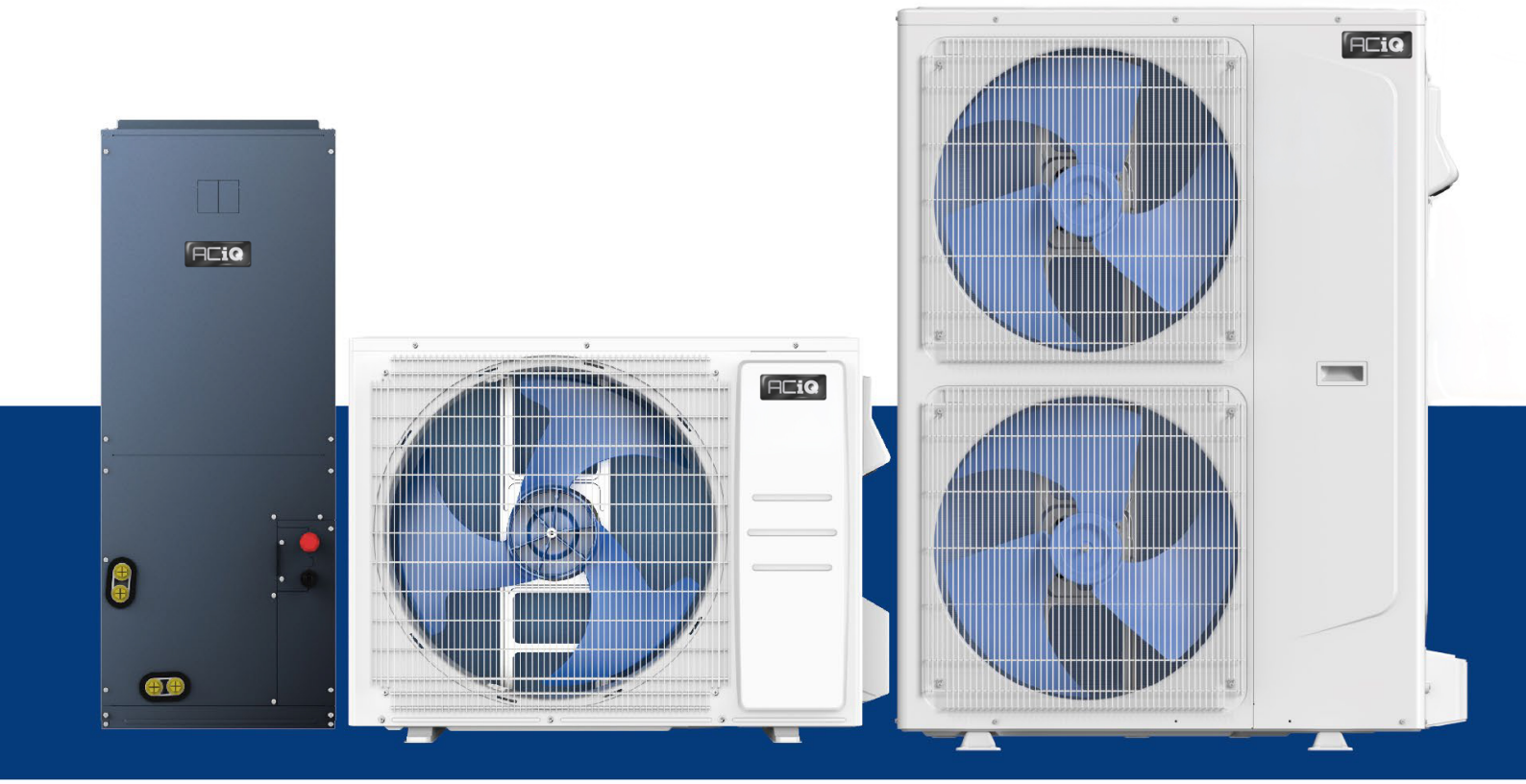
18K-60K R32 DUCTED AIR HANDLER & HEAT PUMP CONDENSER

SERVICE & TECHNICAL MANUAL

Models Covered:

ACiQ-18-AH-E-32	ACiQ-18-HP-E-32
ACiQ-24-AH-E-32	ACiQ-24-HP-E-32
ACiQ-30-AH-E-32	ACiQ-30-HP-E-32
ACiQ-36-AH-E-32	ACiQ-36-HP-E-32
ACiQ-48-AH-E-32	ACiQ-48-HP-E-32
ACiQ-60-AH-E-32	ACiQ-60-HP-E-32



WARNING: DO NOT destroy or lose this manual. Please read the manual thoroughly. Also, store the manual in a place that allows for easy retrieval and future reference. As a result of continuous product improvement, the specification and design of this product are subject to change without advanced notice. Consult your manufacturer or your dealer for further details regarding this product. The images and illustrations within this this manual are for reference only. The actual shape and size of your product may vary.

VERSION DATE: 10-30-25

Remarks:

All Data in this manual are from ACiQ, Data may change according to test surroundings, ACiQ reserves right of explanation on data.

TABLE OF CONTENTS

Section 1: Warnings and Safety Precautions

1. Warnings

NOTE：FCC and IC related content only applies to models with WiFi function.

※ FCC WARNING

WARNING: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

※ FCC STATEMENT

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
● Reorient or relocate the receiving antenna.
● Increase the separation between the equipment and receiver.
● Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
● Consult the dealer or an experienced radio/TV technician for help.

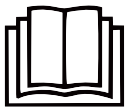
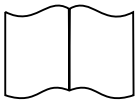
※ IC STATEMENT

This device complies with Industry Canada licence exempt RSS standard(s).
Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

※ IC STATEMENT

This equipment complies with FCC's and IC's RF radiation exposure limits set forth for an uncontrolled environment. The antenna(s) used for this transmitter must be installed and operated to provide a separation distance of at least 7-7/8in.(20cm) from all persons and must not be collocated or operating in conjunction with any other antenna or transmitter. Installers must ensure that 7-7/8in.(20cm) separation distance will be maintained between the device (excluding its handset) and users.

Warning

Symbol	Note	Explanation
	WARNING	This symbol shows that this appliance uses a inflammable refrigerant. If the refrigerant is leaked and exposed to an external ignition source, there is a risk of fire.(Only for the AC with UL or ETL-MARKING, UL60335-2-40)
	CAUTION	This symbol shows that the operation manual should be read carefully.
	CAUTION	This symbol shows that a service personnel should be handling this equipment with reference to the installation manual.
	CAUTION	This symbol shows that information is available such as the operating manual or installation manual.

NOTE:

The Air conditioner with R32 refrigerant, if roughly treated, may cause serious harm to the human body or surrounding things.

- The room space and maximum refrigerant charge requirements are shown in the table as follows.
- If ice has formed on the unit, do not use means to accelerate the defrosting process other than those recommended by the manufacturer.
- Do not use any cleaners on the unit other than what's approved by the manufacture.
- Do not pierce or burn air conditioner and ensure that the refrigerant pipeline is not damaged.
- The appliance must be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater).
  Notice that the refrigerant may be odorless.
- The storage of the air conditioner should be in a location that's able to prevent unit.
- Be sure to follow all local codes and safety requirements.

Room Space and Maximum Refrigerant Charge Requirements

Refrigerant Type	Allowable Refrigerant Charge Amount, (oz(kg))	Min. Floor Area For Installation, (ft^2(m^2))
R32	＜64.9 (＜1.84)	75.35 (7)
	64.9~82.54 (1.84~2.34)	86.11 (8)
	82.58~100.18 (2.341~2.84)	96.88 (9)
	100.21~117.82 (2.841~3.34)	107.64 (10)
	117.85~135.45 (3.341~3.84)	129.17 (12)
	135.49~153.09 (3.841~4.34)	139.93 (13)
	153.12~170.73 (4.341~4.84)	161.46 (15)
	170.76~188.36 (4.841~5.34)	199.13 (18.5)

	188.4~206 (5.341~5.84)	236.81 (22)
	206.04~223.64 (5.841~6.34)	279.86 (26)
	223.67~241.27 (6.341~6.84)	322.92 (30)

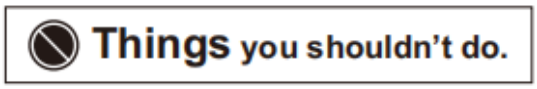
Note:

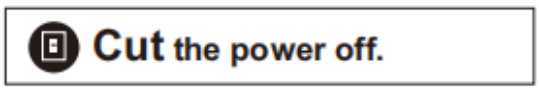
Data calculation scenario: The minimum installation height of the duct outlet from the floor is 7-3/16in. (2.2m).

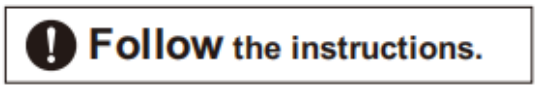
2. Safety Precautions

Incorrect installation or operation by not following these instructions may cause harm or damage to people, properties, etc. The seriousness is classified by the following indications：

⚠WARNING	⚠ CAUTION
This symbol indicates the possibility of death or serious injury.	**This** symbol indicates the possibility of injury or damage to properties.







⚠ WARNING

- **Don't** connect the ground wire to the gas pipeline, water pipeline, lightning rod, or telephone earth wire.
- **Don't** pull the power cable .Pulling the power cable could result in damage to the unit and electrical shock.
- **Don't** cut off main power switch during operating or with wet hands.It may cause electric shock.
- **Don't** let the air conditioner blow against the heater appliance. Otherwise it will lead to incomplete combustion, thus causing poisoning.
- **Don't** let the remote control and the indoor unit watered or being too wet. Exposure to excessive moisture may cause damage to the unit and or electrical shock.
- **Don't** install the air conditioner in a place where there is flammable gas or liquid unless the distance is equal to or greater than 3-1/4ft.(1m) apart.
- **Don't** use any unapproved liquid or cleaning agent to clean the air conditioner.
- **Don't** attempt to repair the air conditioner by yourself.Incorrect repairs may cause fire or explosion. Contact a qualified service technician for all service requirement.
- **Don't** operate the air conditioner during a lightning storm. The power should be switched off to prevent danger or injury.
- **Don't** put hands or any objects into the air inlets or outlets.This may cause personal injury or damage to the unit.
- **Don't** block air inlet or air outlet.Otherwise, the cooling or heating capacity will be diminished, or cause the system to stop operating.

⚠ WARNING

- **Always** switch off the device and cut the power supply when the unit is not in use for longtime so as to ensure safety.
- **Always** switch off the device and cut the power supply before performing any maintenance or cleaning. Otherwise, it may cause electric shock or damage.

