with TEST, please make the two ones near to HEAT in short circuit. Outdoor begin to run in heating mode, that is, compressor and 4-way valve run, outdoor motor works at low speed.

10. Failure code

WCR : Failure code in pannel controller

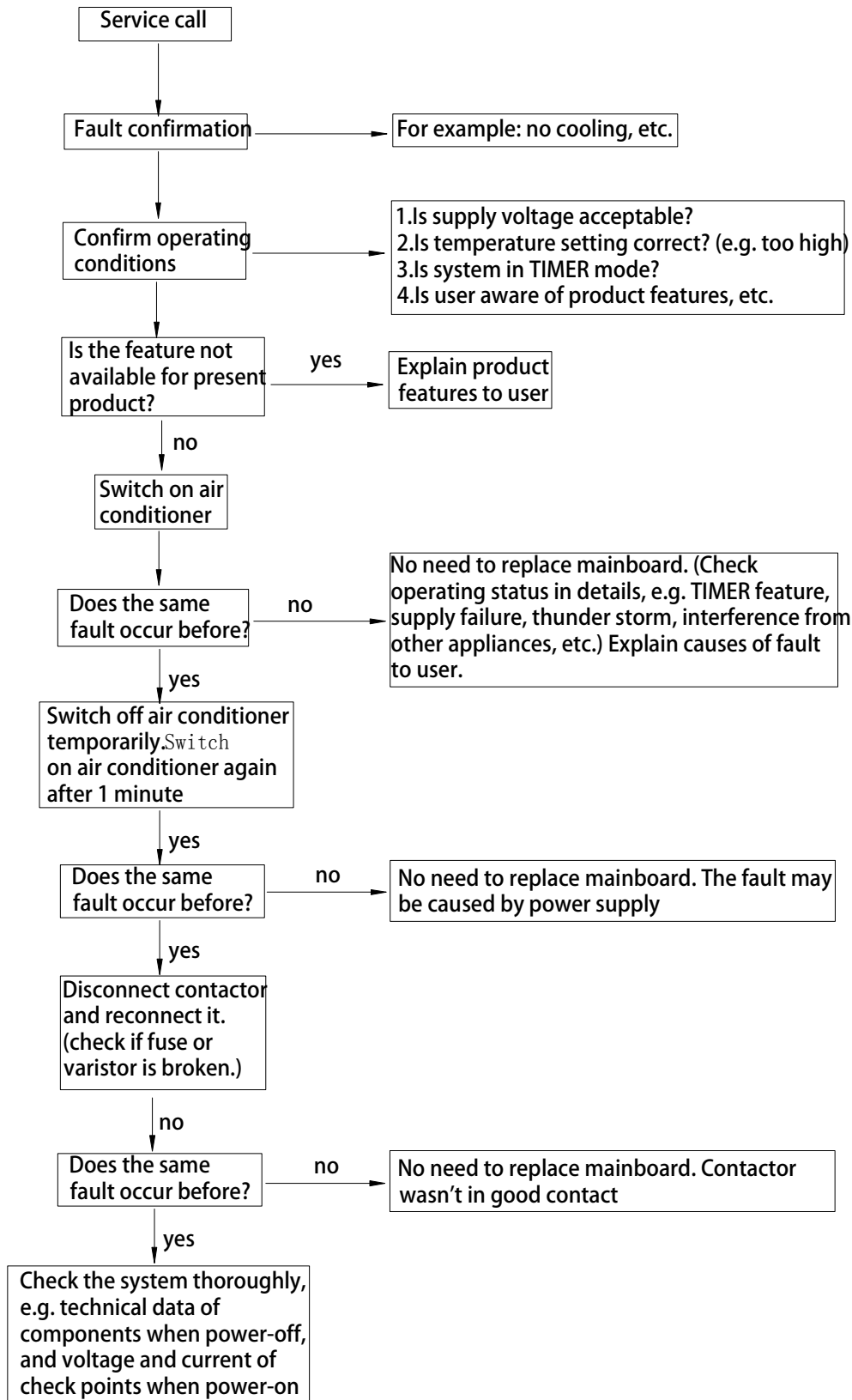
0150514714

CCR : Run lamp flash times

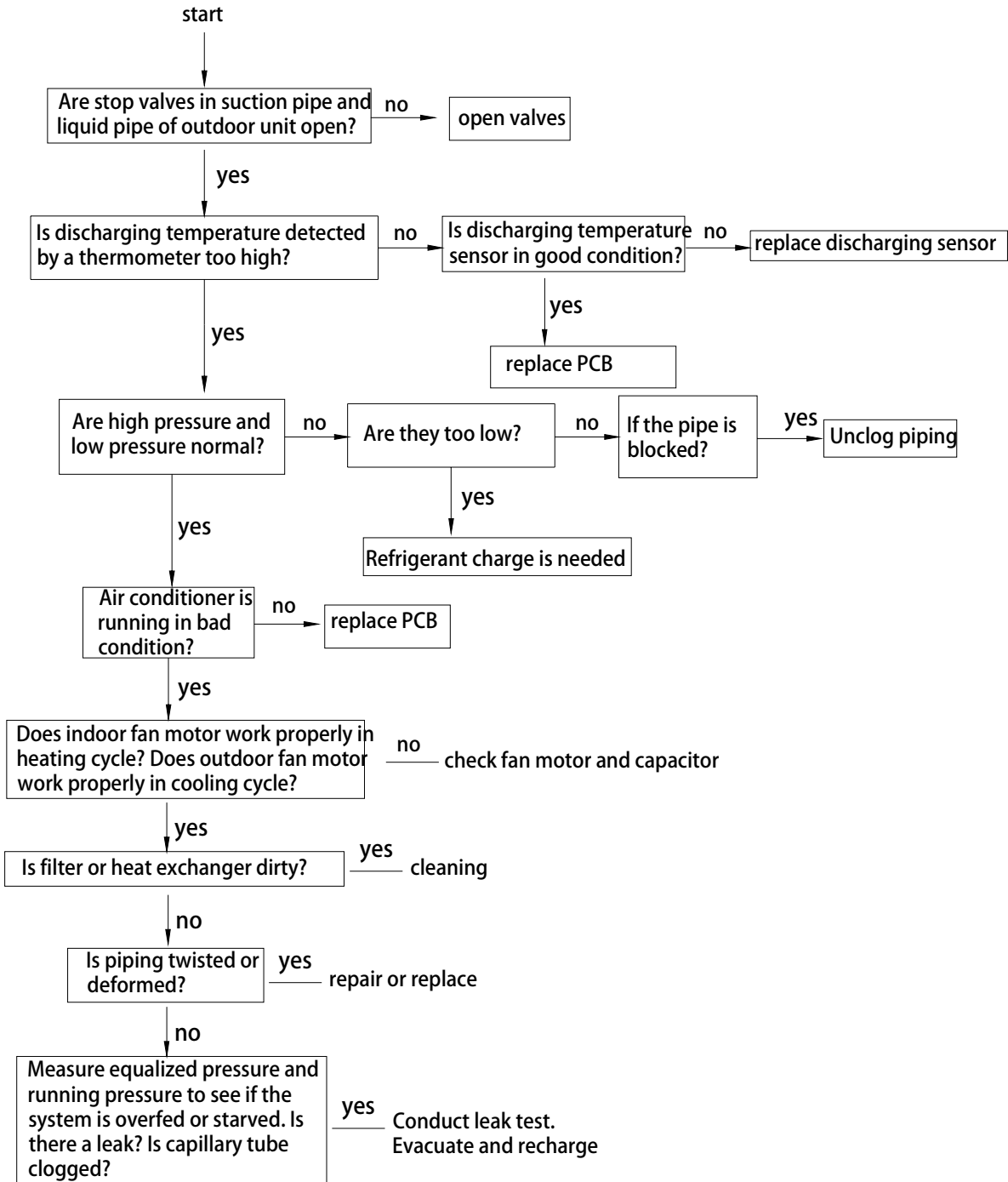
SN	WCR	CCR	Failure description
1	E0	10	Float switch is disconnected 25min or longer.
2	E1	1	Indoor ambient sensor is open-circuit or short-circuit for 2min or longer.
3	E2	2	Indoor pipe sensor is open-circuit or short-circuit for 2min or longer.
4	E3	3	Outdoor ambient sensor is open-circuit or short-circuit for 2min or longer.
5	E4	4	Outdoor discharge/pipe temp. sensor is open-circuit or short circuit for 2min or longer.
6	E5	5	Current is too high or the turn of 3 phase is wrong.
7	E6	6	High or low pressure switch is open circle for 2 minutes.
8	E8	8	Communication problem between indoor and controller.
9	E9	9	Communication problem between indoor and outdoor unit.

11. Troubleshooting

Troubleshooting (before replacement of PCB)

