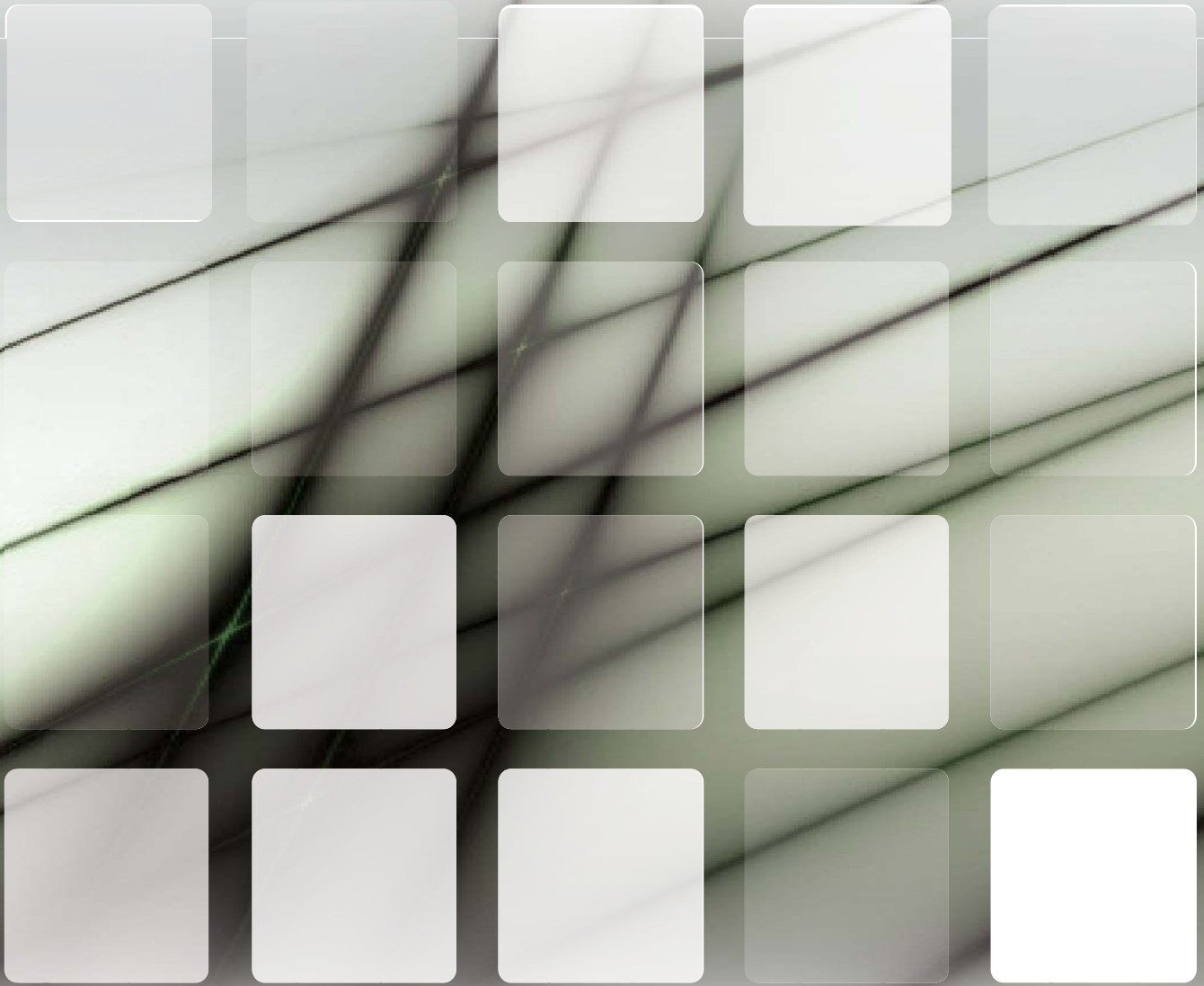


ICHE Series

16 SEER Units

Service Manual

208~230V/1/60Hz



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1. Safety Precautions

Read Safety Precautions Before Installation

Incorrect installation due to ignoring instructions can cause serious damage or injury.

The seriousness of potential damage or injuries is classified as either a WARNING or CAUTION.



Warning

This symbol indicates that ignoring instructions may cause death or serious injury.



Caution

This symbol indicates that ignoring instructions may cause moderate injury to your or damage to your appliance or other property.



Warning

I. Installation Warnings

- This air conditioner is a comfortable unit. Don't use it in some special places for machine rooms, precise instruments, foods, plants, animals, artworks, etc.
- The installation shall be done by the distributor or the professional staff. The installation staff must have related professional knowledge. Misoperation in the self-installation will result in fire, electric shock, injury, water leak, etc.
- If the air conditioner needs to be moved or reinstalled, please inform the distributor or the professional staff to operate. Incorrect installation will result in fire, electric shock, injury, water leak, etc.
- The users are not permitted to rebuild or repair the air conditioner by their own. Incorrect repair will result in fire, electric shock, injury, water leak, etc. please inform the distributor or the professional staff to repair.

II. Electrical Warnings

- The power supply capacity and wire diameter shall be selected according to the design manual. Generally, the power line of the air conditioner is thicker than that of the motor.
- When connecting the power supply, comply with the regulations specified by the local power company. According to the law, the ground wire must be connected. The misconnection of the ground wire will result in electric shock.
- To prevent misoperation of the air-conditioner, don't interlace or wind the power line (208-230V/60Hz/1N) with the connecting wires (low-voltage wires) of the indoor and outdoor units.



Caution

- Make sure the water drainage ditch is useable.
- Make sure the current leakage protection switch is equipped. If not, an electric shock will take place.
- Make sure the foundation and hoisting air firm and reliable. If not, it will result in a falling accident.
- Make sure all cables are correctly connected. The misconnection of the cables will result in the damage of electrical components.
- Pre-installation exposure to water or other moistures will result in short circuit of its electrical components. Don't store it in any damp cellar expose it to rain or water.
- In case of the refrigerant leaks during installation, the room must be ventilated at once. If the leaked refrigerant is exposed flame, some toxic gases will be generated.
- After installation, make sure the refrigerant is not leaked.
- A lighting protection device must be equipped according to national laws and regulations against the lighting strike.

2. External Appearance

2.1 Indoor Unit

Floor-ceiling



Round-way cassette



Duct



AHU



2.2 Outdoor Unit



3 Product Features

3.1 Operation features

- Long Piping & Cost Effective
- Low noise operation, as low as 54dB(A)
- 24V communication protocol, it's much safer than others and easier to connect to IDU.

3.2 Performance features

- High efficiency AC fan motors.
- Wide operation temperature range: Cooling: 16°C-46°C; Heating: -7°C-30°C
- R410A environment friendly refrigerant.
- Continuous Cooling Transformation Inner-grooved tube has high thermometric conductivity.

3.3 Reliability features

- Concealed stop valve design.
- Painted galvanized steel cabinet.
- High pressure ratio compressor.
- Service window to check the operation states.
- Refrigerant cooling PCB to increase the PCB life.

3.4 Safety features

- **Compressor three-minute delay start**
 - The compressor starts with a maximum delay of 30 seconds when the unit is started for the first time, and a maximum of 3 minutes when the subsequent unit restarts.
 - The outdoor fan motor and compressor start at the same time, but after the compressor stops, the outdoor fan motor will stop after a delay of 30 seconds.
- **Automatic shutoff based on discharge temperature**

If the compressor discharge temperature exceeds 115°C for 5 seconds, and T5 discharge temperature overheat protection occurs 20 times within 100 minutes, the compressor will stop to work. After the discharge temperature is down to 90°C, the unit restart.

- **Inverter module protection**

The inverter module has an automatic shutoff mechanism based on the unit's current, voltage, and temperature. If automatic shutoff is initiated, the corresponding error code is displayed on the outdoor unit and the unit stops operation.

- **Compressor preheating**
 - Preheating is automatically activated when ambient temperature (T4) and discharge temperature (T5) is lower than 1°C and the compressor stop.
 - When T4 or T5 is higher than 3°C, or the T4 and T5 temperature sensor are failed at the same time, or compressor runs, the unit will exit compressor preheating.

- A small current is introduced into the compressor from the terminal, so that the compressor can achieve a preheating effect due to the heating of the coil when the compressor is not rotating.
- **Sensor redundancy and automatic shutoff**
 - If one temperature sensor malfunctions, the air conditioner continues operation and displays the corresponding error code, allowing for emergency use.
 - When more than one temperature sensor is malfunctioning, the air conditioner ceases operation.

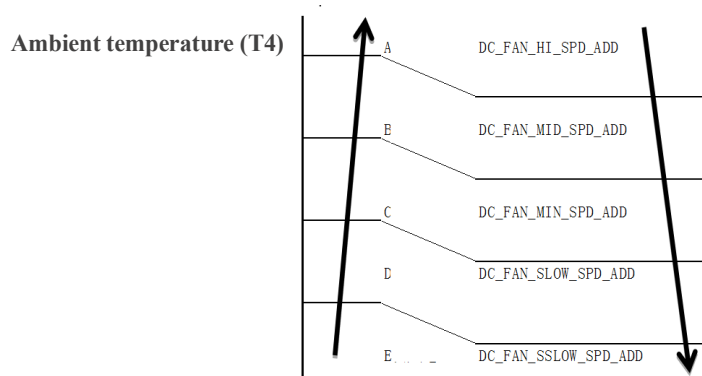
3.5 Basic functions

3.5.1 Abbreviation

Abbreviation	Element
T1	IDU room temperature
T2	IDU evaporator coil temperature
T3	ODU condenser coil temperature
T4	ODU ambient temperature
T5/TP	Discharge temperature
Ts	Setting temperature

3.5.2 Cooling mode

- **Compressor frequency control**
 - The start and running frequency depends on the temperature difference between room and setting temperature.
 - The running frequency will be limited by ambient temperature, indoor fan speed and outdoor unit current.
- **Compressor start and stop protection**
 - In order to prevent the compressor from starting and stopping frequently, wait for 6 minutes after the compressor is stopped, and then respond to the start signal after 6 minutes.
- **Outdoor fan motor control**
 - The outdoor unit fan speed changing is according ambient temperature (T4). For different model outdoor unit, the fan speeds are different.



- **Indoor fan motor control**

- The indoor fan motor will always run until ten seconds of shutdown. The purpose of delay stop is to prevent mildew.
- You can set turbo/high/middle/low/auto fan speed. The fan speed in auto fan mode is according to the temperature difference between room and setting temperature.

3.5.3 Heating mode

- **Compressor frequency control**

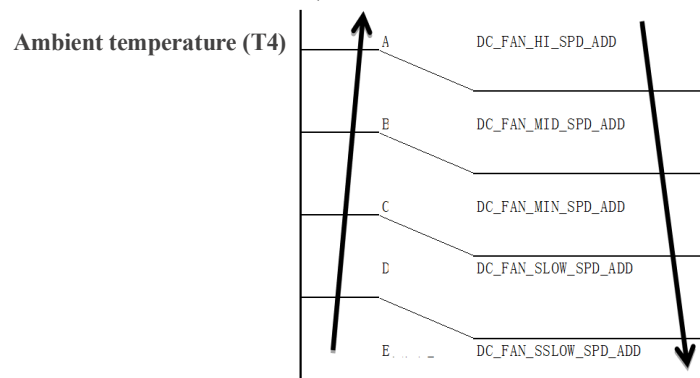
- The start and running frequency depends on the temperature difference between room and setting temperature.
- The running frequency will be limited by ambient temperature, indoor fan speed and outdoor unit current.

- **Compressor start and stop protection**

- In order to prevent the compressor from starting and stopping frequently, after the compressor stops, it will wait for 3.5 minutes, and then respond to the start signal after 3.5 minutes.
- Please note that: The four-way valve will switch after receiving the heating signal, but the four-way valve will not power off when the heating is in standby.

- **Outdoor fan motor control**

The outdoor unit fan speed changing is according ambient temperature (T_4). For different model outdoor unit, the fan speeds are different.



- **Indoor fan motor control**

- Can set turbo/high/middle/low/auto fan speed. The fan speed in auto fan mode is according to the temperature difference between room and setting temperature.

- **Defrosting mode**

- The unit enters defrosting mode according to T3, the running time of compressor.
- In defrosting mode, the compressor continues to run, the indoor and outdoor motor will stop, the 4-way valve is OFF, and the “ dF” symbol is displayed in indoor unit.
- If any one of the following conditions is satisfied, defrosting ends and the machine switches to normal heating mode:
 - a. T3 maintained above 18°C for 120 seconds.
 - b. Unit runs for 10 minutes consecutively in defrosting mode.
- After defrosting mode, the unit may enter anti-cold-wind protection.

3.5.4 Forced operation function

- Press the **forced** button, the unit switches forced mode in the following order: forced auto mode → forced cooling mode → OFF → forced auto mode.
- Action method: running at 19 gear frequency (56HZ) and high fan speed.
- Exit method: short press force button/stop exit/power down exit/automatically switch to normal operation after 60min.
- The sign of mandatory mode is "dH", press this button, dH and pressure flash alternately.
- HPS bad judgment will be shield during the forced operation of the system.