DANGER
PELIGRO

CARBON MONOXIDE POISONING HAZARD

Special Warning for Installation of Furnace or Air Handling Units in Enclosed Areas such as Garages, Utility Rooms or Parking Areas.

Carbon monoxide producing devices (such as an automobile, space heater, gas water heater, etc.) should not be operated in enclosed areas such as unventilated garages, utility rooms or parking areas because of the danger of carbon monoxide (CO) poisoning resulting from the exhaust emissions. If a furnace or air handler is installed in an enclosed area such as a garage, utility room or parking area and a carbon monoxide producing device is operated therein, there must be adequate, direct outside ventilation.

This ventilation is necessary to avoid the danger of CO poisoning which can occur if a carbon monoxide producing device continues to operate in the enclosed area. Carbon monoxide emissions can be (re) circulated throughout the structure if the furnace or air handler is operating in any mode.

CO can cause serious illness including permanent brain damage or death.

B10259-216

⚠ WARNING

This product contains fluorinated greenhouse gases.

- **Refrigerant** leakage will contribute to climate change.
- **Never** tamper with the refrigerant system or attempt repair without proper training and compliance to local and national codes.
- **The** refrigerant in this system has a lower global warming potential (GWP) than a refrigerant with higher GWP, if leaked to the atmosphere. This appliance contains a refrigerant fluid with a GWP equal to [675]. This means that if 35 oz (1kg) of this refrigerant fluid would be leaked to the atmosphere, the impact on global warming would be [675] times higher than 35 oz (1kg) of CO_2 , over a period of 100 years.

⚠ WARNING

- **Please** mount the system on a secure surface to prevent the unit from falling and causing injury or damage.
- **The** appliance shall be installed in accordance with national wiring regulations.
- **If** the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly

qualified persons in order to avoid a hazard.

- **Contact** a qualified service technician for all service requirements.
- **The** air conditioner must be grounded. Incomplete grounding may result in electric shocks.
- **Make sure** that the system has its own dedicated electrical circuit and that all electrical work is conducted by an individual that is certified or licensed to do such work in the state or region in which the insulation is taking place.
- **Ensure** the following objects are not under the indoor unit: Microwaves, ovens and other hot objects. Computers and other high electrostatic appliances. Electrical sockets.Items susceptible to water damage.
- **The** piping between indoor and outdoor unit shall not be reused, unless they can be properly flushed and re-flared.
- **The** specifications for electrical requirements are listed on the data plate of the unit.
- **WARNING** RISK OF ELECTRIC SHOCK. CAN CAUSE INJURY OR DEATH: System contains oversize protective earthing (grounding) terminal which shall be properly connected.
- **WARNING** RISK OF ELECTRIC SHOCK. CAN CAUSE INJURY OR DEATH: System contains two independent protective earthing (grounding) terminals which both shall be properly connected and secured.

⚠ CAUTION

- **Don't** operate the system with windows or doors open. Doing so will limit the system effectiveness.
- **Don't** stand on the top of the outdoor unit or place heavy objects on it. This could cause personal injuries or damage to the unit.
- **Don't** use the system for other purposes, such as drying clothes, preserving foods, etc.
- **Don’t** apply the cold air to the body for a long time. It will deteriorate your physical conditions and cause health problems.

⚠ CAUTION

- **Appropriate** adjustments of the setting temperature can prevent the waste of electricity.
- **Use** an all-pole disconnection type breaker with at least1/8 in. (3mm) between the contact point gaps that provide full disconnection under over voltage category III.
- **If** your air conditioner is permanently connected to the fixed wiring, a residual current device (RCD) having rated residual operating current not exceeding 30 mA should be installed in the fixed wiring.
- **The** power supply circuit should have leakage protector and air switch of which the capacity should be more than1.5 times of the maximum current.
- **Regarding** the installation of the air conditioners, please refer to the below paragraphs in this manual.
- **LEAK DETECTION SYSTEM installed. Unit must be powered except for service.**

  Continuous air circulation required for proper functioning. Unit must be powered except for service.
- **This** unit is equipped with electrically powered safety measures. To be effective, the unit must be electrically powered at all times after installation, other than when servicing.

E-Waste

Meaning of crossed out wheeled dustbin:

Don't dispose of electrical appliances as unsorted municipal waste, use separate collection facilities .

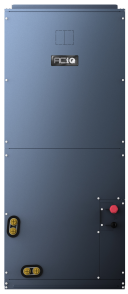
Contact you local government for information regarding the collection systems available .

If electrical appliances are disposed of in landfills or dumps, hazardous substances can leak into the groundwater and get into the food chain, damaging your health and well-being. When replacing old appliances with new ones, the retailer is legally obligated to take back your old appliance for disposals at least free of charge .

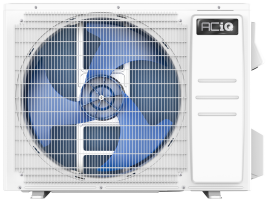
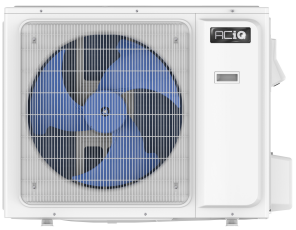
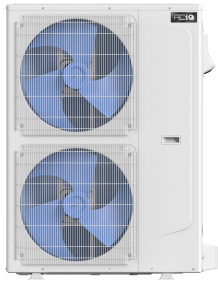
Section 2: General Information

1. Product Lineup

1.1 Indoor Unit

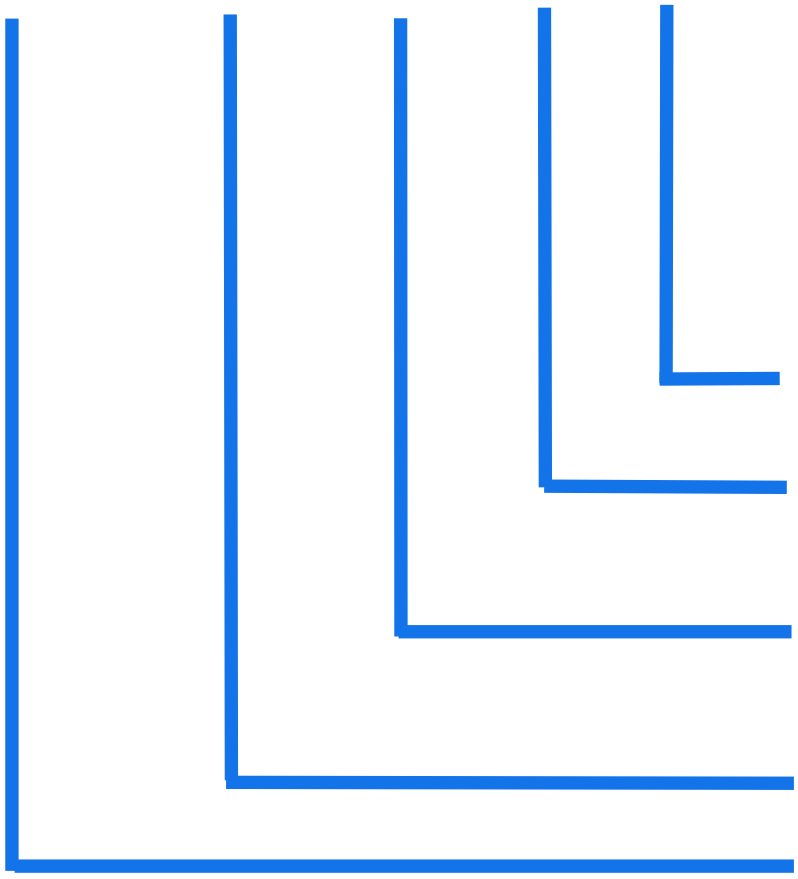
Standard Series			
Appearance	**Capacity**	**Power Supply**	**Model**
	18K	208-230V~1Ph~60Hz	ACiQ-18-AH-E-32
	24K	208-230V~1Ph~60Hz	ACiQ-24-AH-E-32
	30K	208-230V~1Ph~60Hz	ACiQ-30-AH-E-32
	36K	208-230V~1Ph~60Hz	ACiQ-36-AH-E-32
	48K	208-230V~1Ph~60Hz	ACiQ-48-AH-E-32
	60K	208-230V~1Ph~60Hz	ACiQ-60-AH-E-32

1.2 Outdoor Unit

Standard Series			
Appearance	**Capacity**	**Power Supply**	**Model**
	18K	208-230V~1Ph~60Hz	ACiQ-18-HP-E-32
	24K	208-230V~1Ph~60Hz	ACiQ-24-HP-E-32
	30K	208-230V~1Ph~60Hz	ACiQ-30-HP-E-32
	36K	208-230V~1Ph~60Hz	ACiQ-36-HP-E-32
	48K	208-230V~1Ph~60Hz	ACiQ-48-HP-E-32
	60K	208-230V~1Ph~60Hz	ACiQ-60-HP-E-32

2. Nomenclature

ACiQ-18-AH-E-32



Refrigerant Type:
32 = R32

Series

Product Type:
AH = Air Handler
HP = Heat Pump

Unit Capacity:
18 = 18K/18,000 BTU

Brand: ACiQ

3. Product Features

- **ALL DC Inverter Technology**
- **R32 environmentally friendly refrigerant**
- **Wide Ambient Temperature Range:** 5°F~125°F(-15℃~52℃)
- **Wide Voltage Range:** 170~253V power supply
- **Compatible with both 24V control and 485 communication**
- **High Efficient:** SEER2 16~18
- **PCB Refrigerant Cooling Technology** (30~60K)
- **Auto-restart Function**
- **Flexible Installation:** Vertical, horizontal, and inverted installation
- **High ESP:** MAX.ESP up to 1 in.g(250Pa)
- **Fan and Evaporator Slide-out Design**
- **Multiple Protection Functions**