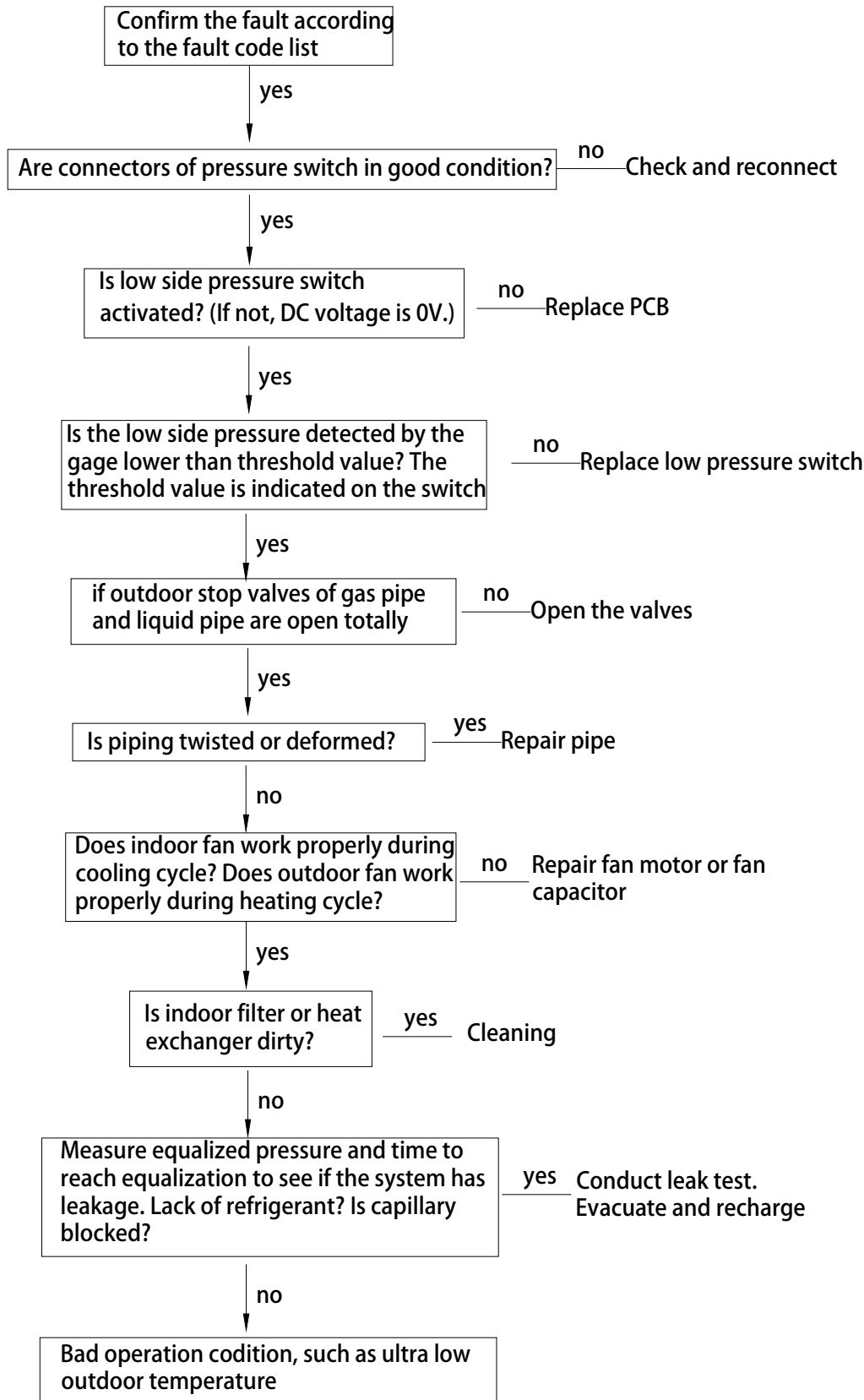


1) Compressor discharging temperature protection

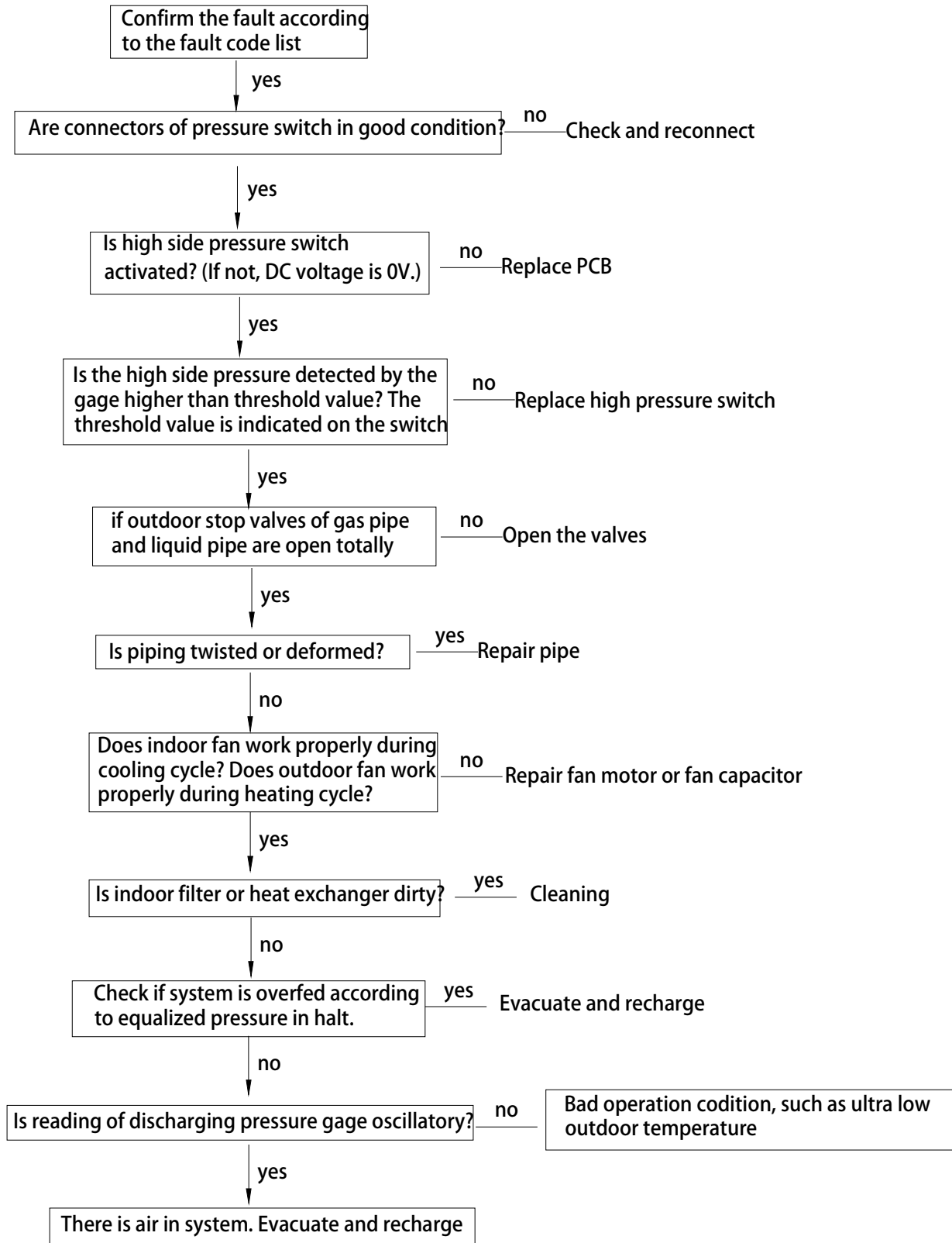


Note: The protection is activated when temperature is higher than 120° C and restored when lower than 100° C.