3.5.5 Electric memory function

If the unit is cut out of power during the operation, when it is powered up again, the unit will run as previous setting. Or user turn on the unit manually, the unit will run as previous setting.

3.5.6 Wired controller (Optional)

- Connect with wired controller, can set the ON/OFF, running mode, temperature, fan speed, swing, turbo, sleep mode and timer.
- If there is error, error code will also be showed in wired controller.

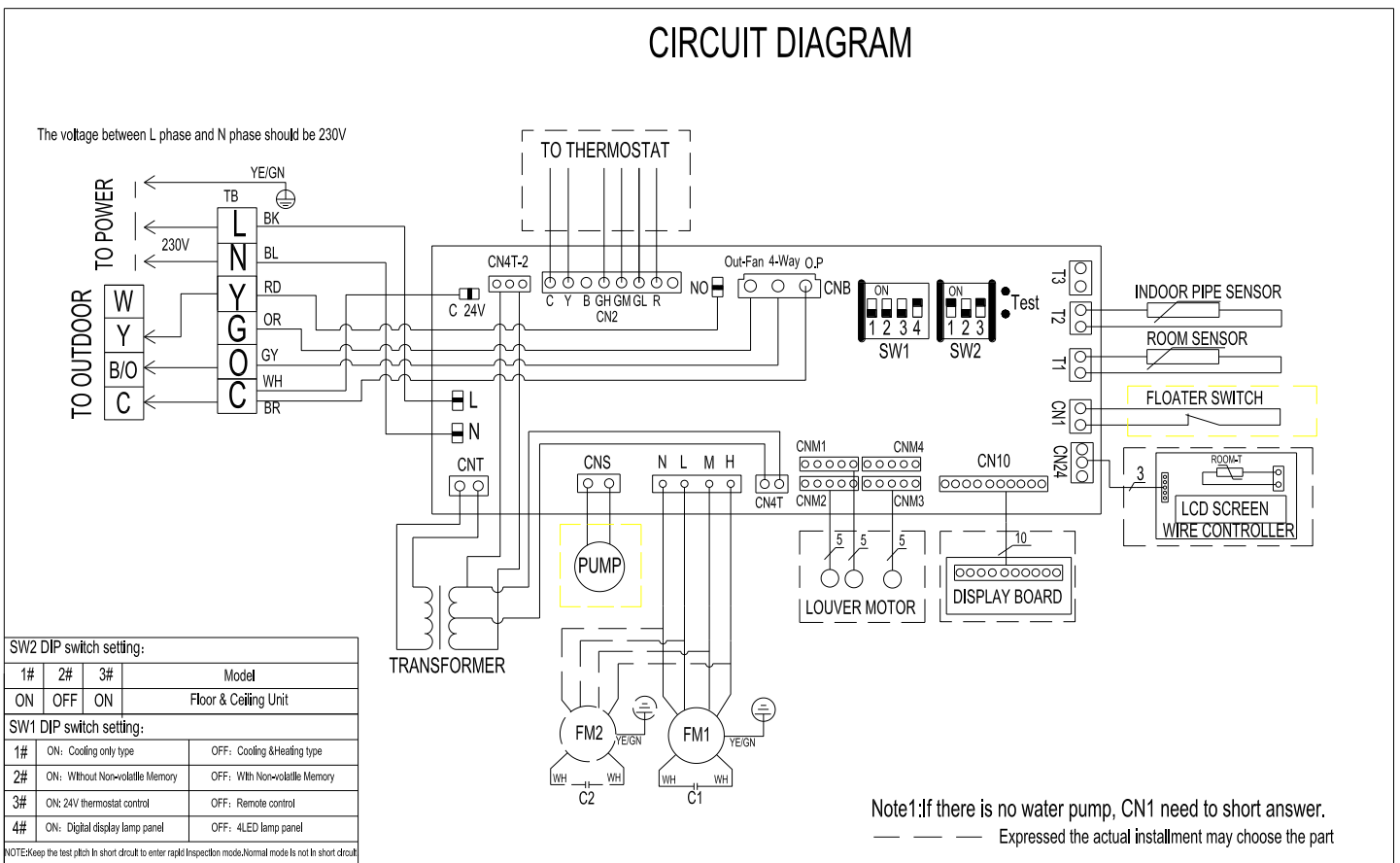
4 Electrical wiring diagram

4.1 Indoor Unit

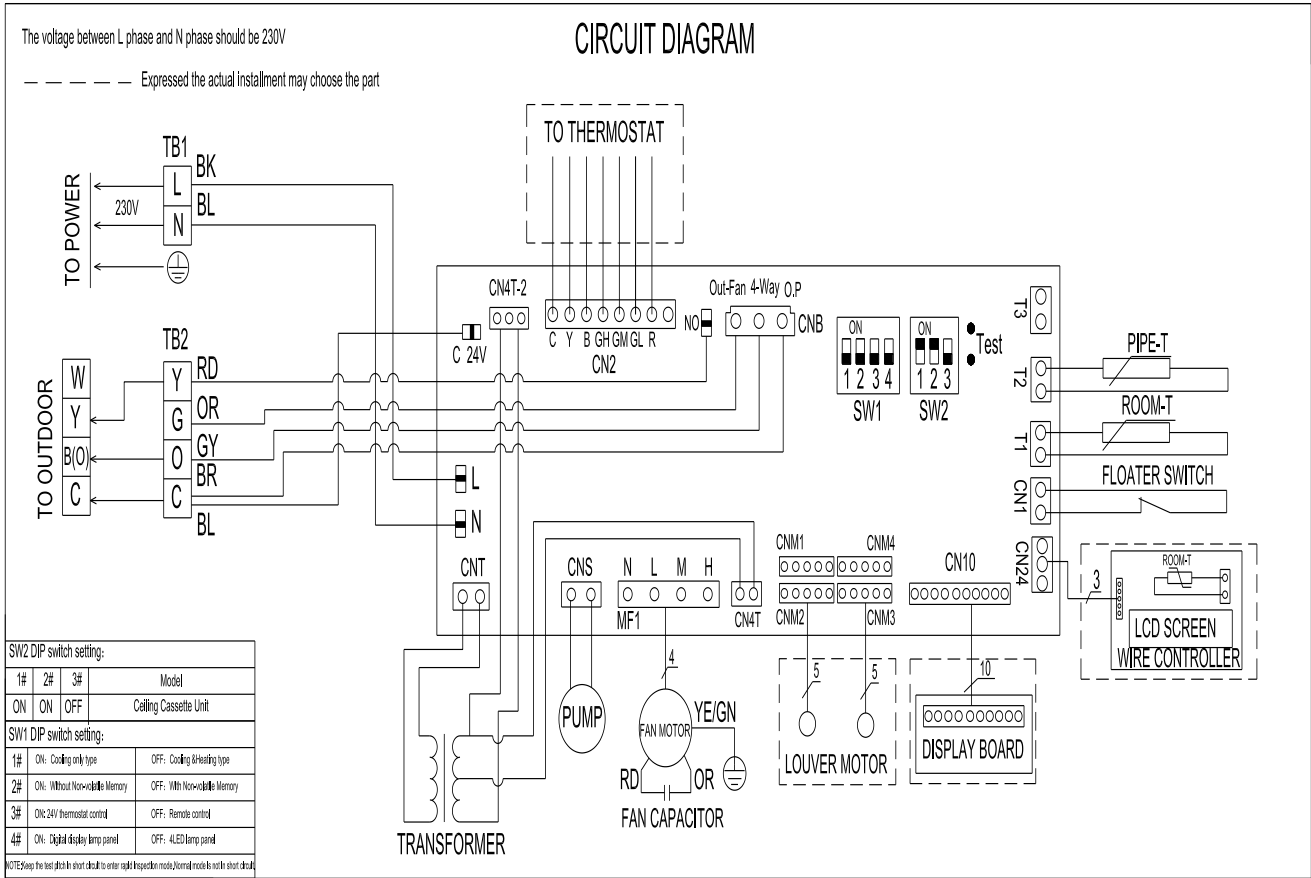
4.1.1 Floor-ceiling

18K&60K

CIRCUIT DIAGRAM