4. Optional Accessories

- **Golden aluminum foil heat exchanger**
- **Plastic mesh cover on the back**

5. Functions Overview

Function Overview				
No	Category	Series / Functions	● Default function x Invalid ◎ Optional function	
			Standard	Details refer to
1	Basic Control	On/Off	●	Section 7→1
2		Cooling Mode	●	Section 7→2.5
3		Heating Mode	●	Section 7→2.6
4		Fan Mode	●	Section 7→2.4
5		Auto-Fan Speed	●	
6		Turbo Mode	●	
7		Auto Mode	●	Section 7→2.8
8		Auto Mode(temperature settable)	●	
9		Dehumidification	●	Section 7→2.7
10		Auto-Restart	●	Section 7→2.14
11		Auto-Swing（up & down）	X	
12		Auto-Swing（left & right）	X	
13		Child Lock	●	Section 7→1
14	Efficiency	Inverter	●	
15		Eco Mode	●	
16	Comfortable	Intelligent preheating	●	
17		Intelligent defrosting	●	Section 7→2.11
18		Anti-cold Air Function	●	Section 7→2.9
19		Temperature Control	0.5℃/1℃, 1℉	Section 7→1
20		Quiet Mode	●	Section 7→2.4
21		Sleep Mode	●	Section 7→2.12
22		Auto-constant Air Volume	X	
23		Manual Constant Air Volume	●	
24		Breezeless sensation	X	
25		iFeel	X	
26	Heath	Self-Cleaning	X	
27		Filter Indicator	●	Section 7→1
28		Fresh Air Intake	X	
29		Dust Filter（PM2.5）	X	
30		Activated carbon filter	X	
31	Intelligent Control	Timer	●	Section 7→2.13
32		Weekly Timer	●	Section 7→1
33		Centralized Control	X	
34		BMS (Modbus-RTU Protocol)	X	
35		BMS (Modbus-TCP Protocol)	X	
36		BMS (BACnet-IP Protocol)	X	
37		Integrated Wi-Fi	X	
38		Integrated Wi-Fi& support TUYA	X	
39		WIFI Control	X	
40		Voice panel/voice control	X	

41	Stable	Forced defrosting	●		
42		Self-diagnosis	X		
43		8°C Heating Mode	X		
44		Dry Contact Fire Alarm	●		Section 7→3
45		Dry Contact Window Open Detection	●		Section 7→3
46		Dry Contact Remote Control	●		Section 7→3
47		Real-Time Monitoring	●		
48		Anti-Corrosion Coating Fin	●		
49		Golden fin	●		Section 2→4
50		Chassis electrical heating	●		Section 7→2.16
51		Oil Heater Band	X		
52		Drain Pump	X		
53		Float Switch	X		
54	Diversifying Selection	Switch to ambient temperature	●		Section 7→1
55		°F/°C Switch	●		Section 7→1
56		Screen display	●		Section 7→1
57		Stationary swing wind	X		
58		Independent Swing Control	X		
59		Mute remote control	X		
60		Auxiliary Electric Heating	X		
61		Jewish during Sabbath's Day	●		Section 7→1
62		Room Card Control	●		Section 7→3
63		Power Limit	●		Section 7→2.15
64		RS485 Communication	●		
65		24V Communication	●		Section 7→2.2
66		LNS Communication	X		