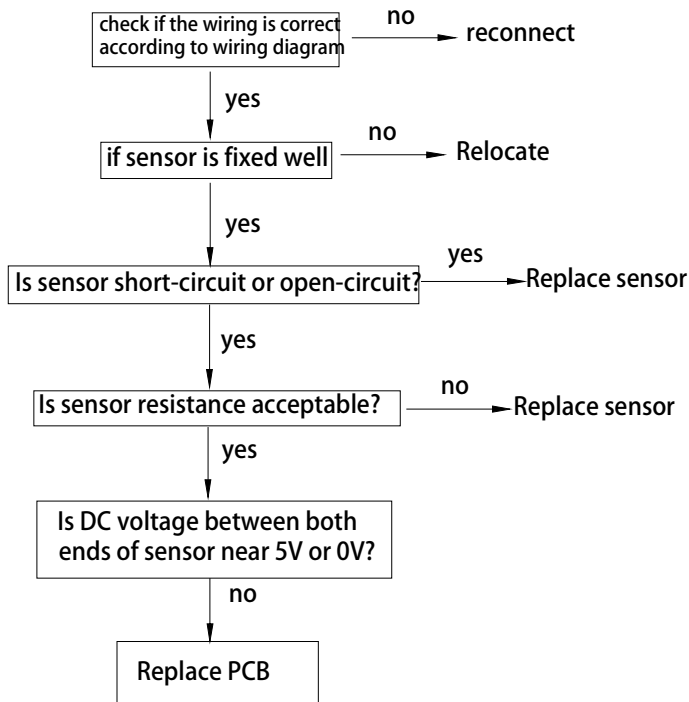
2) Low pressure protection



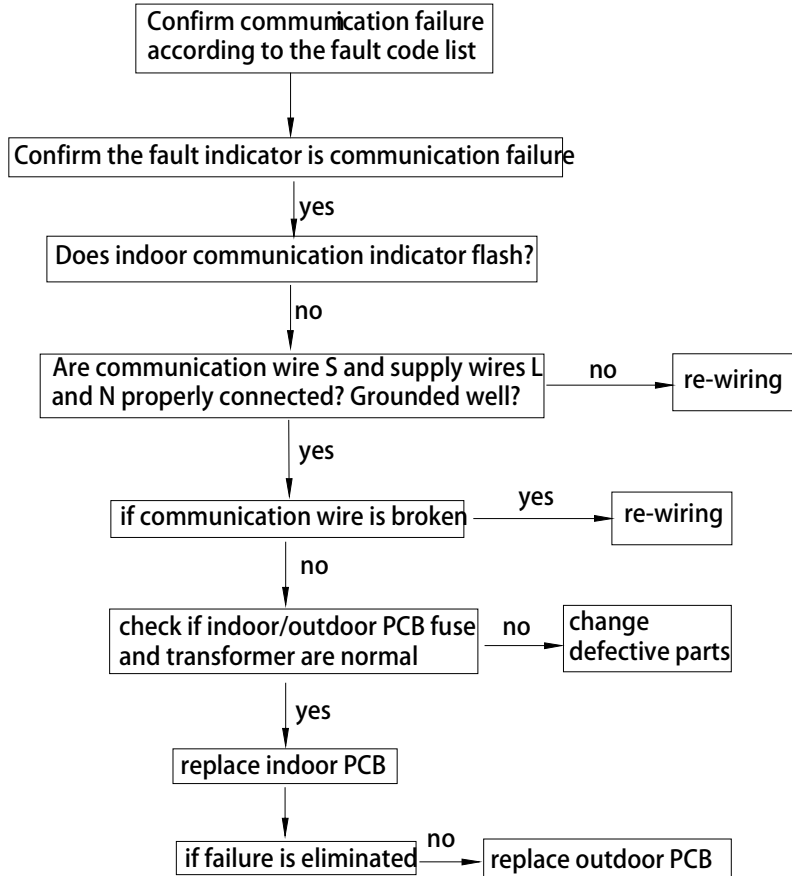
3) High pressure protection



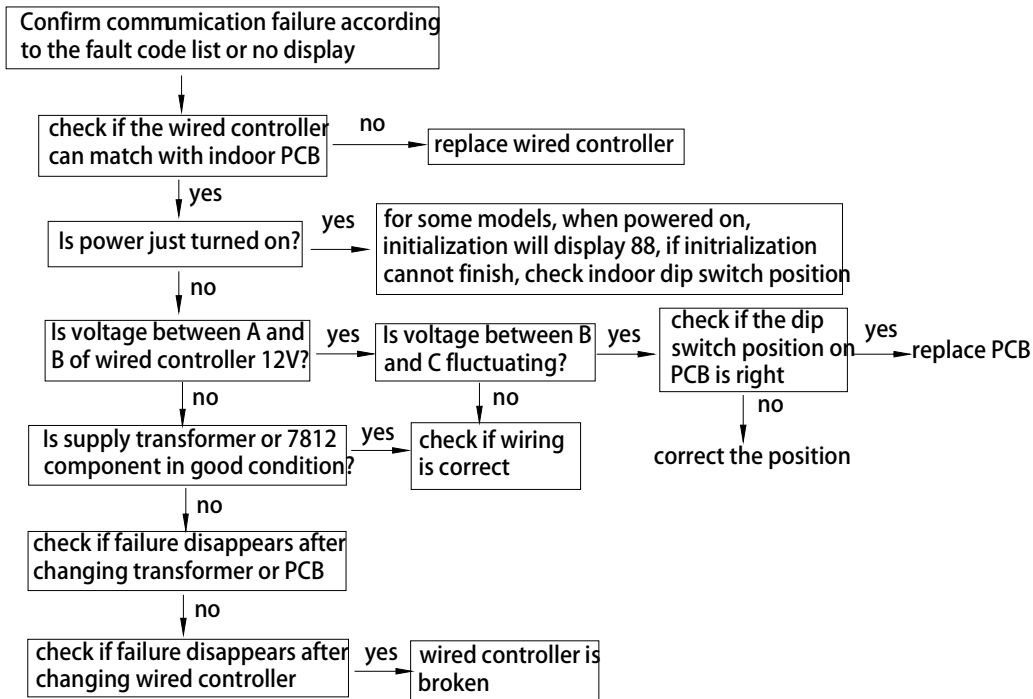
4) Sensor failure