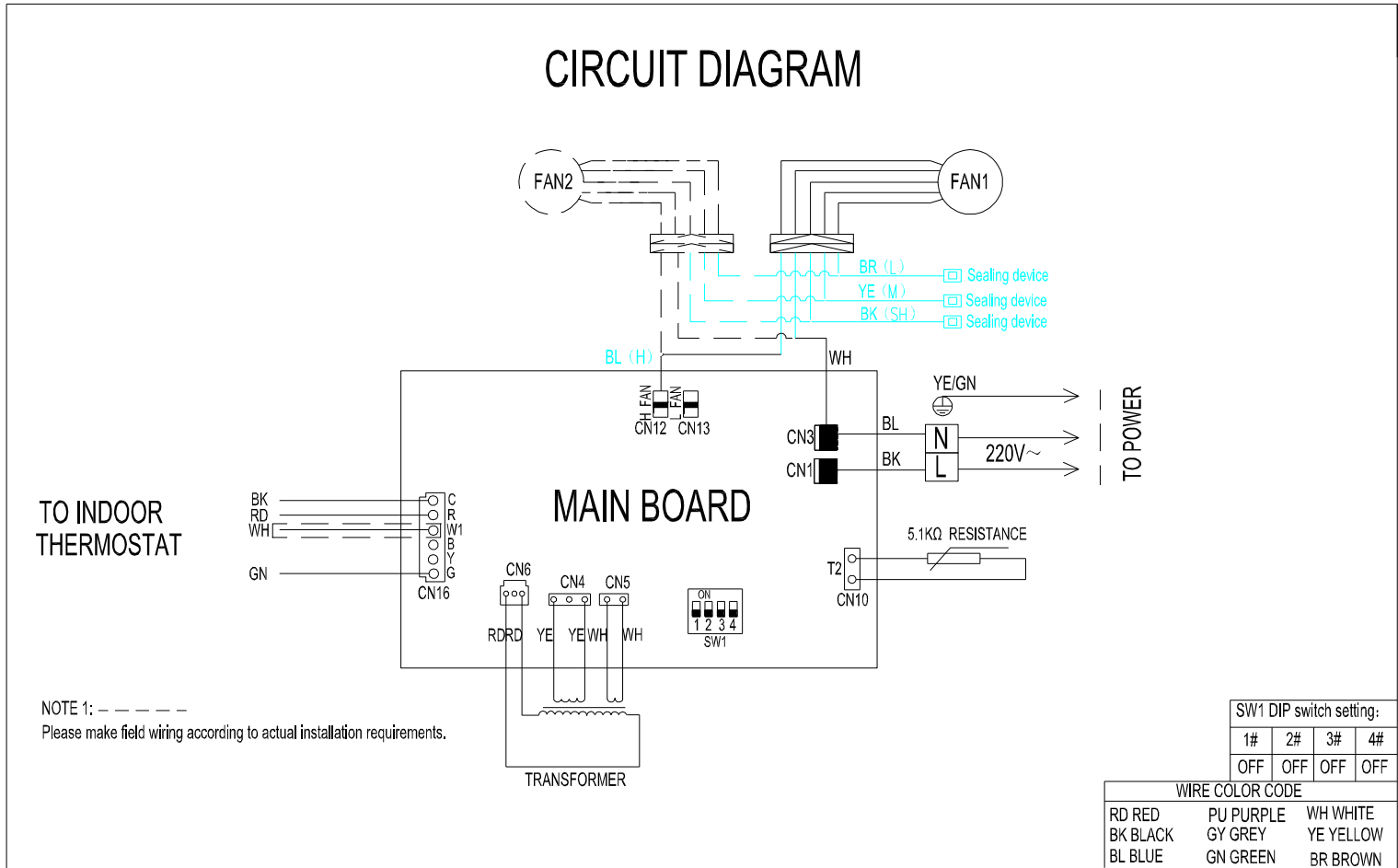


18K&60K



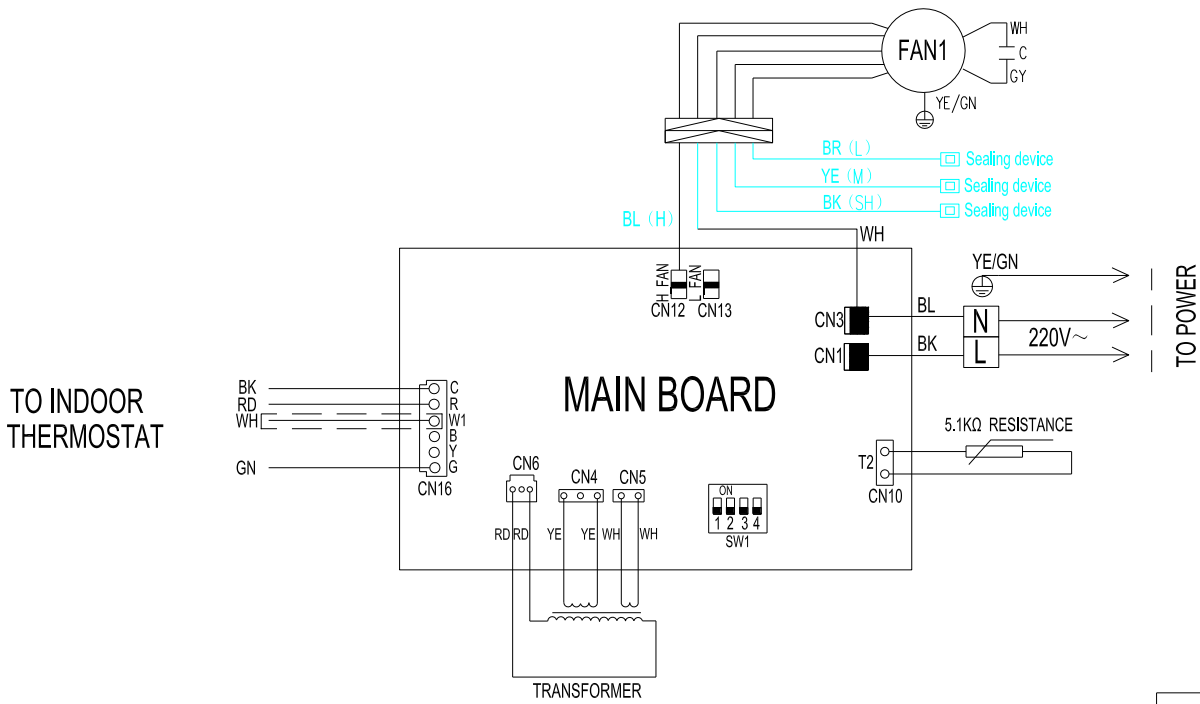
18K/24K/36K

CIRCUIT DIAGRAM



48K/60K

CIRCUIT DIAGRAM

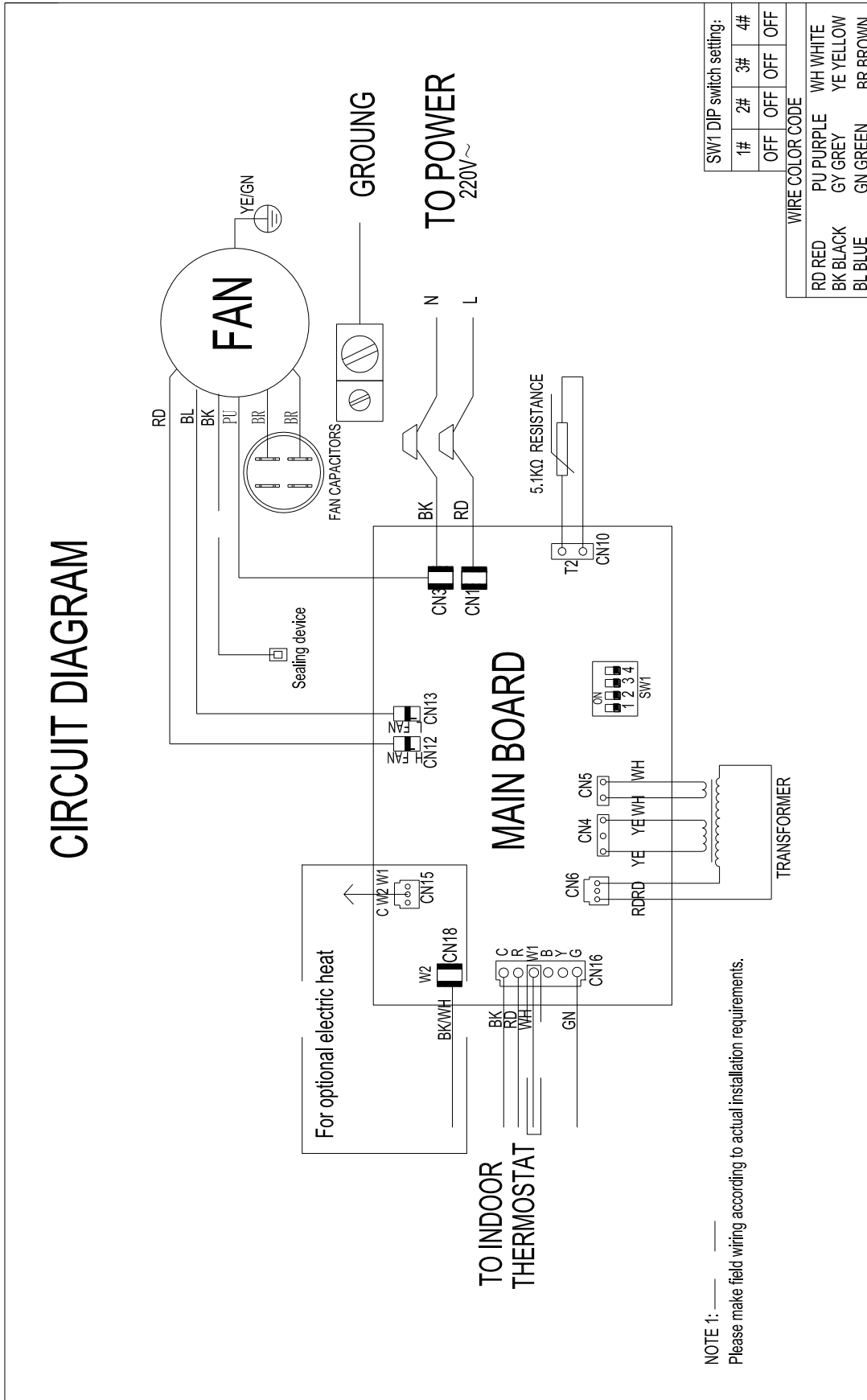


NOTE 1: - - - - -
Please make field wiring according to actual installation requirements.

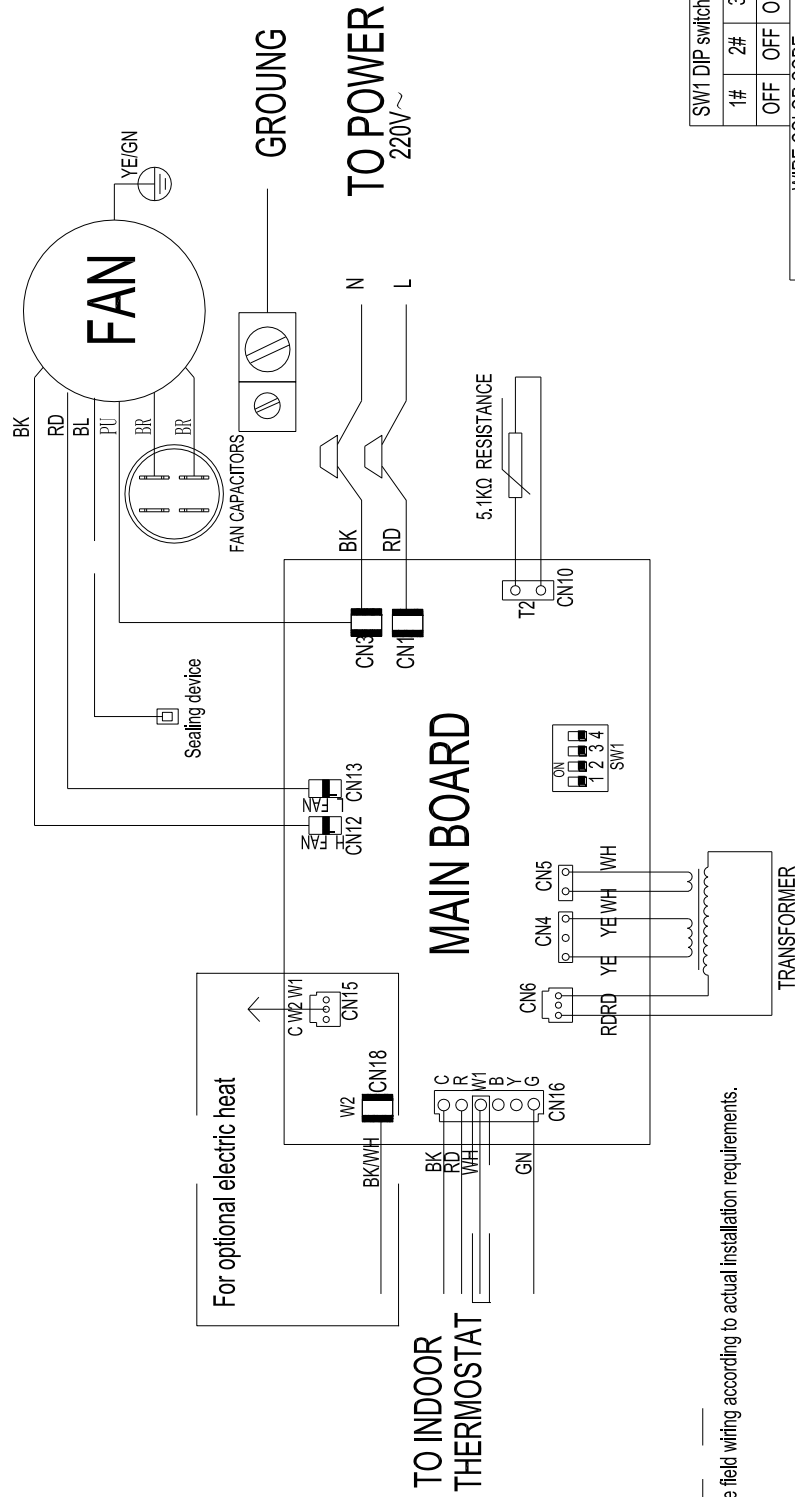
SW1 DIP switch setting:			
1#	2#	3#	4#
OFF	OFF	OFF	OFF

WIRE COLOR CODE		
RD RED	PU PURPLE	WH WHITE
BK BLACK	GY GREY	YE YELLOW
BL BLUE	GN GREEN	BR BROWN

CIRCUIT DIAGRAM



CIRCUIT DIAGRAM

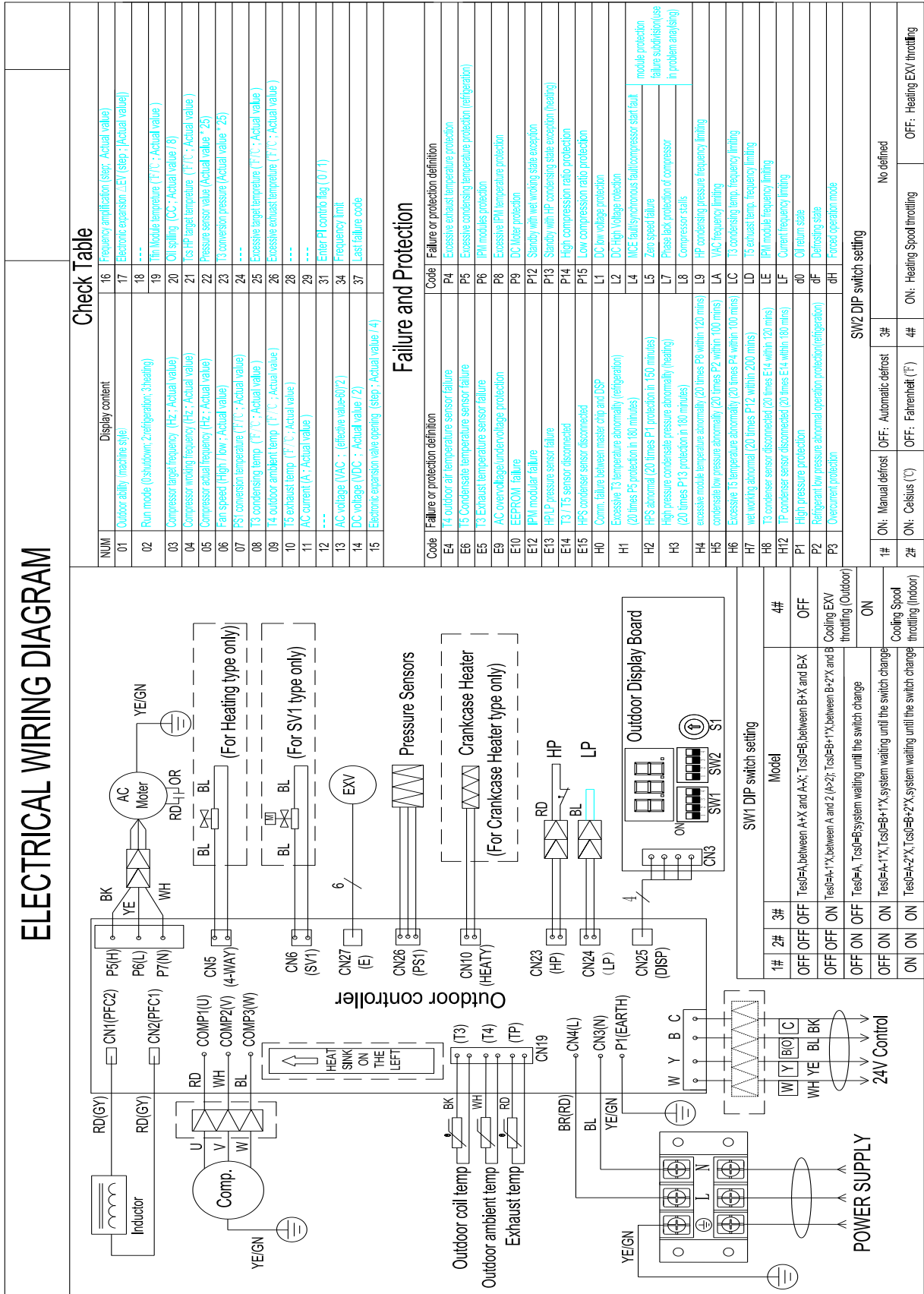


NOTE 1: _____
Please make field wiring according to actual installation requirements.