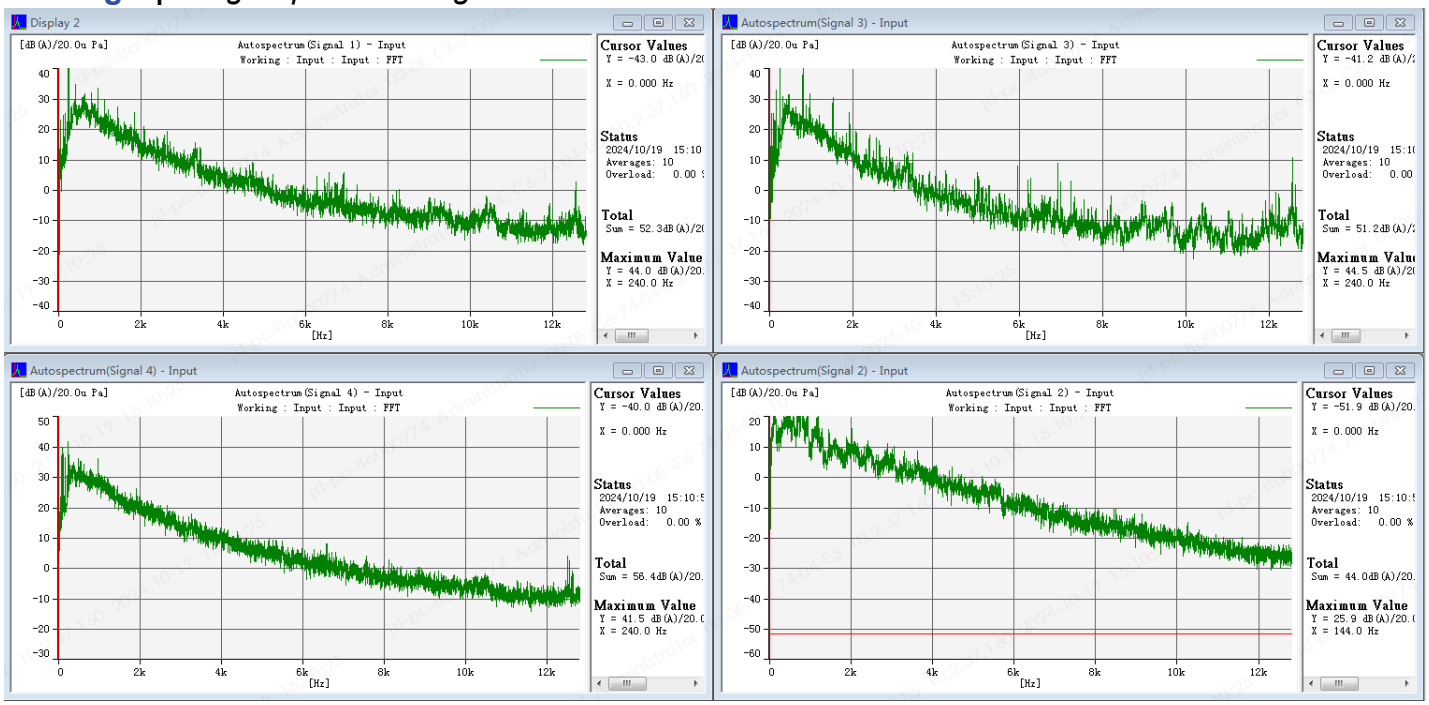
Section 3: Performance Data

1. Noise Spectrum Diagram

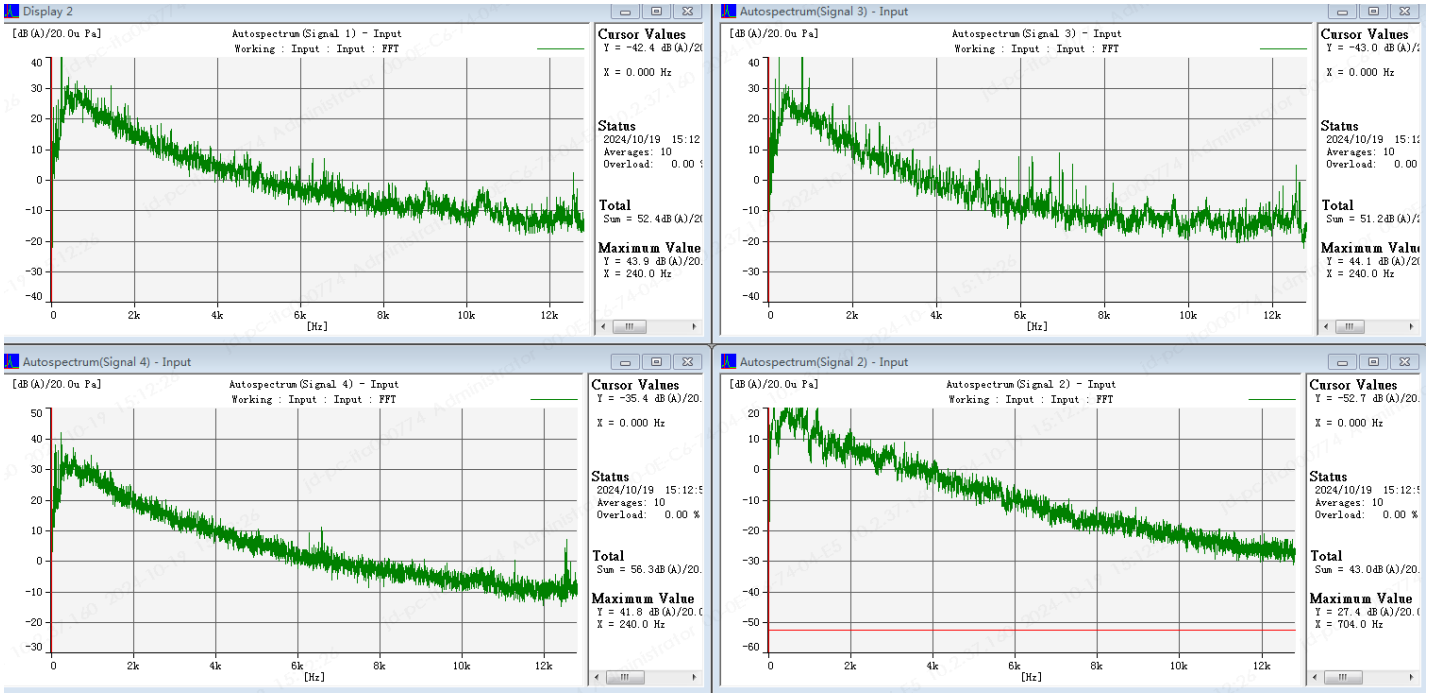
1.1 Standard Series

18K　ACiQ-18-AH-E-32 / ACiQ-18-HP-E-32

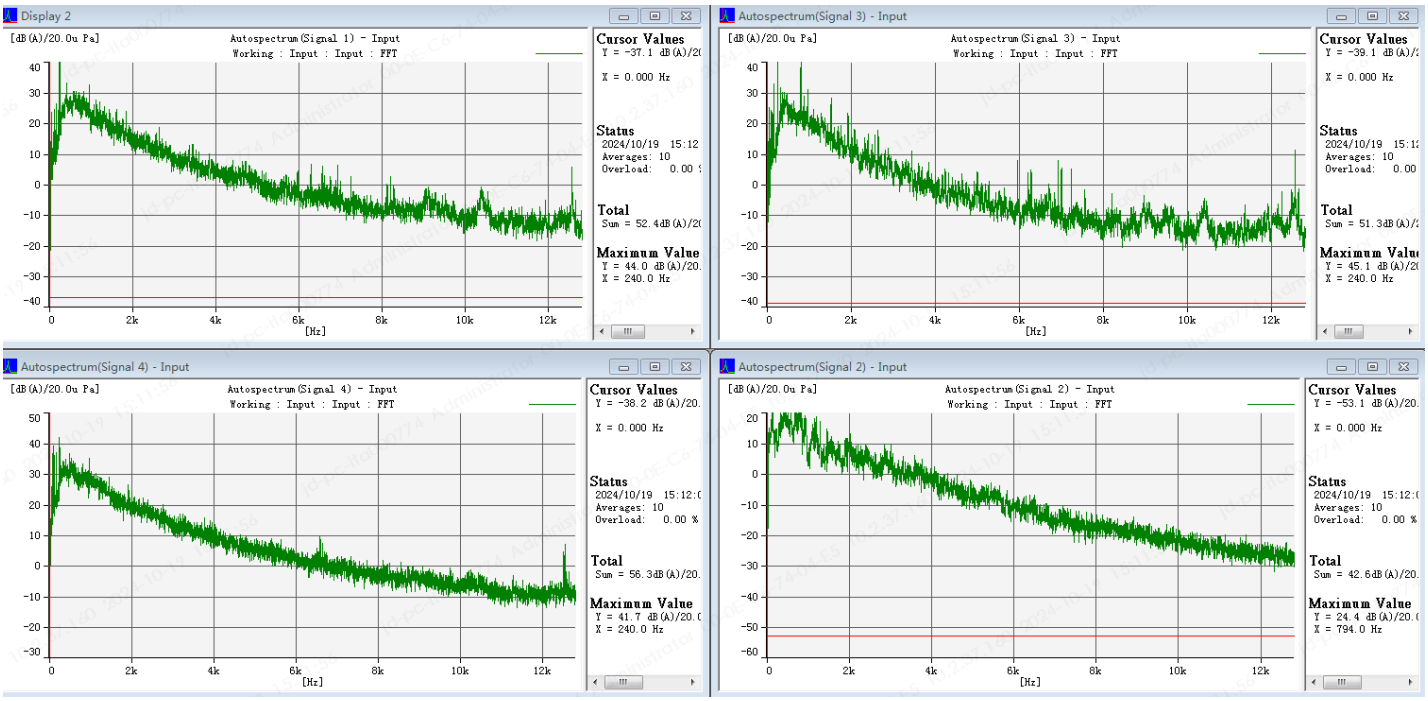
Cooling | *High Speed Setting*



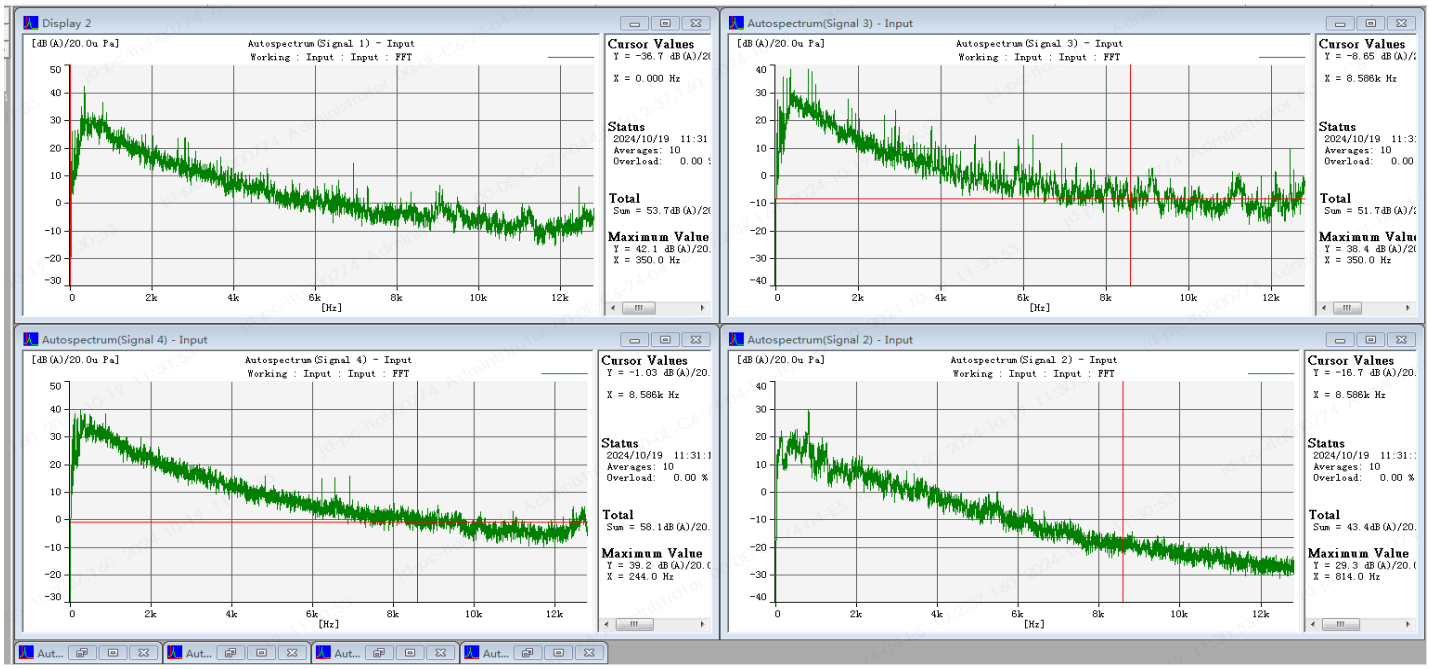