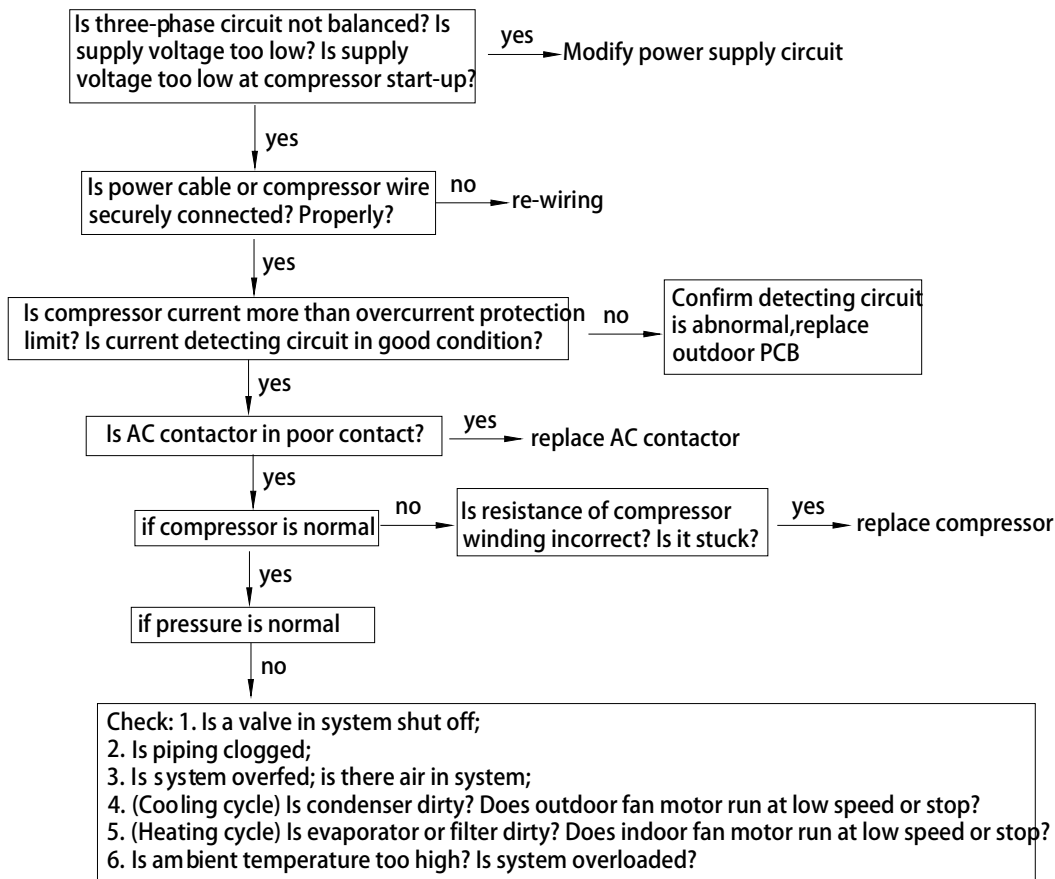
5) Communication error between indoor and outdoor units



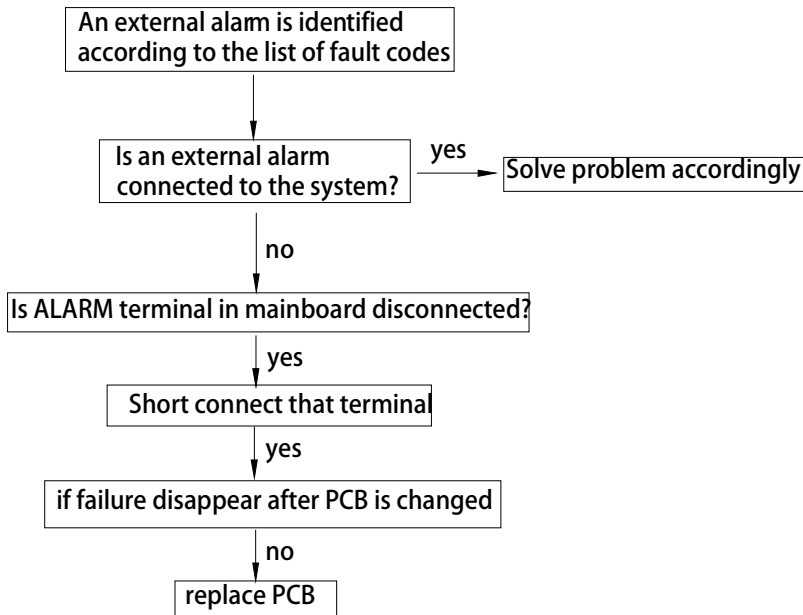
6) Communication failure between wired controller and indoor PCB or no display on wired controller