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	

4.2 Outdoor unit (18&60K)



Check Table

NUM	Display content	16
01	Outdoor ability (machine style)	Frequency amplification (step: Actual value)
02	Run mode (0: shutdown, 2: refrigeration, 3: heating)	Electronic expansion ΔEV (step: Actual value)
03	Compressor target frequency (Hz: Actual value)	18 ---
04	Compressor actual frequency (Hz: Actual value)	19 Thin Module temperature (°F/°C: Actual value)
05	Fan speed (High/ low: Actual value)	20 Oil sipping (CC: Actual value / 8)
06	PS1 compressor temperature (°F/°C: Actual value)	21 Tcs HP target temperature (°F/°C: Actual value)
07	T3 condensing temp (°F/°C: Actual value)	22 Pressure sensor value (Actual value * 25)
08	T4 outdoor ambient temp (°F/°C: Actual value)	23 T5 condenser pressure (Actual value * 25)
09	T5 exhaust temp (°F/°C: Actual value)	24 ---
10	AC current (A: Actual value)	25 Excessive target temperature (°F/°C: Actual value)
11	---	26 Excessive exhaust temperature (°F/°C: Actual value)
12	---	28 ---
13	AC voltage (VAC: effective value/0/2)	29 ---
14	DC voltage (VDC: Actual value / 2)	31 Enter PI control lag (0 / 1)
15	Electronic expansion valve opening (step: Actual value / 4)	34 Frequency limit
		37 Last failure code

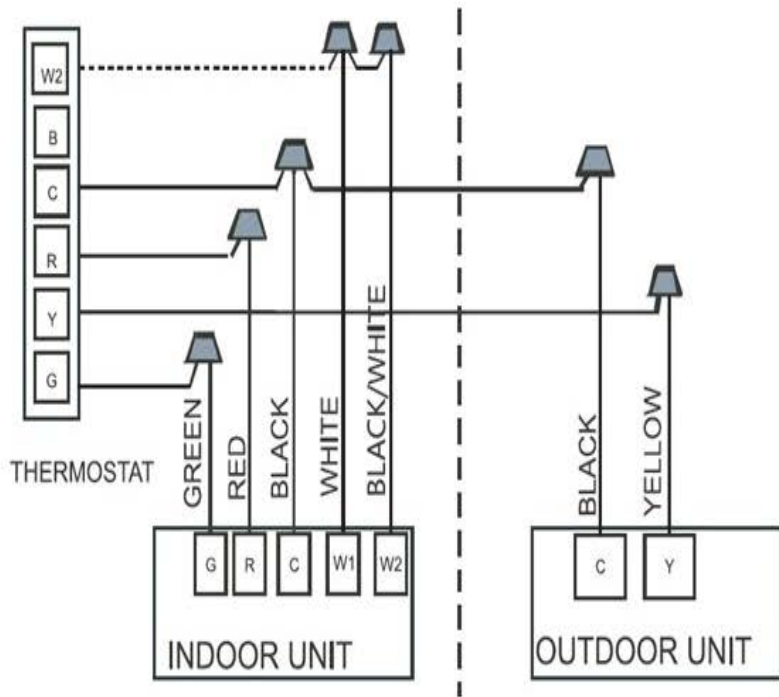
Failure and Protection

Code	Failure or protection definition	Code	Failure or protection definition
E4	T4 outdoor air temperature sensor failure	P4	Excessive exhaust temperature protection
E6	T5 Condensate temperature sensor failure	P5	Excessive condensing temperature protection (refrigeration)
E5	T3 Exhaust temperature sensor failure	P6	PHI modules protection
E9	AC overvoltage/undervoltage protection	P8	Excessive PH temperature protection
E10	EEPROM failure	P9	DC Motor protection
E12	PIPI modular failure	P12	Standby with wet working state exception
E13	HP/LP pressure sensor failure	P13	Standby with HP condensing state exception (heating)
E14	T3/T5 sensor disconnected	P14	High compression ratio protection
E15	HPS condenser sensor disconnected	P15	Low compression ratio protection
H0	Comm. failure between master chip and DSP	L1	DC low voltage protection
H1	Excessive T3 temperature abnormality (refrigeration) (20 times P5 protection in 180 minutes)	L2	DC High Voltage protection
H2	HPS abnormal (20 times P1 protection in 150 minutes)	L4	RICE Indisynchronous fault/compressor start fault
H3	High pressure condensate pressure abnormality (heating) (20 times P13 protection in 180 minutes)	L5	Zero speed failure
H4	Excessive mobile temperature abnormality (20 times P8 within 120 mins)	L7	Phase lock protection of compressor
H5	condensate low pressure abnormality (20 times P2 within 100 mins)	L8	Compressor stalls
H6	Excessive T5 temperature abnormality (20 times P4 within 100 mins)	L9	HP condensing pressure frequency limiting
H7	wet working abnormal (20 times P12 within 200 mins)	LA	UAC frequency limiting
H8	T3 condenser sensor disconnected (20 times E14 within 120 mins)	LC	T3 condensing temp. frequency limiting
H12	IP condenser sensor disconnected (20 times E14 within 120 mins)	LD	T5 exhaust temp. frequency limiting
P1	High pressure protection	LE	PHI module frequency limiting
P2	Refrigerant low pressure abnormal (greater protection (refrigeration))	LF	Current frequency limiting
P3	Overcurrent protection	d0	Oil return state
		dF	Defrosting state
		dH	Forced operation mode

SW2 DIP switch setting

#	ON: Manual defrost	OFF: Automatic defrost	3#	ON: Heating Speed throttling	OFF: Heating EXV throttling
1#	ON	OFF	4#	ON	OFF

4.3 Control Wiring



Control Wiring for A/C Systems.

The wiring of the cooling only unit is the same, just connect the G, R, C, (W1, W2: if there is electric heater) of the AHU unit and the C, Y of the outdoor unit to the thermostat.

5 Maintenance

5.1 Dimensional drawing of outdoor unit (Unit: mm)

1) Fig. 8-1 is applicable for models of ICHE648(60)K2A-GMG140(160)

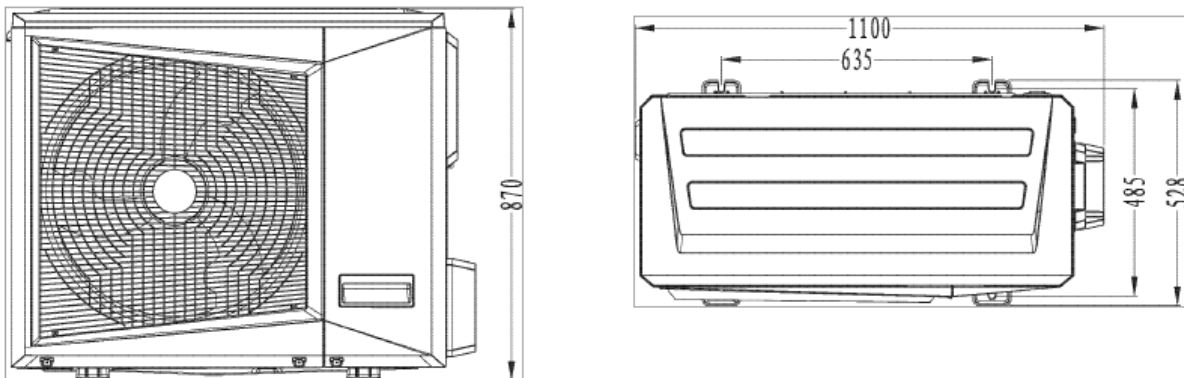
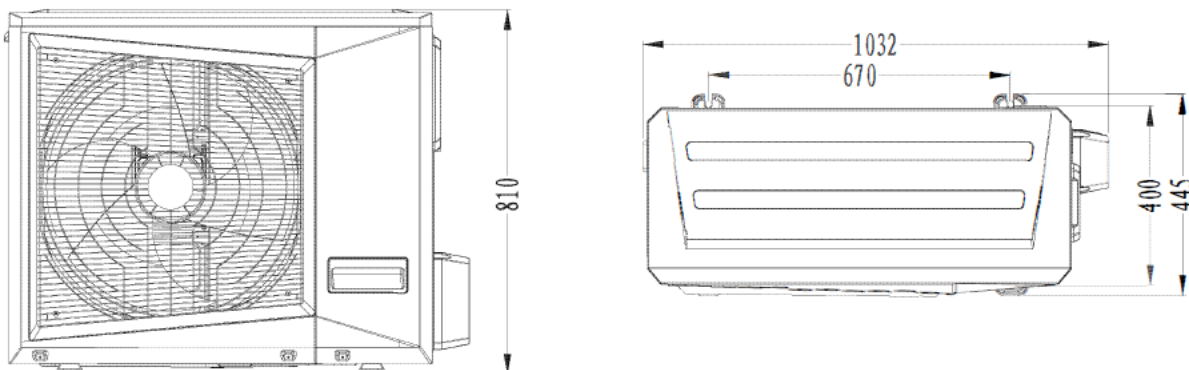
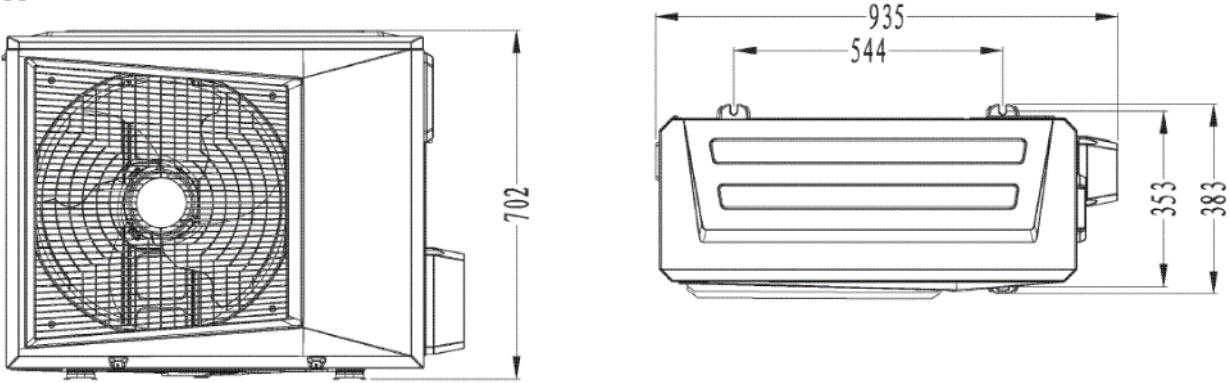


Fig 8-1 Dimension of outdoor unit

2) Fig. 8-2 is applicable for models of ICHE636K2A-GMG105

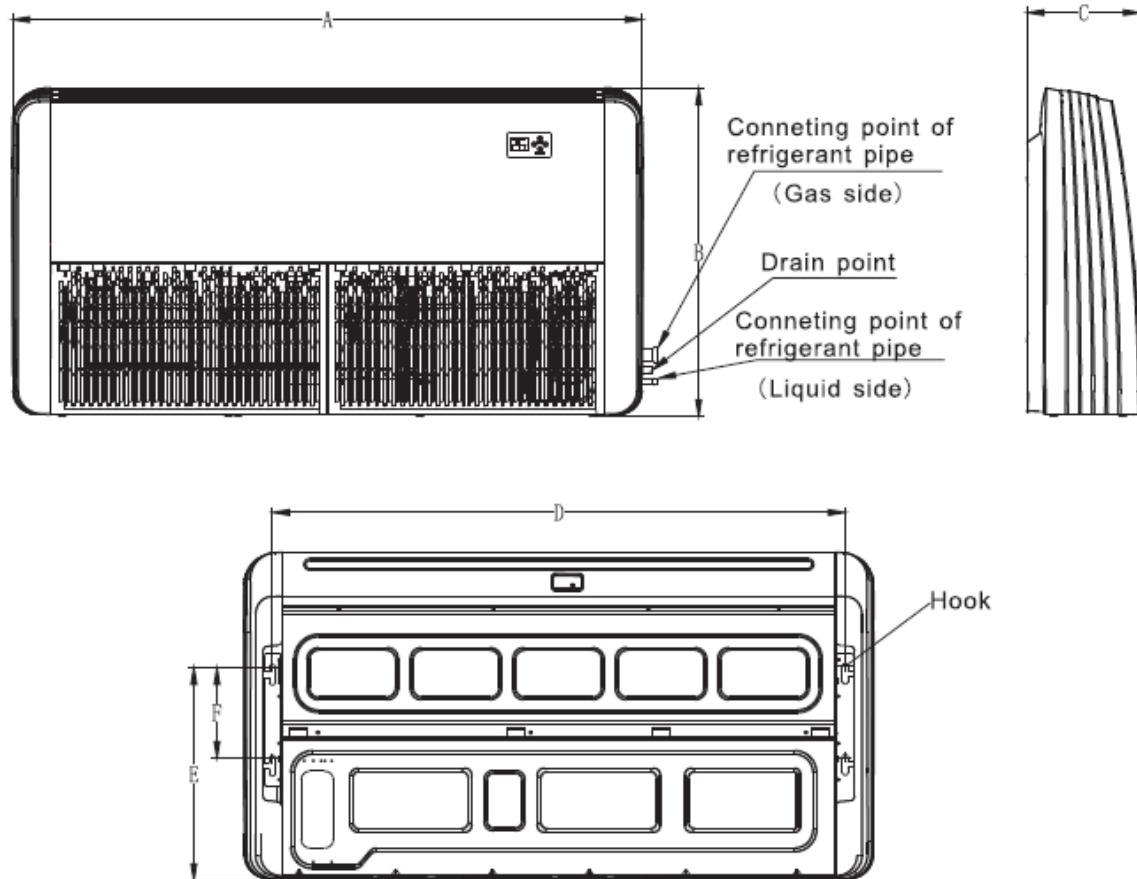


3) Fig. 8-3 is applicable for models of ICHE624(18)K2A-GMG053(71)