Cooling | Medium Speed Setting



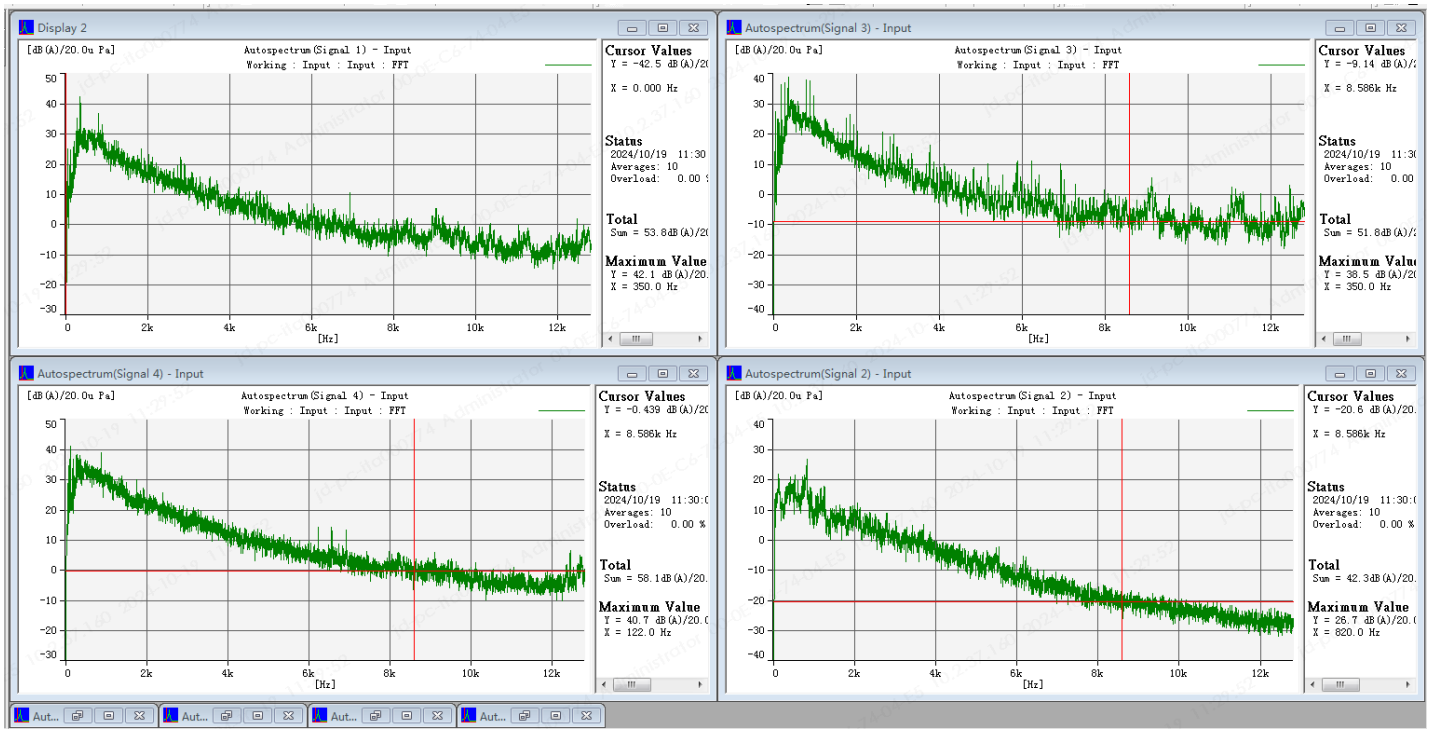
Cooling | *Low Speed Setting*



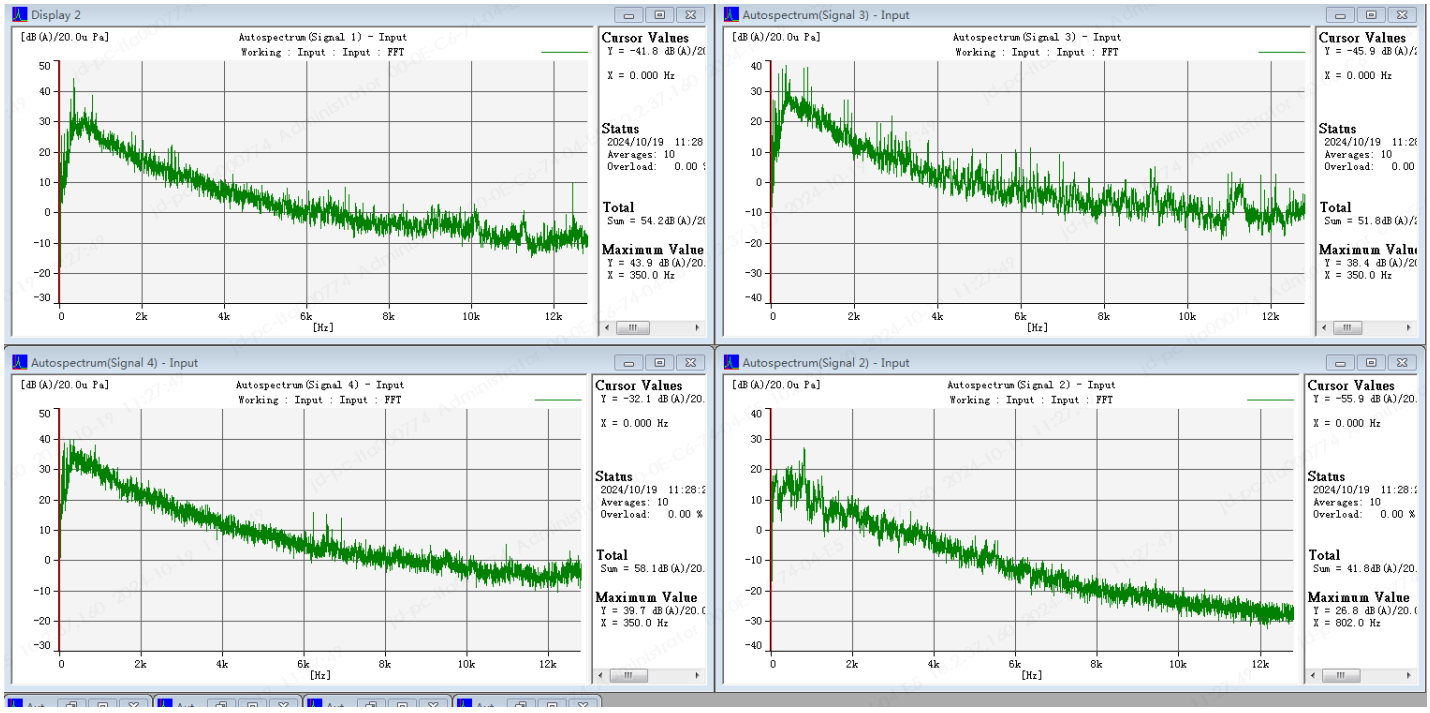
Heating | *High Speed Setting*



Heating | *Medium Speed Setting*

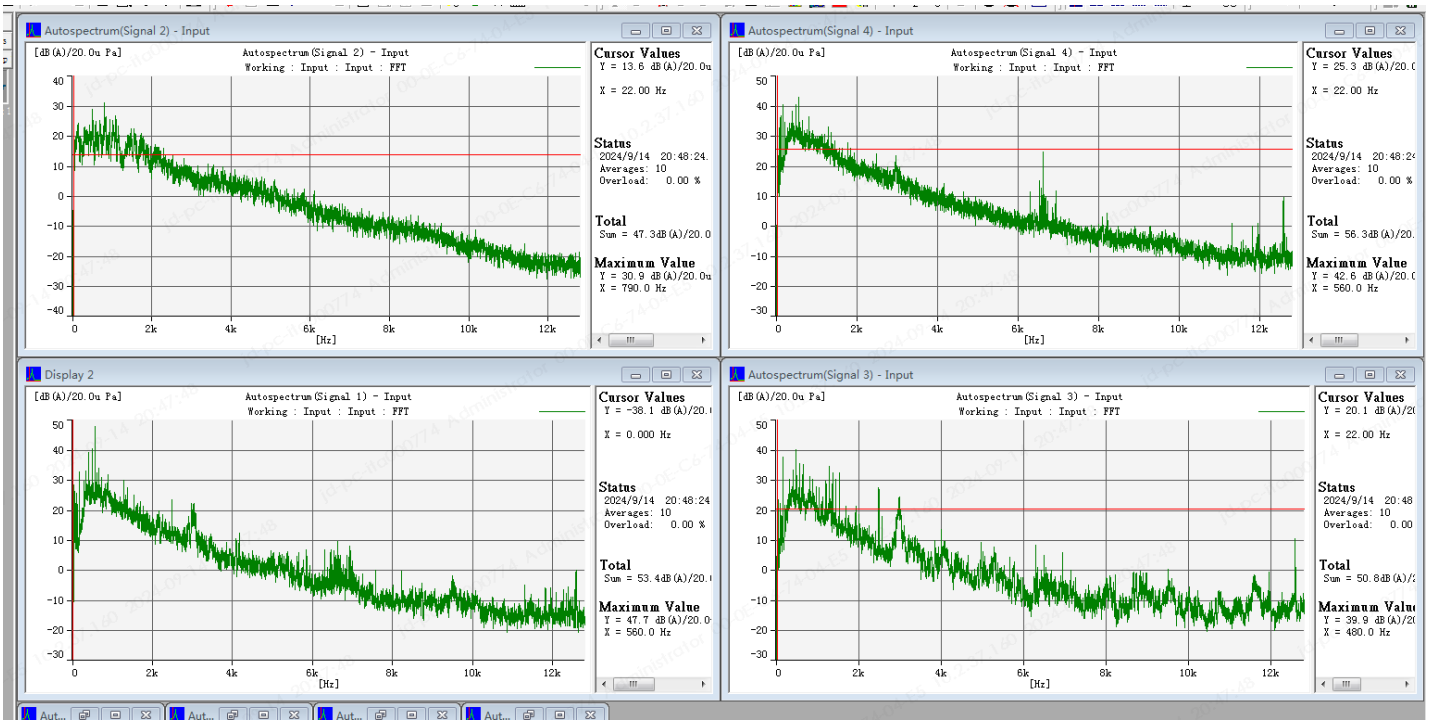


Heating | *Low Speed Setting*