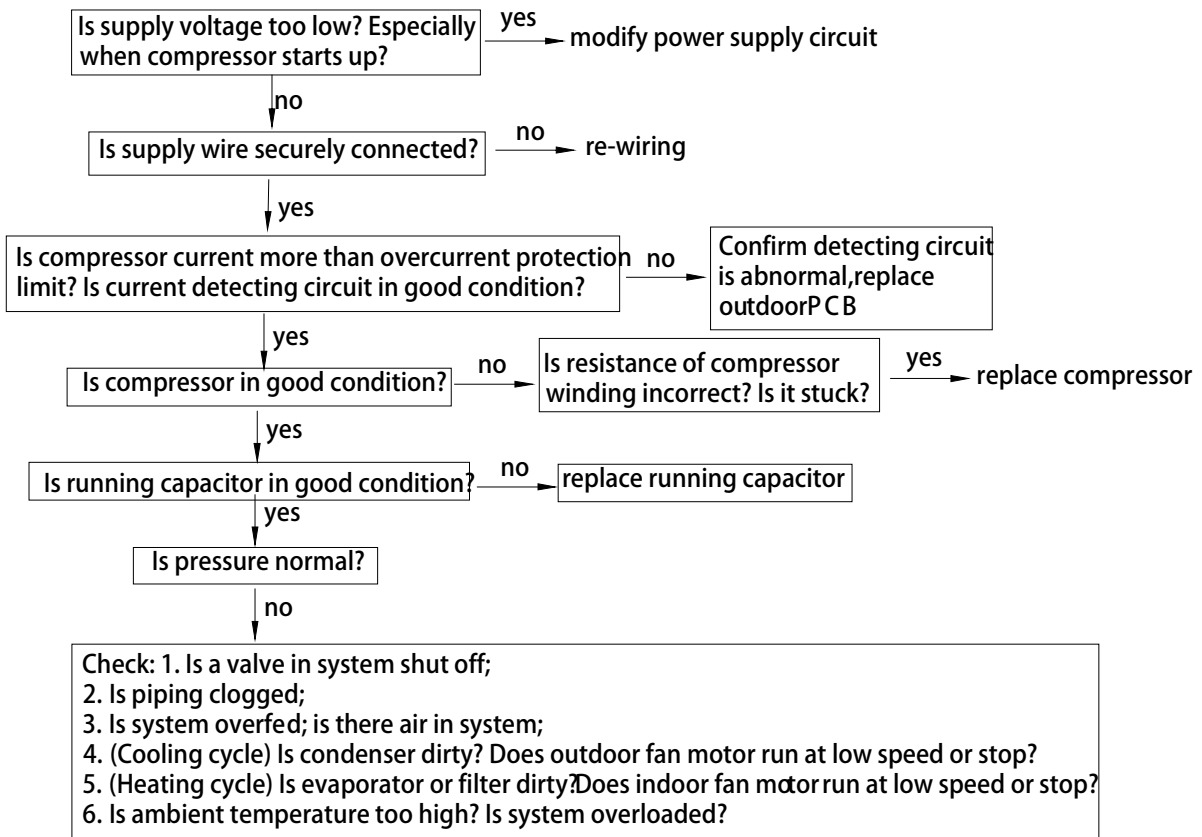
7) Over current protection in 3-phase fixed frequency models