5.1 Dimensional drawing of indoor unit (Unit: mm)

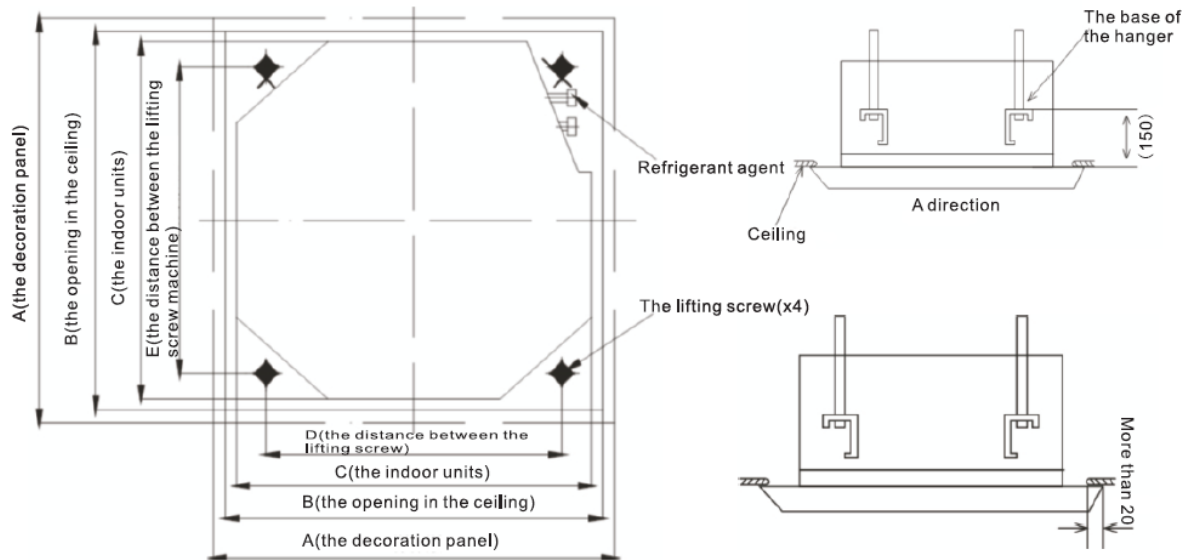
5.1.1 Floor-ceiling



Model (kBtu/h)	A(mm)	B(mm)	C(mm)	D(mm)	E(mm)	F(mm)
18~24	1050	675	235	933	440	188
36	1300	675	235	1185	440	188
48~60	1670	675	235	1553	440	188

5.1.2 Round-way cassette

The position relationship between the opening in the ceiling, the unit and the lifting screw



unit: mm

Model(Btu/h)	Dimensions(H)				
	A	B	C	D	E
For 18K, 24K, 36K, 48K, 60K series	950	890	840	680	780

5.1.3 Duct

5.1 M M M

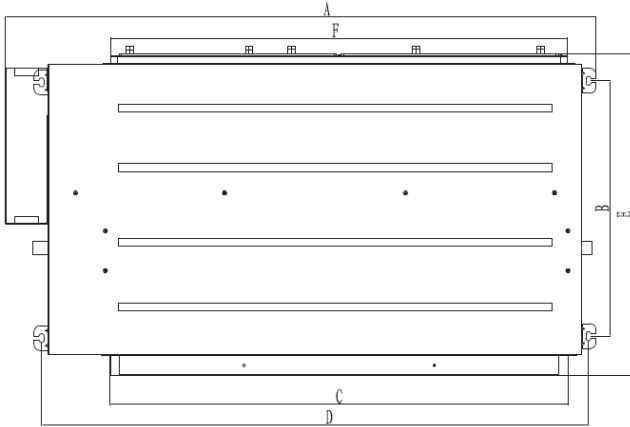
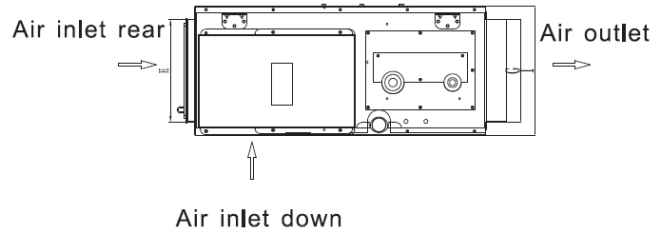
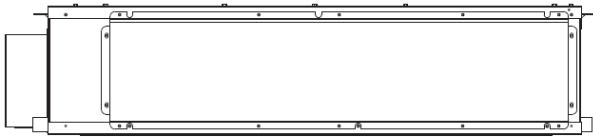
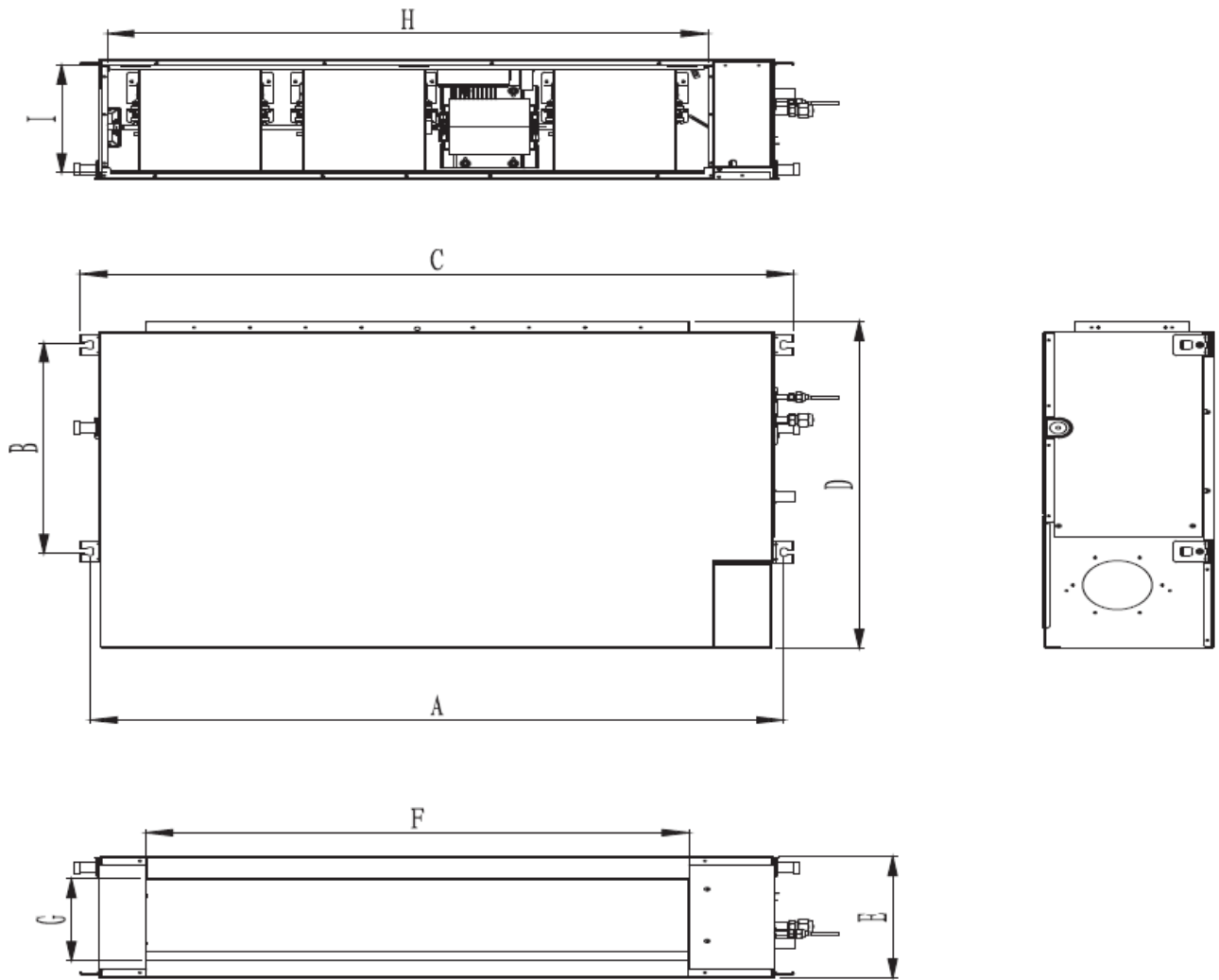


Table 1: unit : mm

Items Model(Btu/h)	A	B	C	D	E	F	G	H	I
18/24K	1190	515	920	1100	643	920	207	207	260
36K	1425	515	1155	1337	643	1155	207	207	260

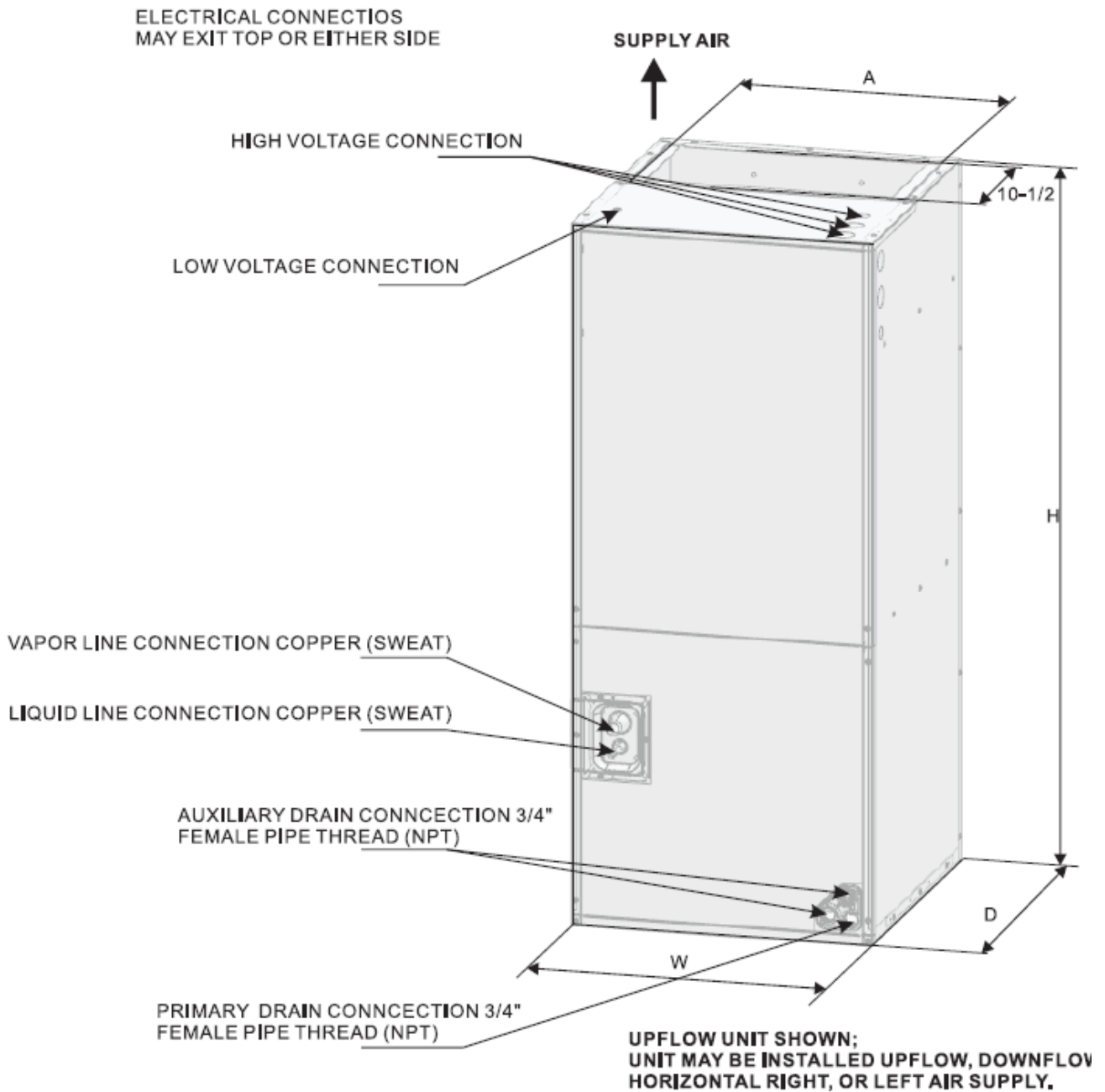
5.1.3.2 M M



unit : mm

Items Model(Btu/h)	A	B	C	D	E	F	G	H	I
48/60K	1242	535	1279	830	307	973	207	1077	273