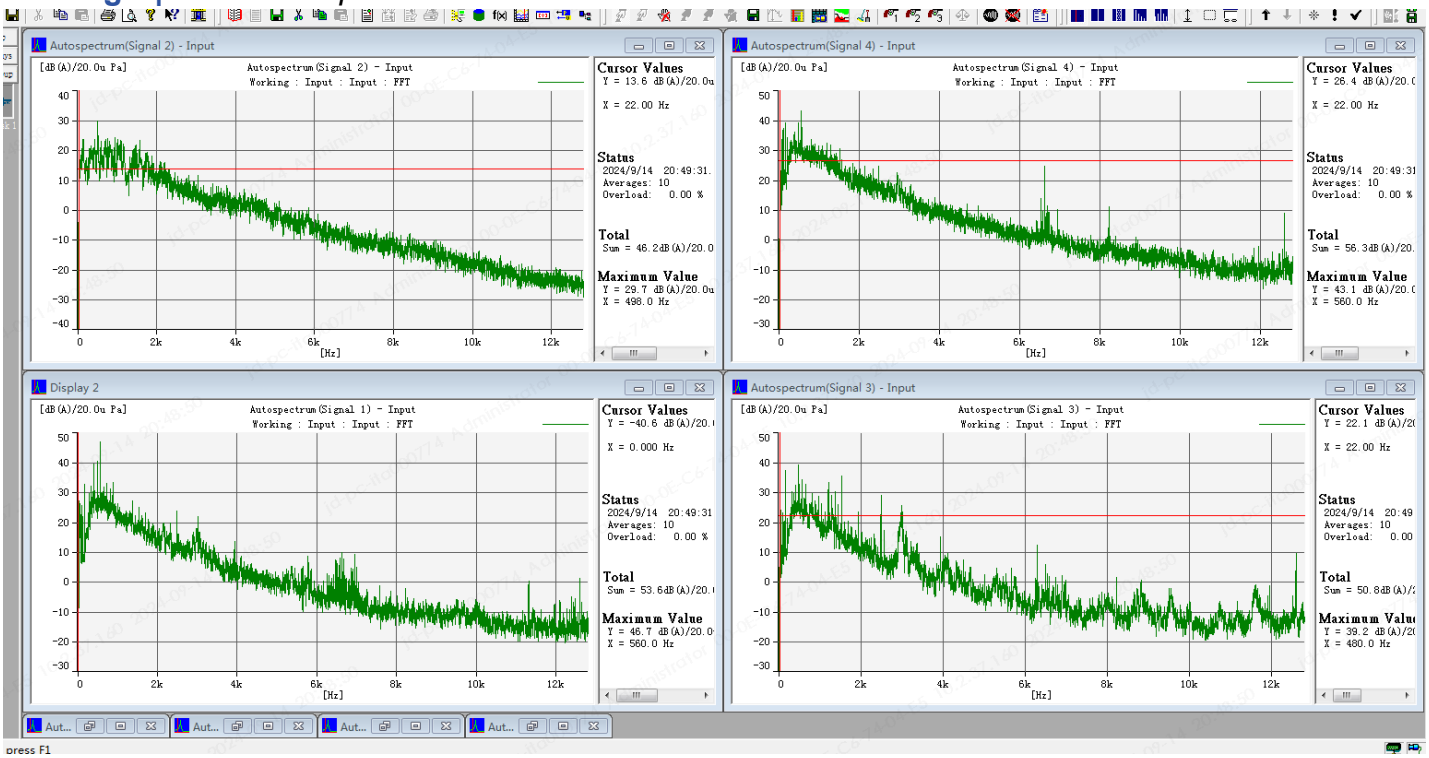


24K　ACiQ-24-AH-E-32 / ACiQ-24-HP-E-32

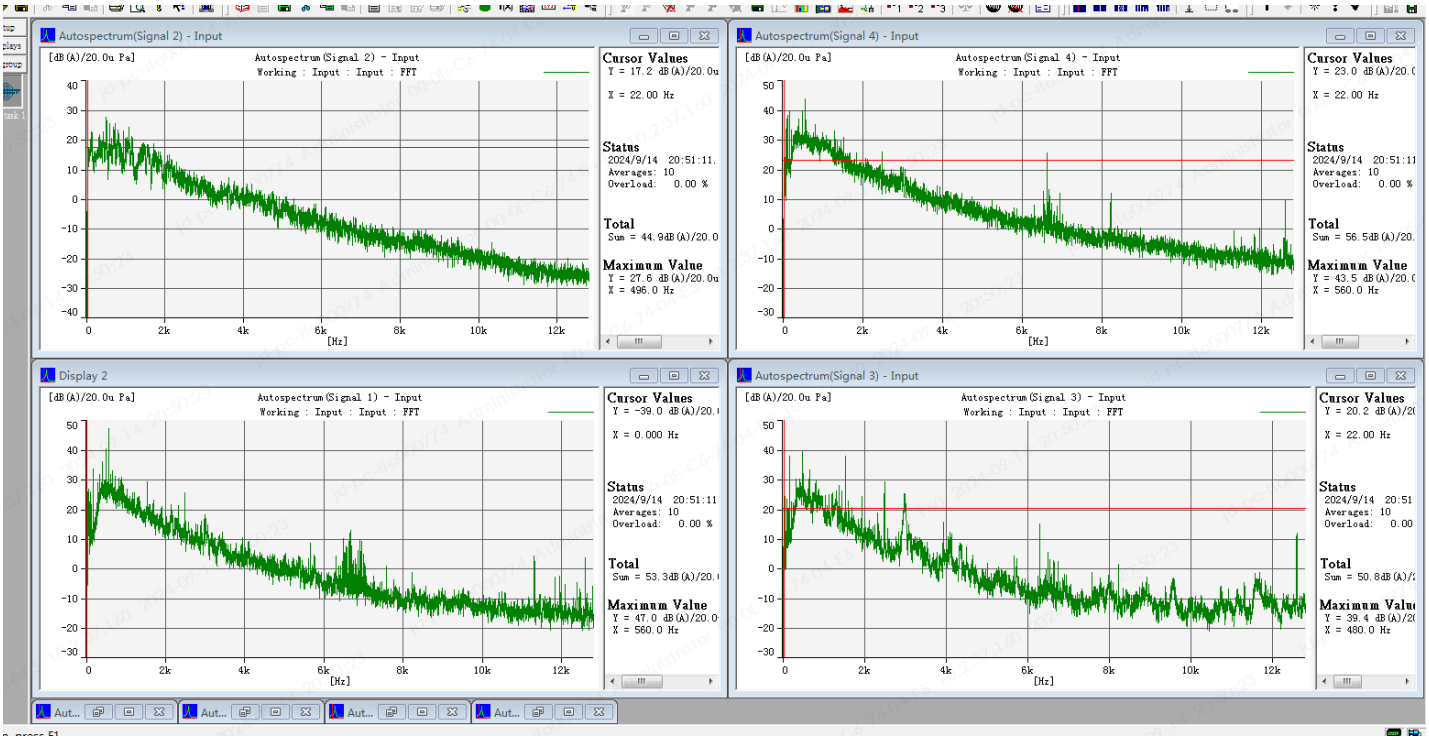
Cooling | *High Speed Setting*



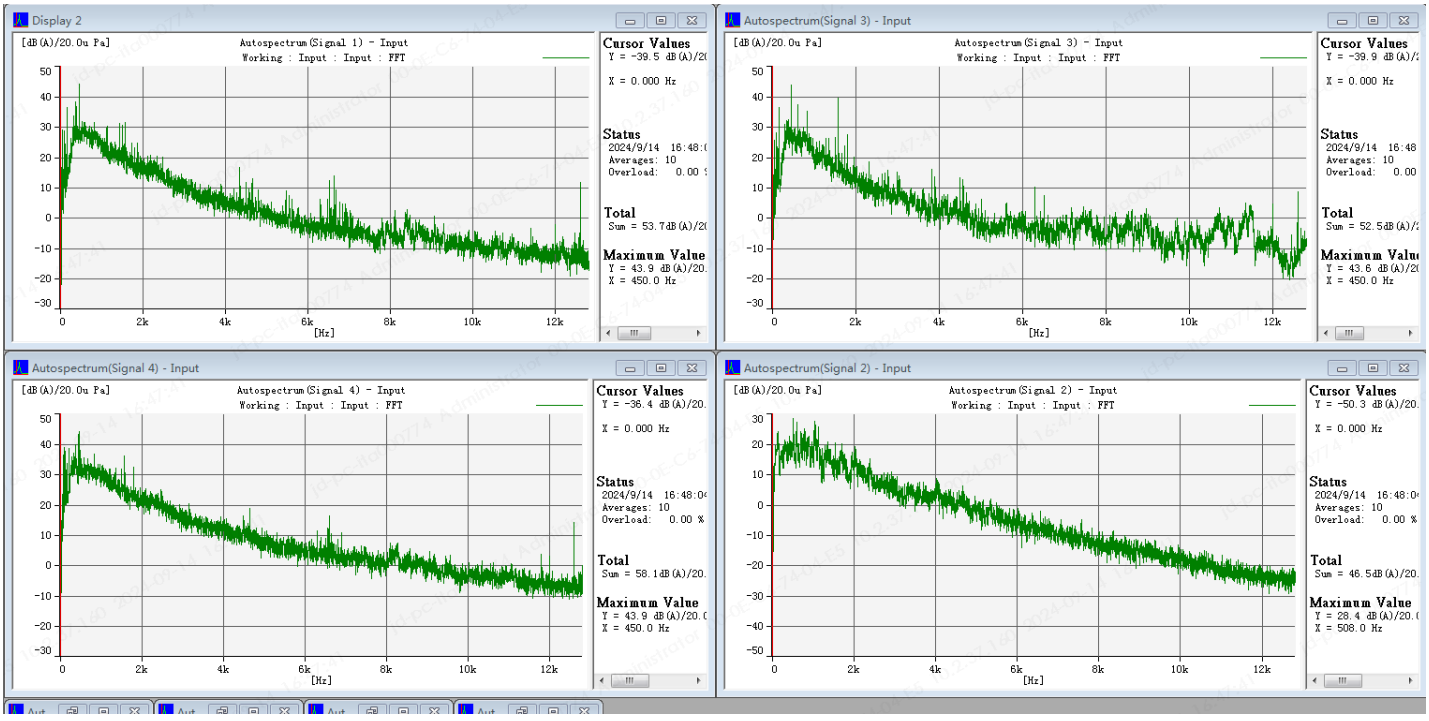
Cooling | *Medium Speed Wind*



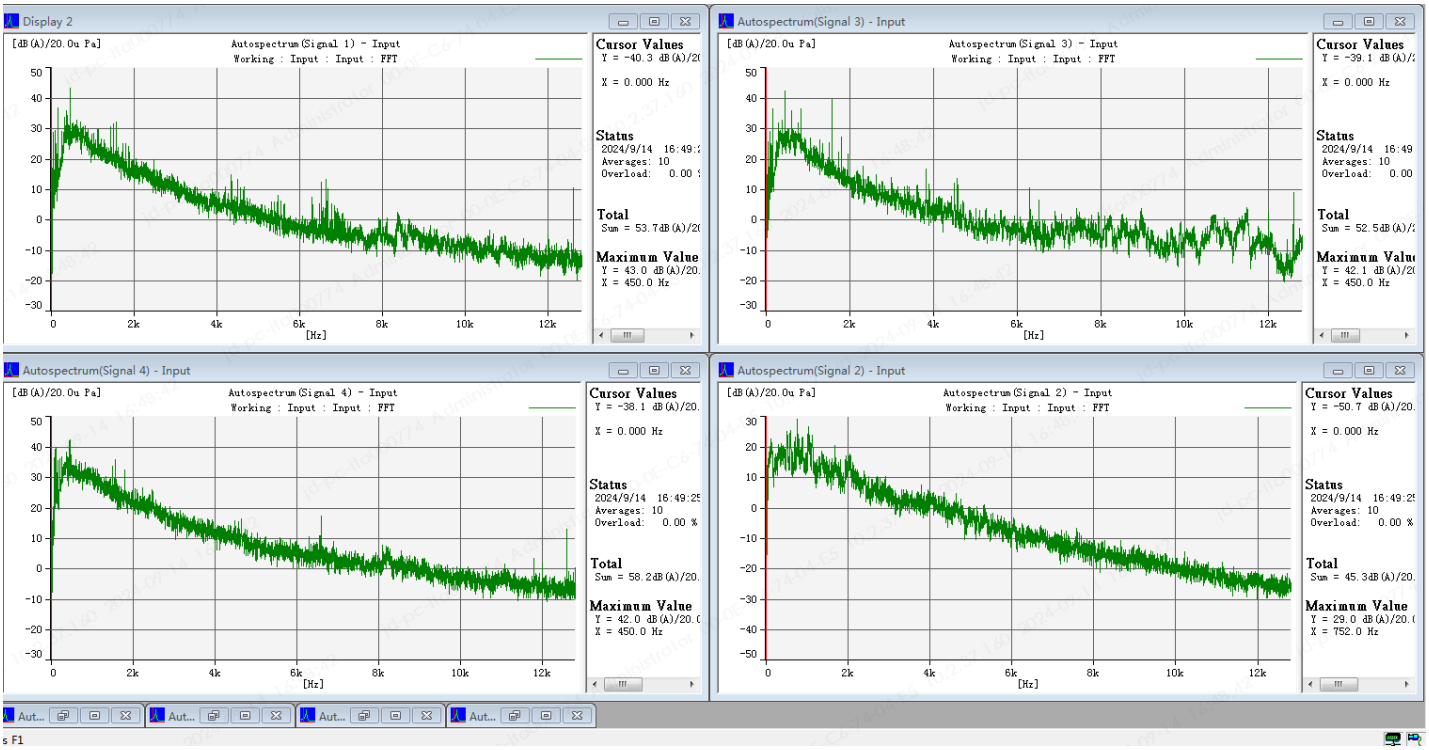
Cooling | *Low Speed Setting*