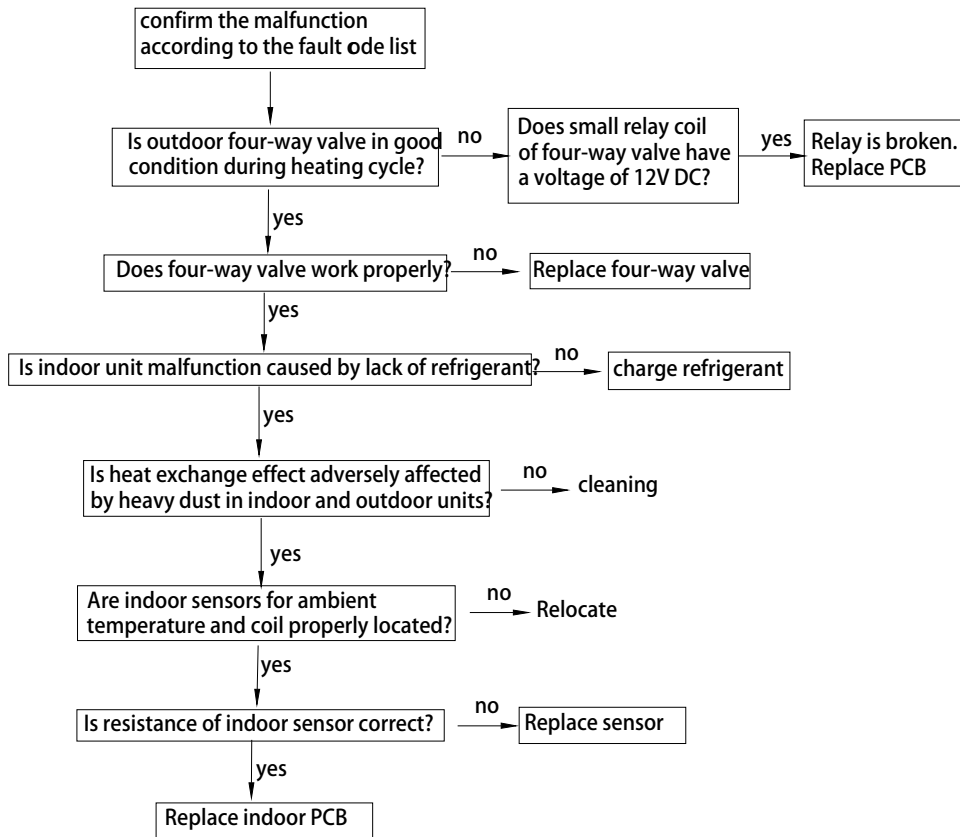
8) External alarm



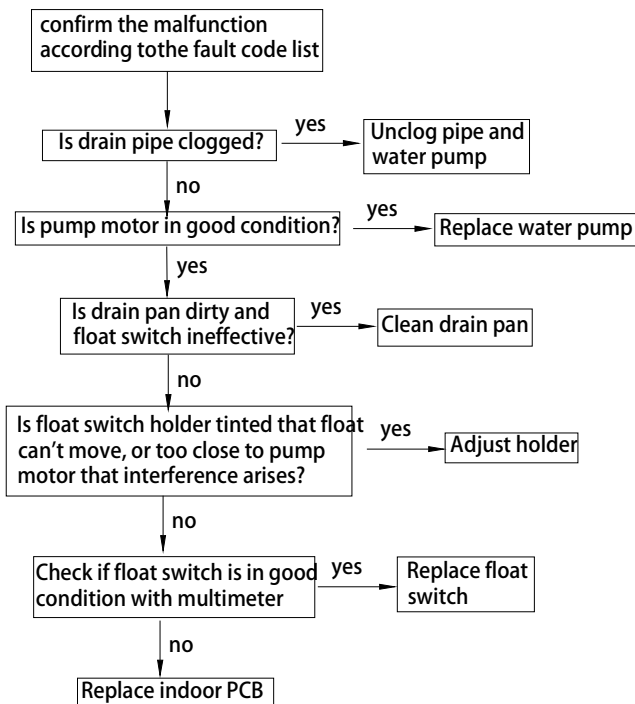
9) Overcurrent protection for single-phase fixed frequency models



10) Temperature cutoff protection



11) Fault in drain system



Note: float switch is close in normal state, when being activated, it is open. Voltage between both ends is 0 V when close, approximately 5 V when open.

12. Sensor characteristic

Model		Name	Code	Characteristic
1U48IN1EAB/ AP48KN1EAA	Indoor	Ambient temp. sensor	001A3900159	R25=23KΩ±3% B25/50=4200K±3%
		Coil pipe temp. sensor	0010401922	R25=10KΩ±3% B25/50=3700K±3%
	Outdoor	Ambient temp. sensor	001A3900110	R25=5KΩ±3% B25/50=3450K±1%
		Discharge temp. sensor	0010450398	R80=50KΩ±3% B25/80=4450K±3%
		Coil pipe temp. sensor	0010451314	R25=5KΩ±3% B25/50=3450K±3%

R25=10KΩ±3% B25/50=3700K±3%

T(°C)	Rnom(KΩ)	T(°C)	Rnom(KΩ)	T(°C)	Rnom(KΩ)	T(°C)	Rnom(KΩ)
-20	90.79	6	23.27	31	7.83	56	3.11
-19	85.72	7	22.2	32	7.52	57	3.11
-18	80.96	8	21.18	33	7.23	58	2.9
-17	76.51	9	20.21	34	6.95	59	2.81
-16	72.33	10	19.3	35	6.68	60	2.72
-15	68.41	11	18.43	36	5.43	61	2.63
-14	64.73	12	17.61	37	5.6	62	2.54
-13	61.27	13	16.83	38	5.59	63	2.49
-12	58.02	14	16.09	39	5.73	64	2.38
-11	54.97	15	15.38	40	5.52	65	2.3
-10	52.1	16	14.71	41	5.32	66	2.23
-9	49.4	17	14.08	42	5.12	67	2.16
-8	46.86	18	13.48	43	4.93	68	2.09
-7	44.46	19	12.9	44	4.9	69	2.03
-6	42.21	20	12.36	45	4.58	70	1.96
-5	40.08	21	11.84	46	4.42	71	1.9
-4	38.08	22	11.34	47	4.26	72	1.85
-3	36.19	23	10.87	48	4.11	73	1.79
-2	34.41	24	10.43	49	3.97	74	1.73
-1	32.73	25	10	50	3.83	75	1.68
0	31.14	26	9.59	51	3.7	76	1.63
1	29.64	27	9.21	52	3.57	77	1.58
2	28.22	28	8.84	53	3.45	78	1.54
3	26.4	29	8.48	54	3.33	79	1.49
4	25.61	30	8.15	55	3.22	80	1.45
5	24.41						