5.1.4 =y

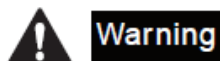


DIMENSIONAL DATA

MODEL SIZE	Dimensions inch[mm]				
	UNIT HEIGHT "H" IN. [mm]	UNIT WIDTH "W" IN.[mm]	UNIT LENGHT "D" IN. [mm]	SUPPLYDUCT "A" IN[mm]	LIQUID LINE/ VAPOR LINE IN
18K	30-1/2"[774]	18-1/10"[460]	20-1/2"[520]	16-1/3"[414]	3/8" / 5/8"
24K	30-1/2"[774]	18-1/10"[460]	20-1/2"[520]	16-1/3"[414]	3/8" / 5/8"
36K	45-3/4"[1162]	19-5/8"[500]	22"[560]	17-7/8"[454]	3/8" / 3/4"
48K	45-3/4"[1162]	19-5/8"[500]	22"[560]	17-7/8"[454]	3/8" / 3/4"
60K	53-1/8"[1350]	22"[560]	24-1/2"[623]	19-1/2"[496]	3/8" / 7/8"

5.2 Troubleshooting

5.3 Safety caution




- Be sure to turn off all power supplies or disconnect all wires to avoid electric shock. While checking indoor/outdoor PCB, please equip oneself with antistatic gloves or wrist strap to avoid damage to the board.
- Electricity remains in capacitors even when the power supply is off.
- Ensure the capacitors are fully discharged before troubleshooting.
(Test the voltage between P and N on back of the main PCB with multimeter. If the voltage is lower than 36V, the capacitors are fully discharged.)

5.4 Error code list

Definitions of malfunction	Error code
T4 Outdoor ambient temperature sensor error	E4
T5 Discharge temperature sensor error	E5
T3 Condenser temperature sensor error	E6
AC under voltage protection	E9
EEPROM error	E10
IPM modular sensor error	E12
HLP Pressure sensor error	E13
T3 or T5 sensor disconnect error	E14
High pressure switch error	E15
Communication error of main chip and IPM chip	H0
T3 sensor high temperature error(In cooling mode) (20 times P5 error within 180mins)	H1
High pressure switch error(20 times P1 error within 150 mins)	H2
High pressure abnormal in heating mode (20 times P13 error within 180 mins)	H3
IPM modular high temp error (20 times P8 within 120 mins)	H4
Low pressure error (20 times P2 within 100 mins)	H5
Discharge temperature abnormal error(20 times P4 within 100 mins)	H6
Wet operation error (20 times P12 within 200 mins)	H7

T3 condenser sensor disconnect error (20 times E14 within 100 mins)	H8
Discharge temp sensor disconnect error(20 times E14 within 180 mins)	H12
High pressure protection	P1
Low pressure protection	P2
DC over current protection	P3
T5 Discharge temperature abnormal error	P4
T3 Condenser sensor high temp protection(In cooling mode)	P5
IPM module protection	P6
IPM high temperature protection (Ft)M high temperature protection (Ft)	P8
DC fan motor error	P9
Wet operation error	P12
High pressure abnormal error(In heating mode)	P13
High compression ratio protection	P14
Low compression ratio protection	P15
DC cable bus low voltage protection	L1
DC cable bus high voltage protection	L2
MCE fault / sync / closed loop	L4
Zero speed protection	L5
Compressor phase loss protection ratio protection	L7
Compressor stalls	L8
Frequency limitation or decline by high pressure	L9
Frequency limitation by voltage	LA
Frequency limitation by condenser temp.	LC
Frequency limitation by discharge temp	LD
Frequency limitation by IPM modular high temp	LE
Frequency limitation by current	LF
Oil return	d0
Defrost	dF
Force cooling	dH

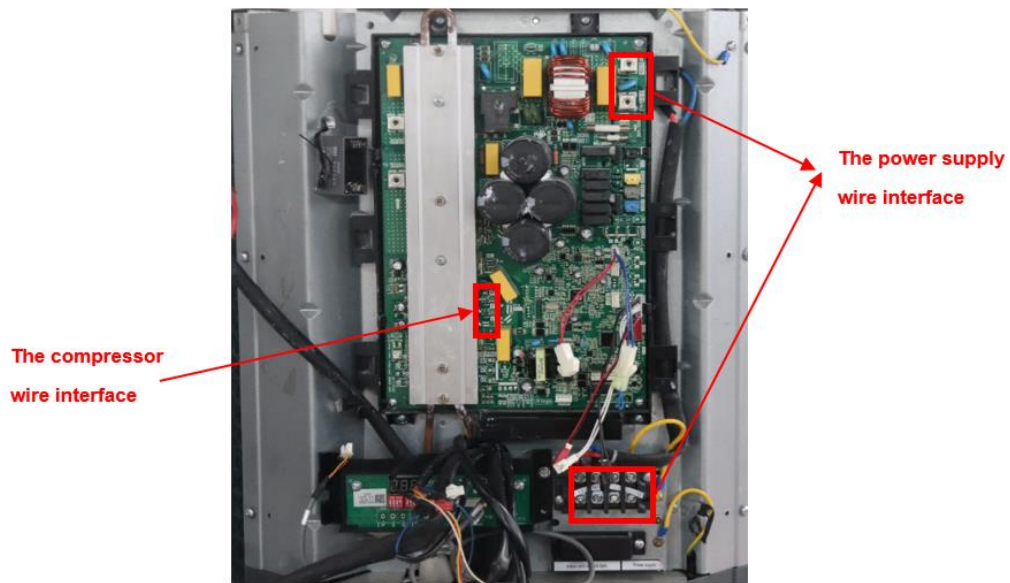
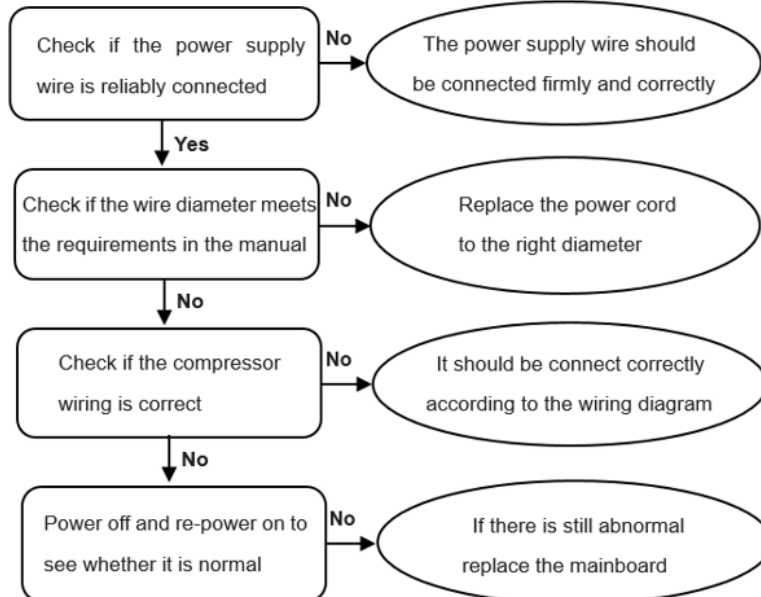
5.5 Troubleshooting by error code

E4/E5/E6 (T4/T5/T3 temperature sensors error)	
Diagnosis	Handling
<p>Check the connection between the sensor and PCB</p> <p style="text-align: right;">Error</p> <p style="text-align: center;">↓ OK</p> <p>Check if the sensor is damaged</p> <p style="text-align: right;">Yes</p> <p style="text-align: center;">↓ No</p> <p>Replace the main board</p>	<p>The sensor should be connected firmly and correctly</p> <p>Replace with a new sensor, and insert it in the corresponding position</p>
 <p style="text-align: center;"> T5/Tp T4 T3 </p>	
E10 (EEPROM failure)	
Diagnosis	Handling
<p>Power off and re-power on to see whether it is normal</p>	<p>If there is still abnormal replace the mainboard</p>

E9 (AC under voltage protection)

Diagnosis

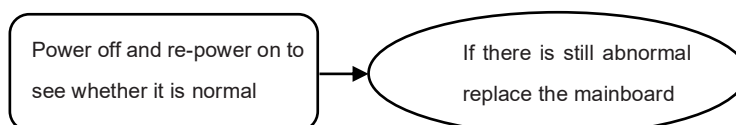
Handling



E12 (IPM modular sensor error)

Diagnosis

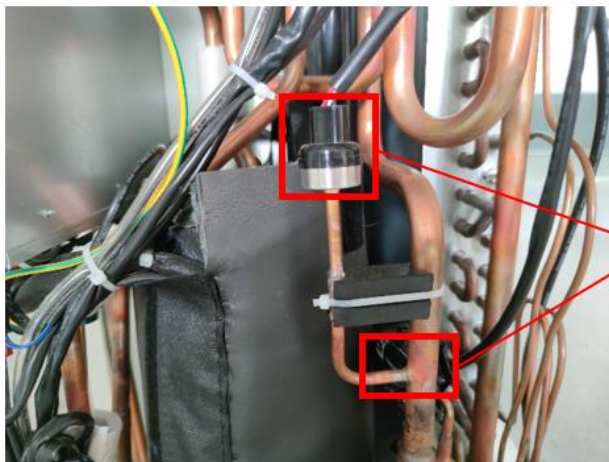
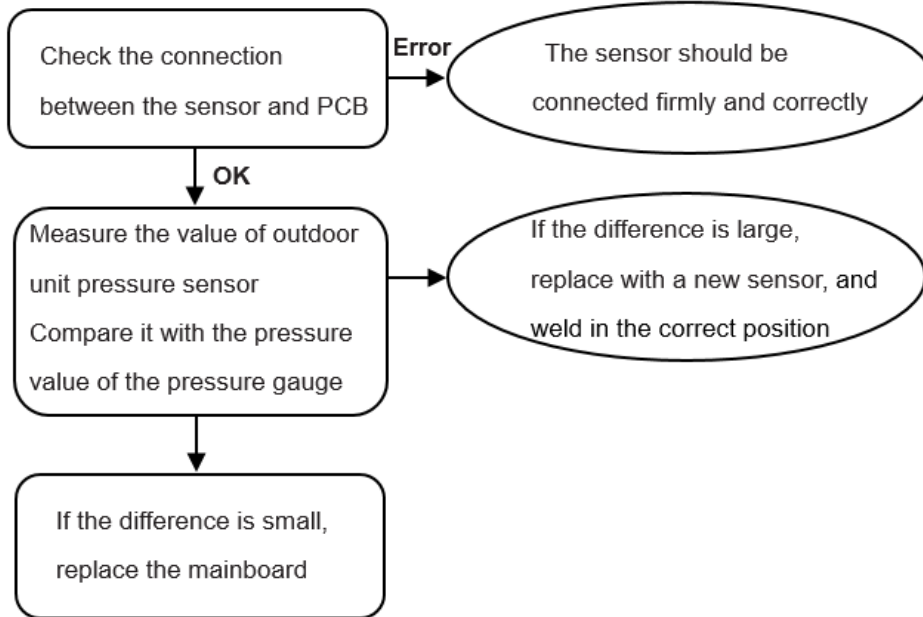
Handling



E13 (HP/LP Pressure sensor error)

Diagnosis

Handling

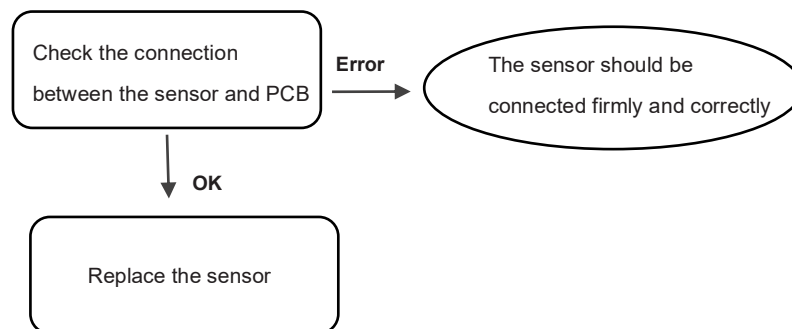


The pressure sensor should be soldered in the correct position

E14/H8/H12 (T3 or T5 sensor disconnect error)