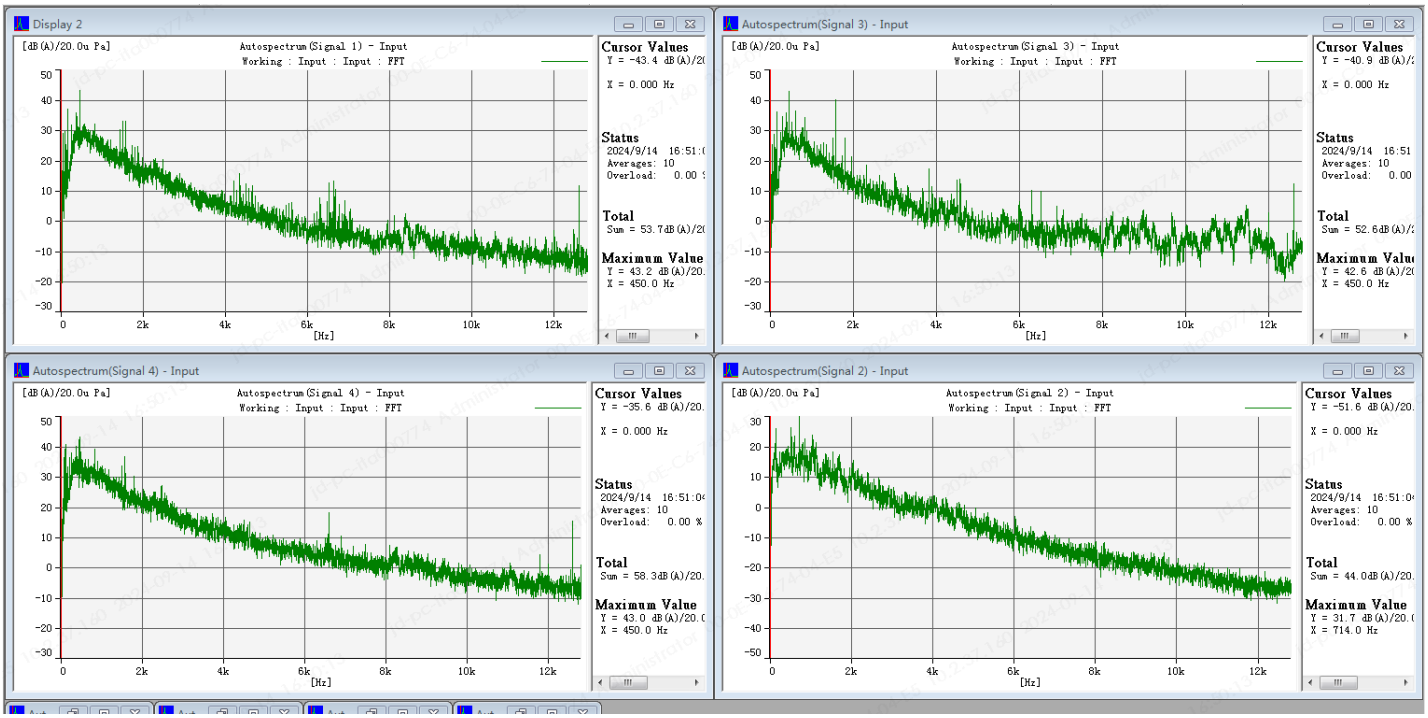
Heating | *High Speed Setting*



Heating | *Medium Speed Setting*

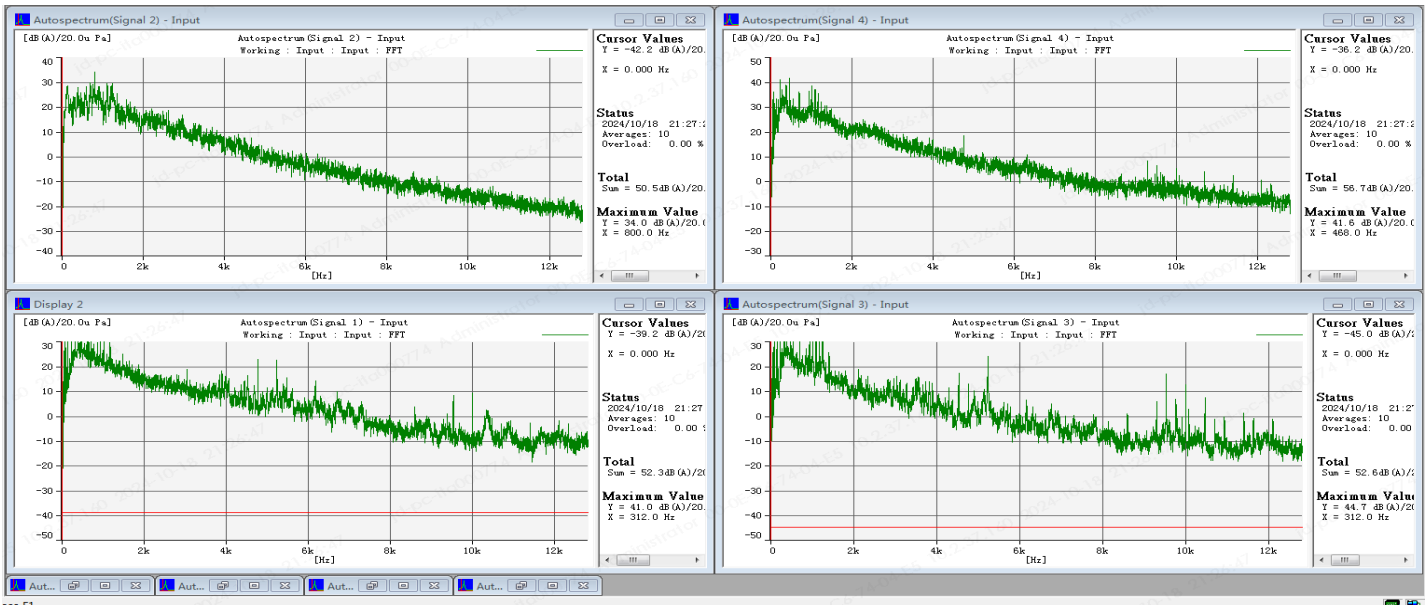


Heating | *Low Speed Setting*

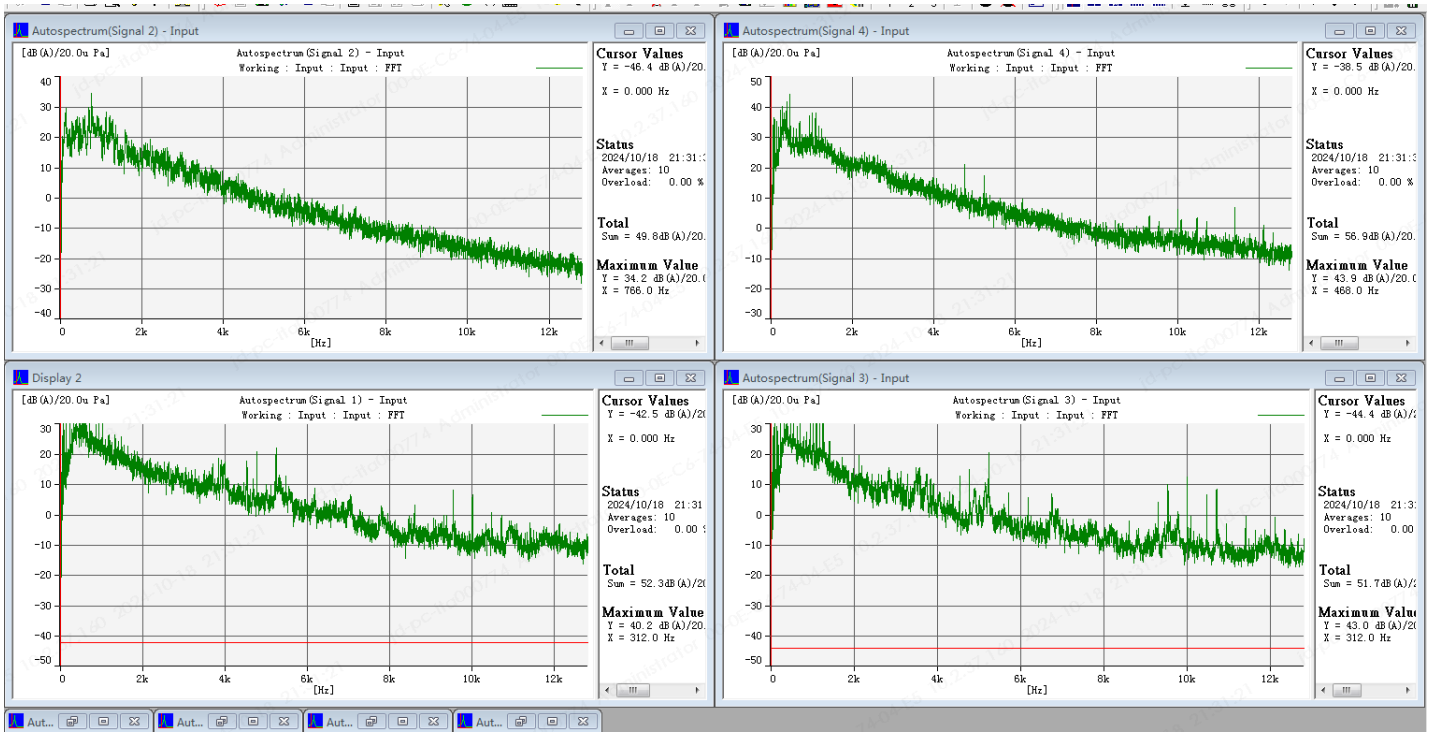


30K　ACiQ-30-AH-E-32 / ACiQ-30-HP-E-32

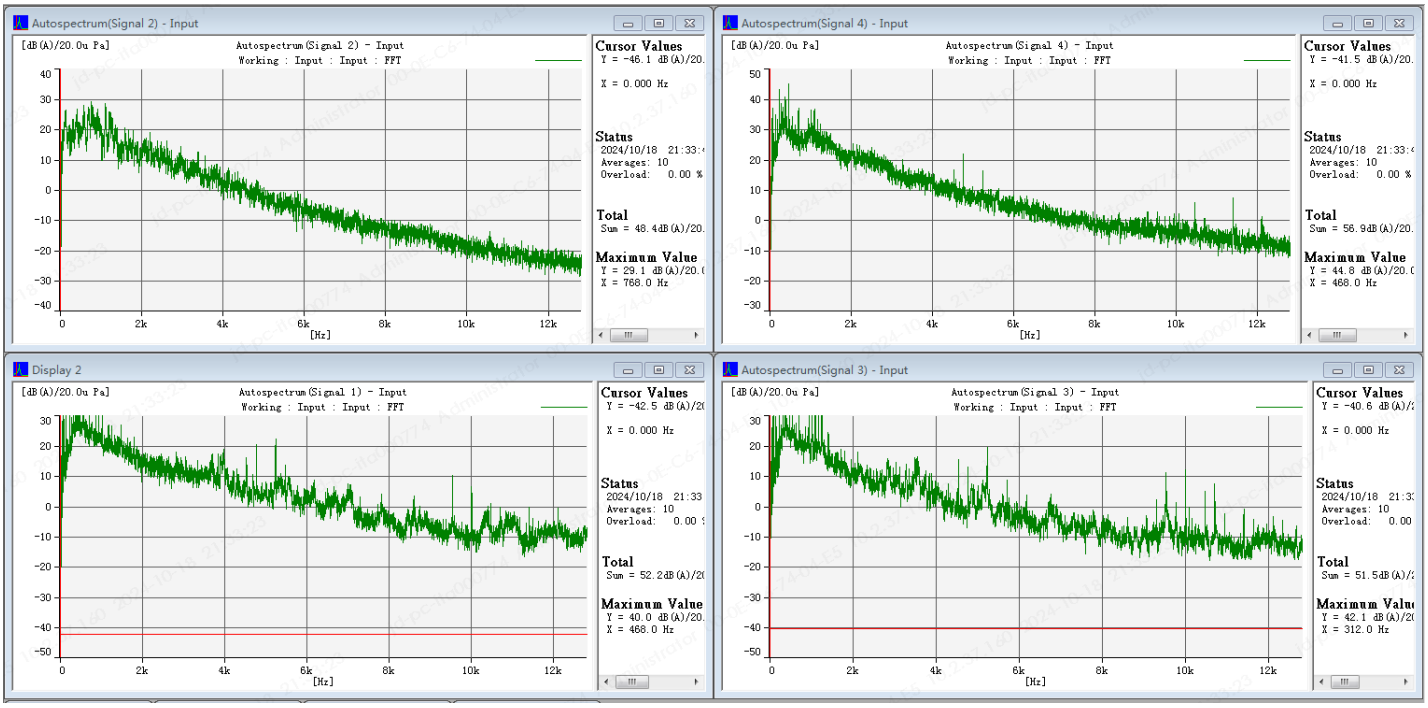