R80=50K Ω ±3% B25/80=4450K±3%							
T(°C)	Rnom(K Ω)	T(°C)	Rnom(K Ω)	T(°C)	Rnom(K Ω)	T(°C)	Rnom(K Ω)
-30	11600	-6	2636	17	760.8	40	253.6
-29	10860	-5	2489	18	722.8	41	242.5
-28	10170	-4	2351	19	687.3	42	232
-27	9529	-3	2221	20	653.8	43	221.9
-26	8932	-2	2099	21	622	44	212.3
-25	8375	-1	1984	22	592	45	203.2
-24	7856	0	1877	23	553.6	46	194.5
-23	7372	1	1775	24	536.6	47	186.3
-22	6920	2	1680	25	511.1	48	178.4
-21	6498	3	1590	26	486.9	49	170.9
-20	6104	4	1506	27	464	50	163.7
-19	5736	5	1426	28	442.3	51	155.9
-18	5392	6	1351	29	421.7	52	150.4
-17	5071	7	1280	30	402.1	53	144.2
-16	4770	8	1214	31	383.6	54	138.3
-15	4488	9	1151	32	366	55	132.7
-14	4225	10	1092	33	349.3	56	127.3
-13	3978	11	1036	34	333.5	57	122.1
-12	3747	12	983.2	35	318.4	58	117.2
-11	3531	13	933.4	36	304.1	59	112.5
-10	3328	14	886.4	37	290.5	60	108
-9	3138	15	841.9	38	277.6	61	103.8
-8	2960	16	800	39	265.3	62	99.68
-7	2793						

R25=23KΩ±2.5% B25/50=4200K±3%							
T(°C)	Rnom(KΩ)	T(°C)	Rnom(KΩ)	T(°C)	Rnom(KΩ)	T(°C)	Rnom(KΩ)
-20°C	281.34	1°C	78.94	21°C	27.86	41°C	11.22
-19°C	263.56	2°C	74.67	22°C	26.54	42°C	10.76
-18°C	247.04	3°C	70.65	23°C	25.3	43°C	10.31
-17°C	231.66	4°C	66.88	24°C	24.12	44°C	9.89
-16°C	217.35	5°C	63.33	25°C	23	45°C	9.49
-15°C	204.02	6°C	60	26°C	21.94	46°C	9.1
-14°C	191.61	7°C	56.86	27°C	20.94	47°C	8.74
-13°C	180.04	8°C	53.91	28°C	19.99	48°C	8.39
-12°C	169.24	9°C	51.13	29°C	19.09	49°C	8.05
-11°C	159.17	10°C	48.51	30°C	18.23	50°C	7.73
-10°C	149.77	11°C	46.04	31°C	17.42	51°C	7.43
-9°C	140.99	12°C	43.72	32°C	16.65	52°C	7.14
-8°C	132.78	13°C	41.52	33°C	15.92	53°C	6.86
-7°C	125.11	14°C	39.45	34°C	15.22	54°C	6.6
-6°C	117.93	15°C	37.5	35°C	14.56	55°C	6.34
-5°C	111.22	16°C	35.66	36°C	13.93	56°C	6.1
-4°C	104.93	17°C	33.92	37°C	13.34	57°C	5.87
-3°C	99.04	18°C	32.27	38°C	12.77	58°C	5.65
-2°C	93.52	19°C	30.72	39°C	12.23	59°C	5.44
-1°C	88.35	20°C	29.25	40°C	11.71	60°C	5.24
0°C	83.5						

R25=5KΩ±3%B25/50=3450K±1%							
T(°C)	Rnom(KΩ)	T(°C)	Rnom(KΩ)	T(°C)	Rnom(KΩ)	T(°C)	Rnom(KΩ)
-10	23.21	27	4.63	64	1.32	101	0.48
-9	22.09	28	4.46	65	1.28	102	0.47
-8	21.03	29	4.29	66	1.24	103	0.46
-7	20.03	30	4.13	67	1.20	104	0.45
-6	19.08	31	3.98	68	1.17	105	0.43
-5	18.19	32	3.84	69	1.13	106	0.42
-4	17.34	33	3.70	70	1.10	107	0.41
-3	16.54	34	3.56	71	1.07	108	0.40
-2	15.78	35	3.44	72	1.04	109	0.40
-1	15.06	36	3.32	73	1.01	110	0.39
0	14.38	37	3.20	74	0.98	111	0.38
1	13.74	38	3.09	75	0.95	112	0.37
2	13.12	39	2.98	76	0.93	113	0.36
3	12.54	40	2.88	77	0.90	114	0.35
4	11.99	41	2.78	78	0.88	115	0.34
5	11.47	42	2.68	79	0.85	116	0.34
6	10.97	43	2.59	80	0.83	117	0.33
7	10.50	44	2.50	81	0.81	118	0.32
8	10.05	45	2.42	82	0.78	119	0.31
9	9.62	46	2.34	83	0.76	120	0.31
10	9.22	47	2.26	84	0.74	121	0.30
11	8.83	48	2.19	85	0.72	122	0.29
12	8.46	49	2.12	86	0.70	123	0.29
13	8.11	50	2.05	87	0.69	124	0.28
14	7.78	51	1.98	88	0.67	125	0.28
15	7.46	52	1.92	89	0.65	126	0.27
16	7.16	53	1.86	90	0.63	127	0.26
17	6.87	54	1.80	91	0.62	128	0.26
18	6.60	55	1.74	92	0.60	129	0.25
19	6.34	56	1.69	93	0.59	130	0.25
20	6.09	57	1.63	94	0.57	131	0.24
21	5.85	58	1.58	95	0.56	132	0.24
22	5.62	59	1.53	96	0.54	133	0.23
23	5.41	60	1.49	97	0.53	134	0.23
24	5.20	61	1.44	98	0.52		
25	5.00	62	1.40	99	0.50		
26	4.81	63	1.36	100	0.49		

Haier Commercial Air Condition

ADDRESS: No.1 Haier Road, Hi-tech Zone, Qingdao 266101 P.R.China

Web: [Http://www.haier.com](http://www.haier.com)