Diagnosis

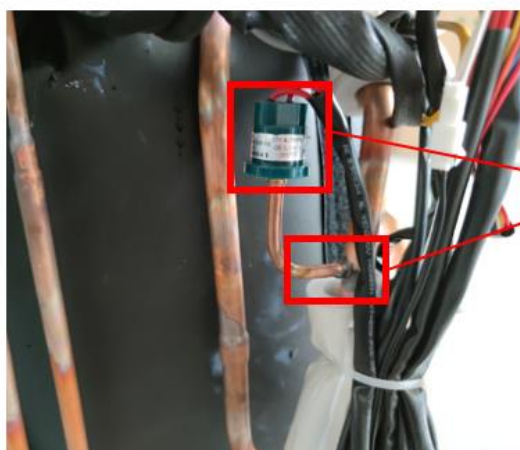
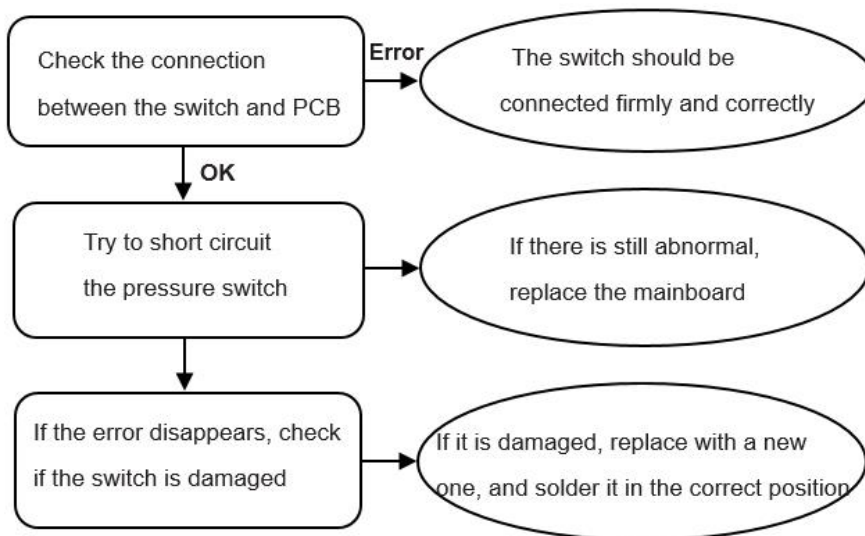
Handling



E15 (High pressure switch error)

Diagnosis

Handling

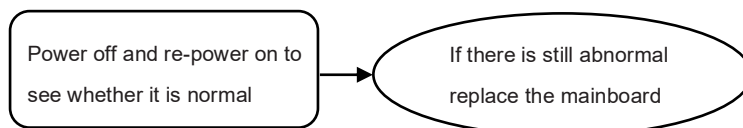


The high pressure switch should be soldered in the correct position

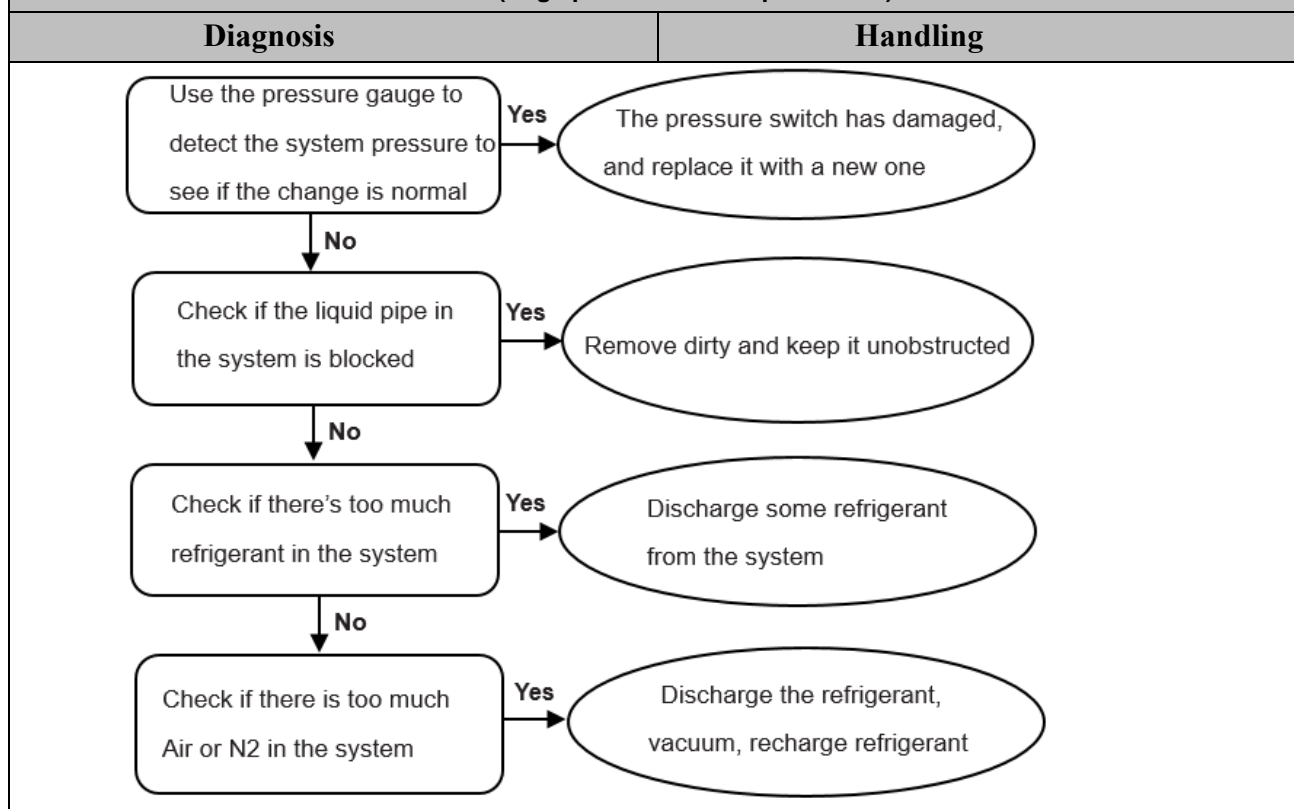
H0 (Communication error of main chip and IPM chip)

Diagnosis

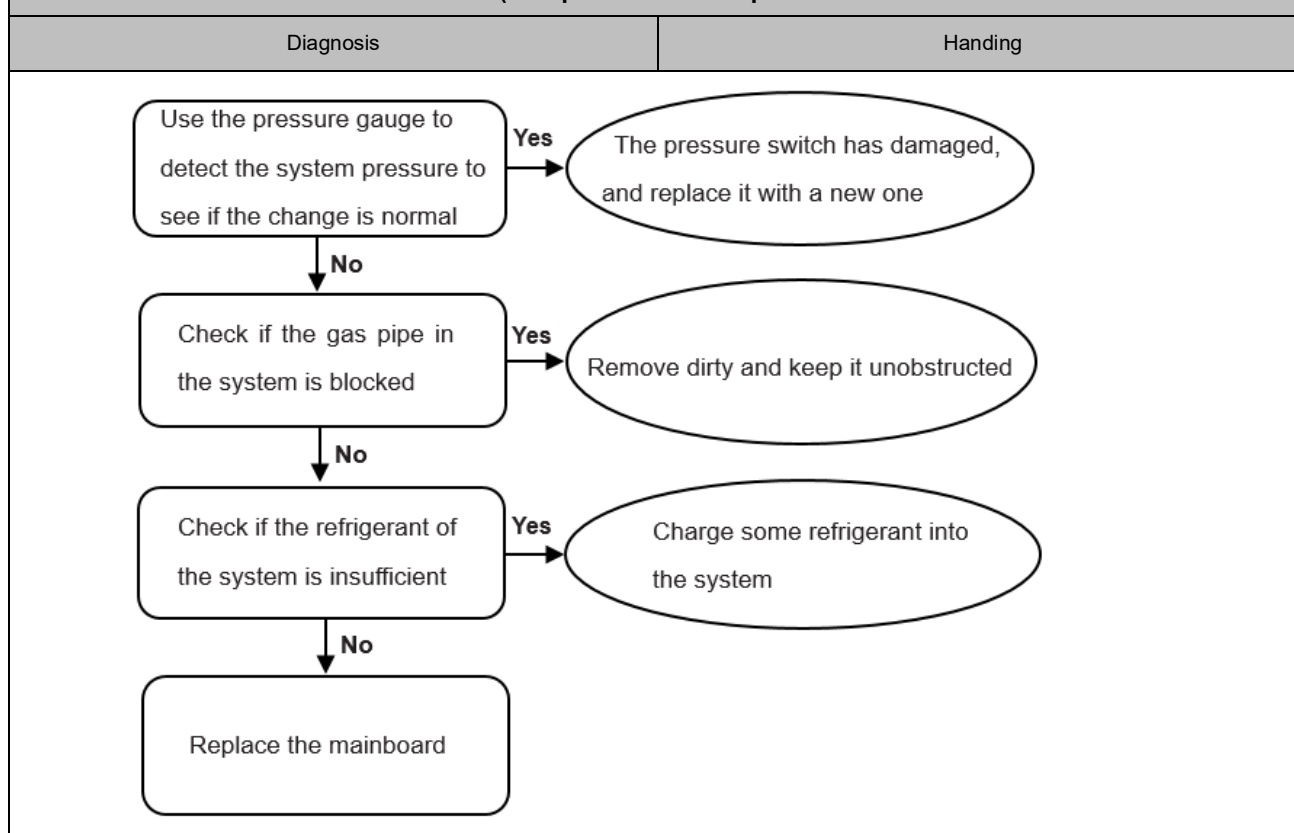
Handling



P1/H2 (High pressure switch protection)



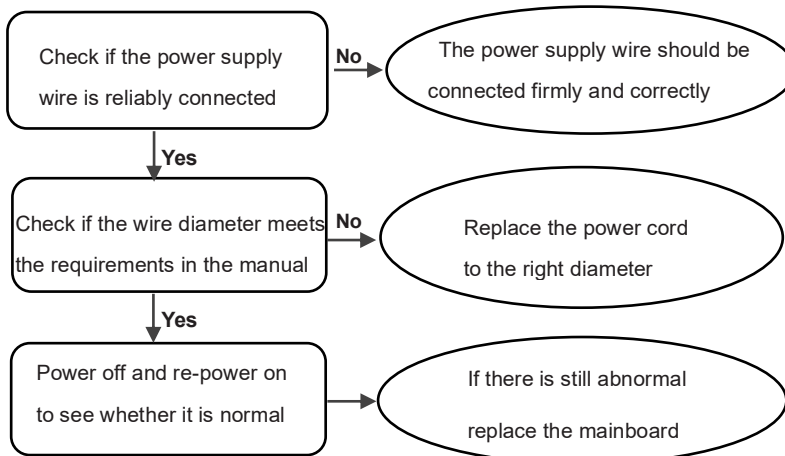
P2/H5 (Low pressure switch protection)



P3(Inverter over current protection)

Diagnosis

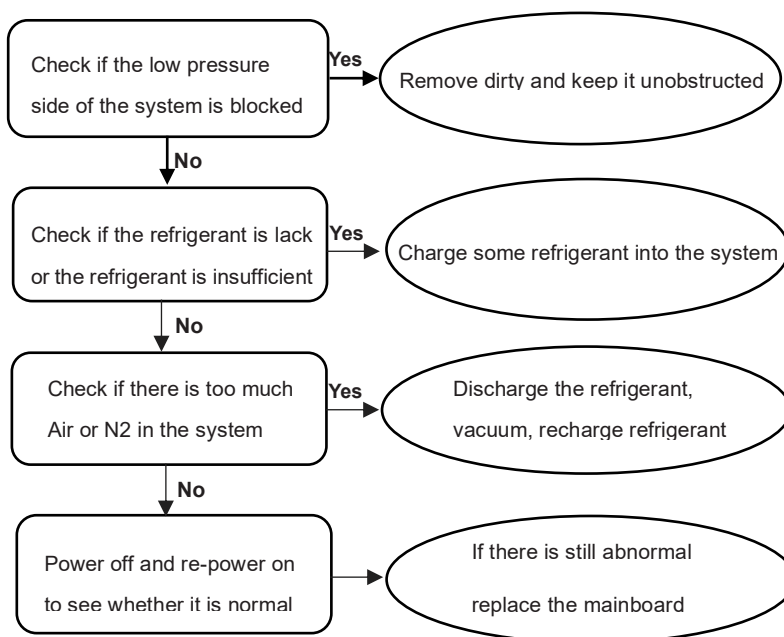
Handling



P4/H6 (T5 Discharge temperature abnormal error)

Diagnosis

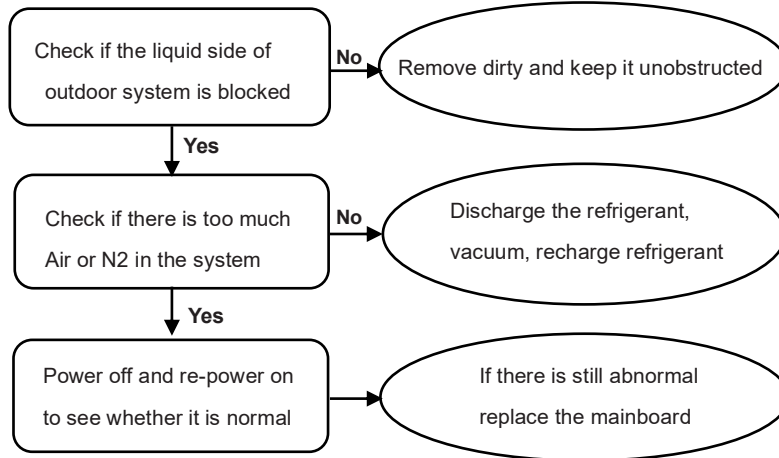
Handling



P5/H1(T3 condenser sensor high temp protection)

Diagnosis

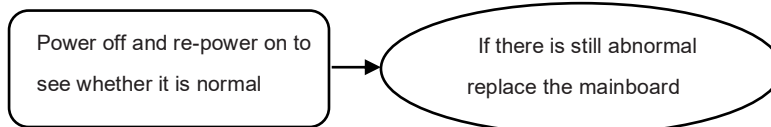
Handling



P6 (IPM module protection)

Diagnosis

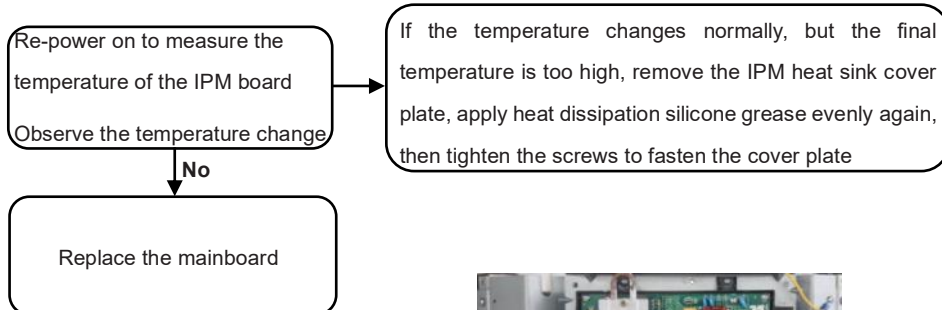
Handling



P8/H4 (IPM high temperature protection)

Diagnosis

Handling



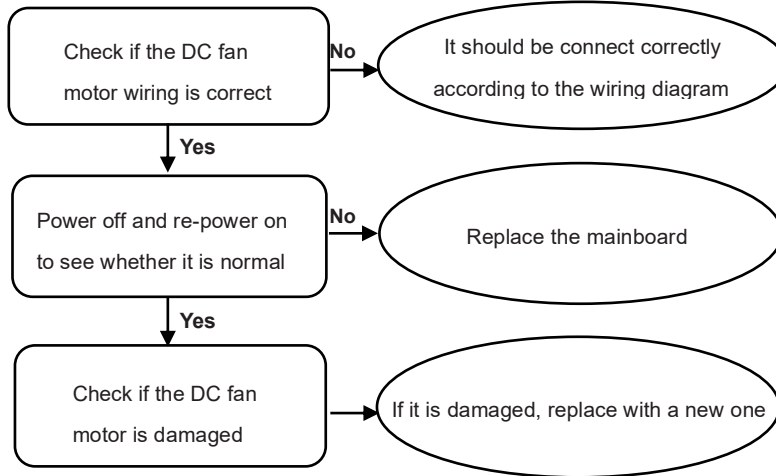
IPM heat sink cover plate should be fastened



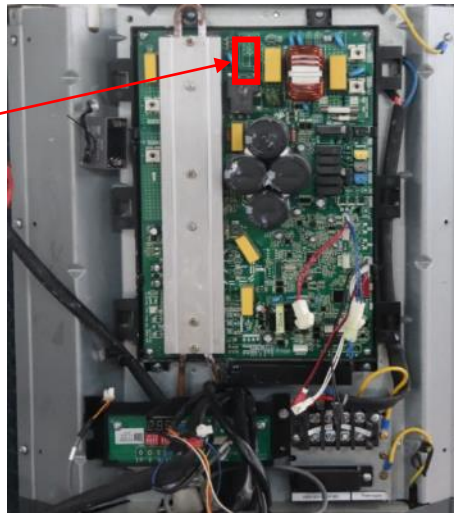
P9 (DC fan motor error)

Diagnosis

Handling



The DC fan motor wire interface



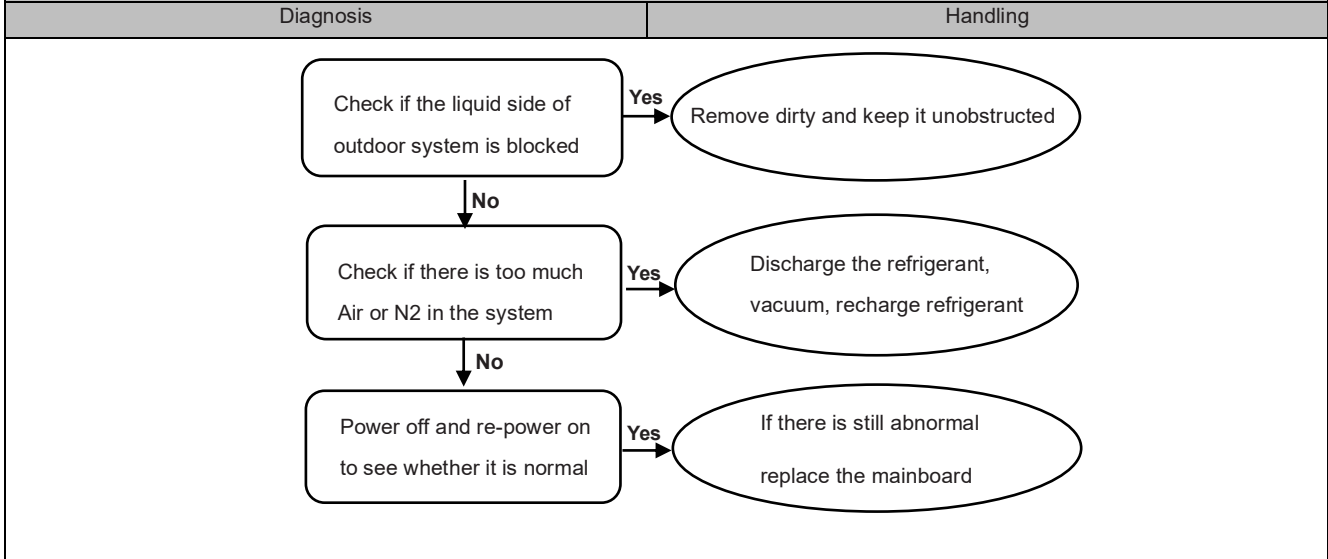
P12/H7 (Wet operation error)

Diagnosis

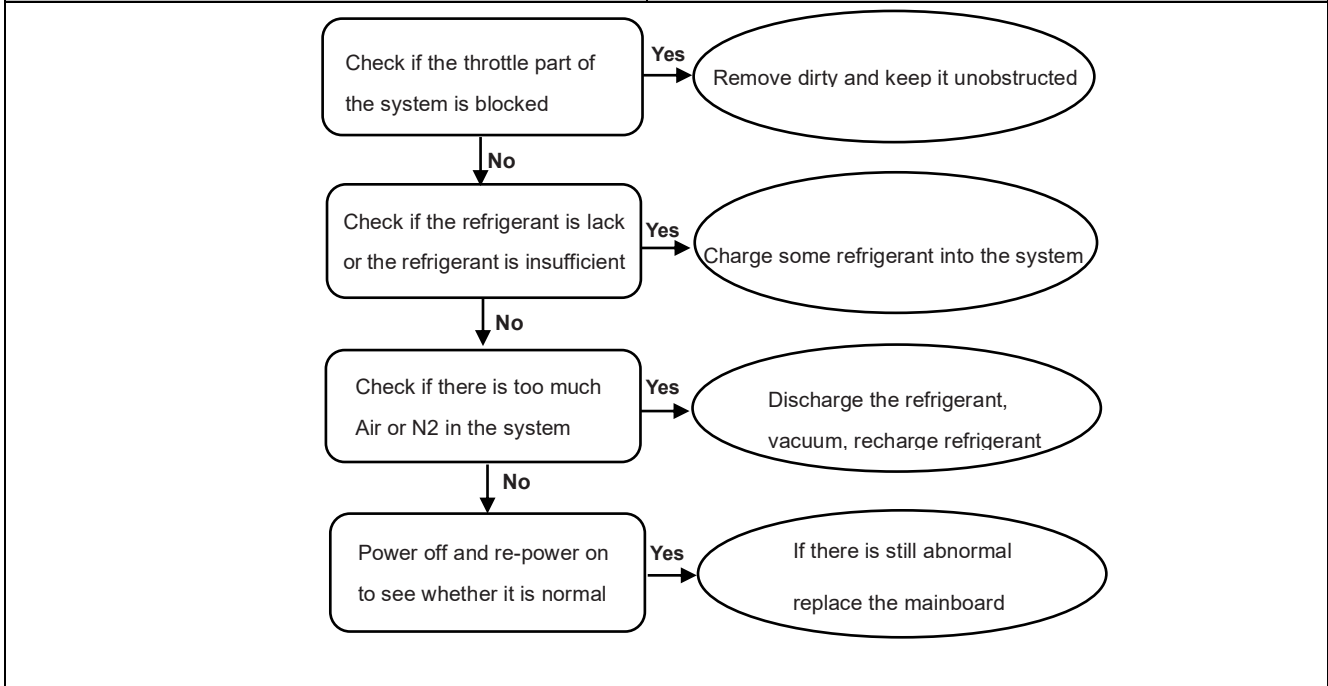
Handling

Power off and re-power on to see whether it is normal

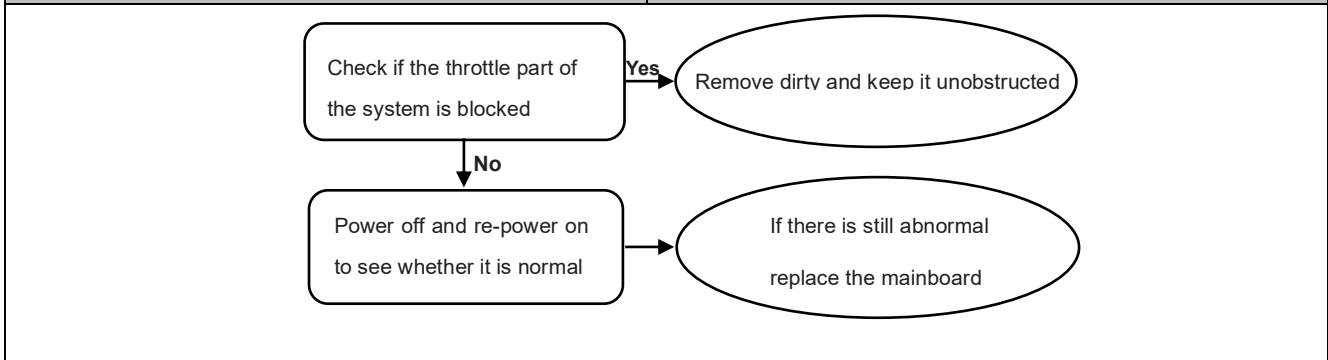
P13/H3(= @)



P14 (High compression ratio protection)



P15 (Low compression ratio protection)



L1/L2(DC cable bus low/high voltage protection)	
Diagnosis	Handling
<div style="border: 1px solid black; border-radius: 10px; padding: 5px; width: fit-content; margin: 0 auto;">Check if the voltage is normal</div> <div style="text-align: center; margin: 5px 0;"> Yes → </div> <div style="text-align: center; margin: 5px 0;"> No ↓ </div> <div style="border: 1px solid black; border-radius: 10px; padding: 5px; width: fit-content; margin: 0 auto;">The power supply is too low or too high</div>	<div style="border: 1px solid black; border-radius: 50%; padding: 10px; width: fit-content; margin: 0 auto; text-align: center;">Replace the mainboard</div> <div style="border: 1px solid black; border-radius: 50%; padding: 10px; width: fit-content; margin: 0 auto; text-align: center; margin-top: 20px;">Connect a transformer before connecting the unit to the power supply, then adjust the voltage to the normal operation range</div>
L4-L8 (IPM module subdivision protection)	
Diagnosis	Handling
<div style="border: 1px solid black; border-radius: 10px; padding: 5px; width: fit-content; margin: 0 auto;">Power off and re-power on to see whether it is normal</div>	<div style="border: 1px solid black; border-radius: 50%; padding: 10px; width: fit-content; margin: 0 auto; text-align: center;">If there is still abnormal replace the mainboard</div>
L9-LE (Frequency limitation protection, not error)	



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