Cooling | *High Speed Setting*



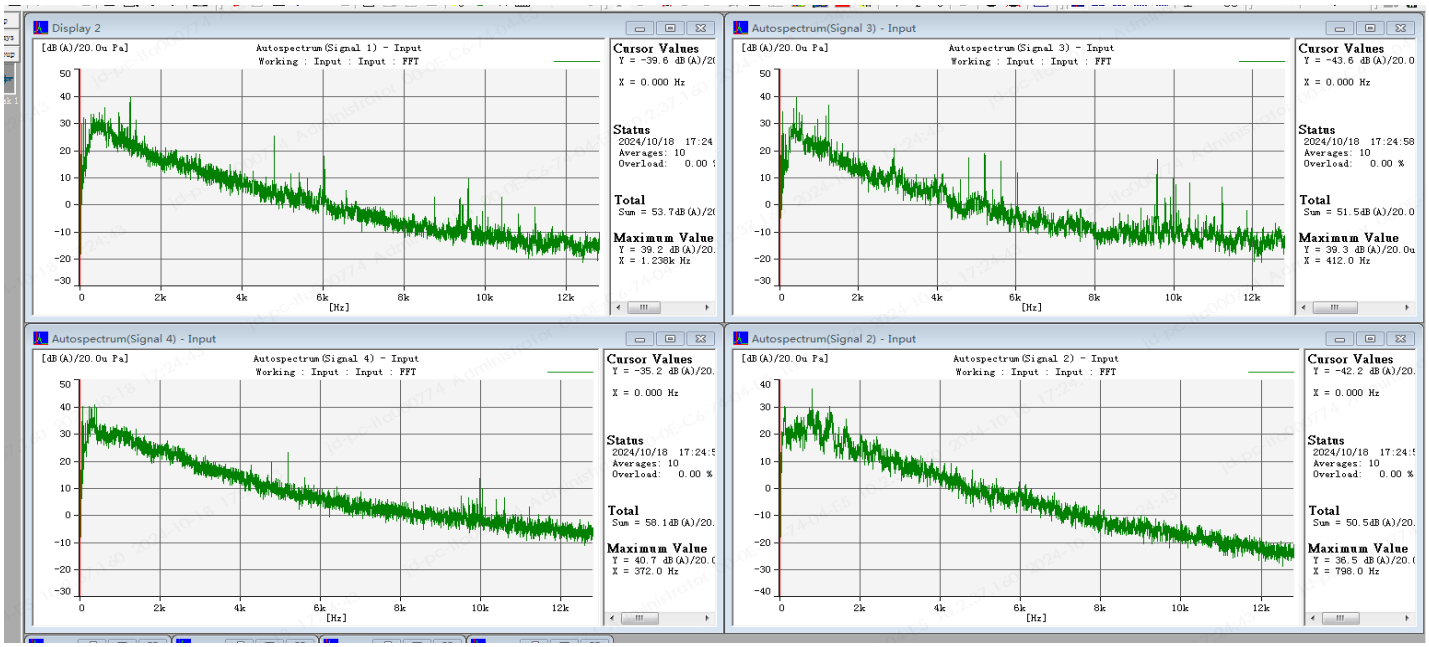
Cooling | *Medium Speed Setting*



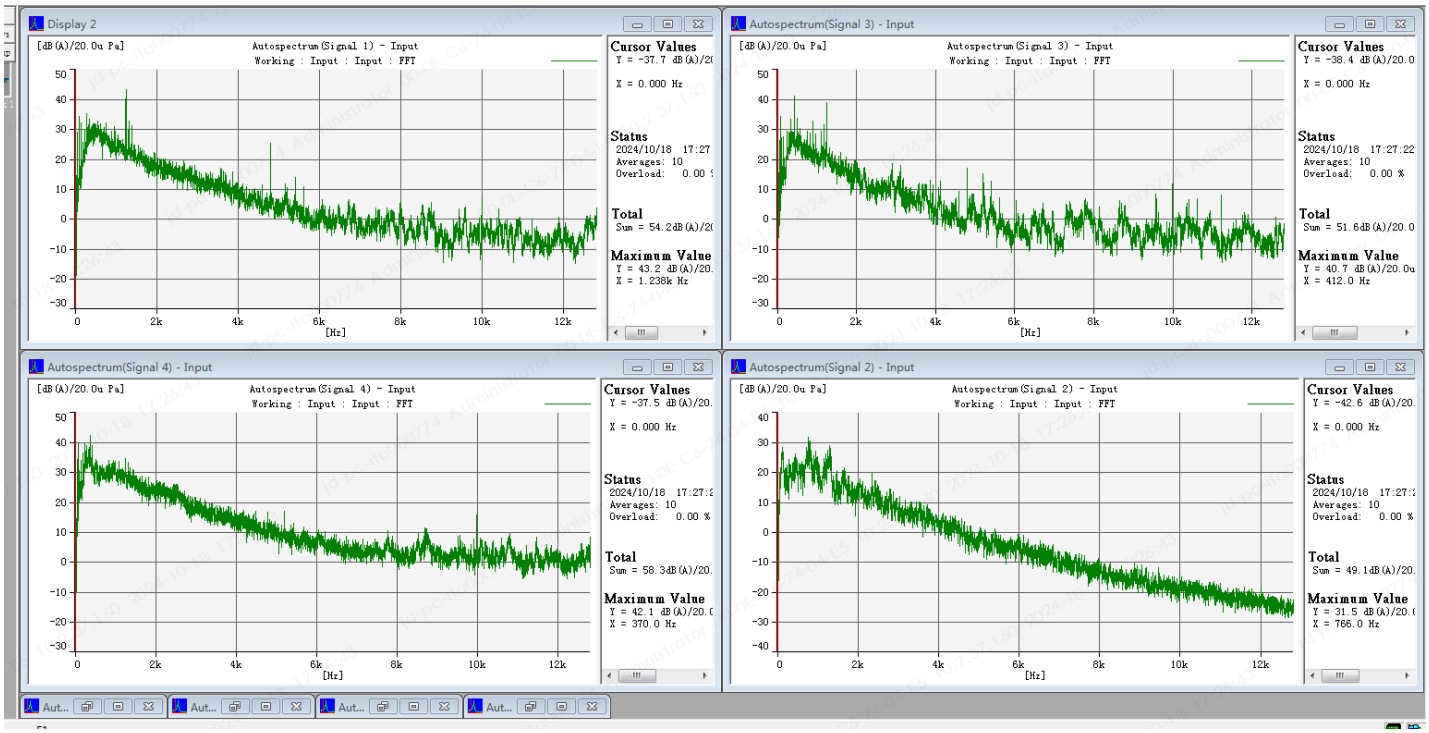
Cooling | *Low Speed Setting*



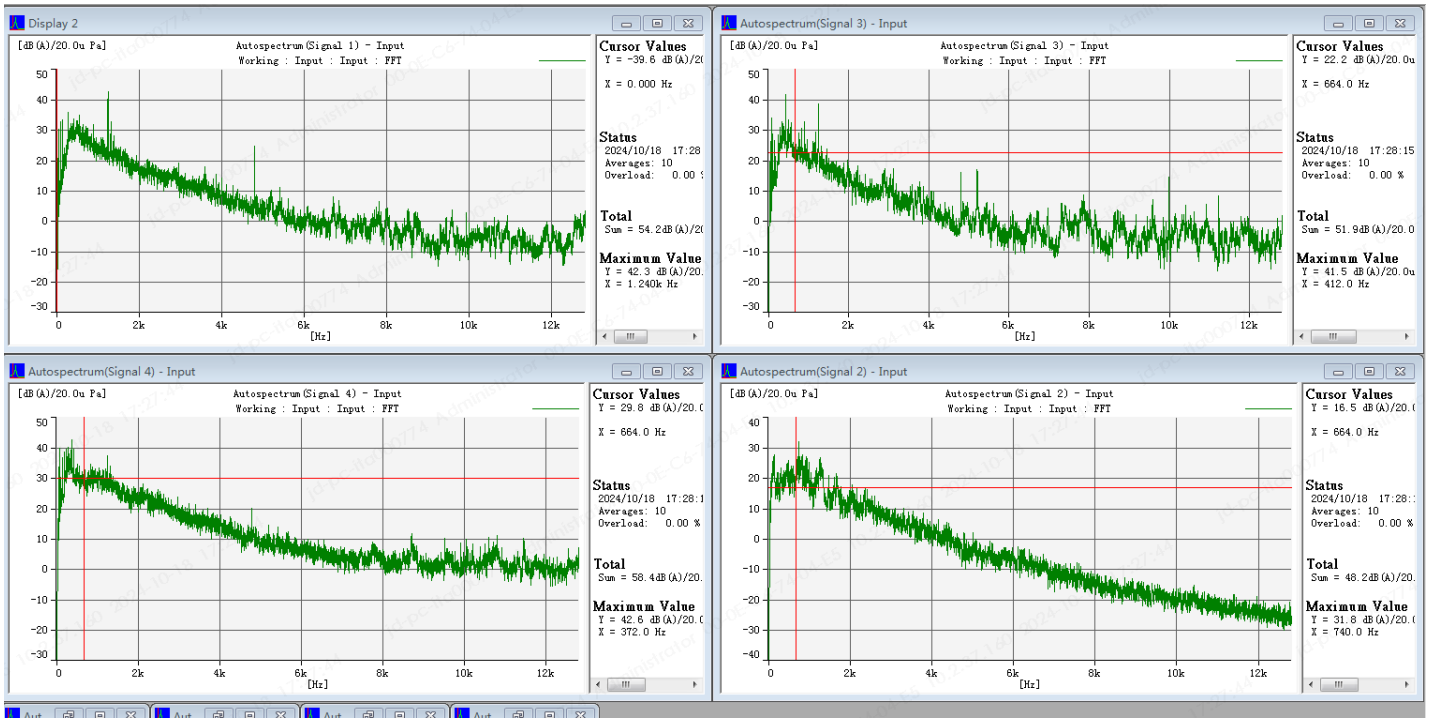
Heating | *High Speed Setting*



Heating | *Medium Speed Setting*

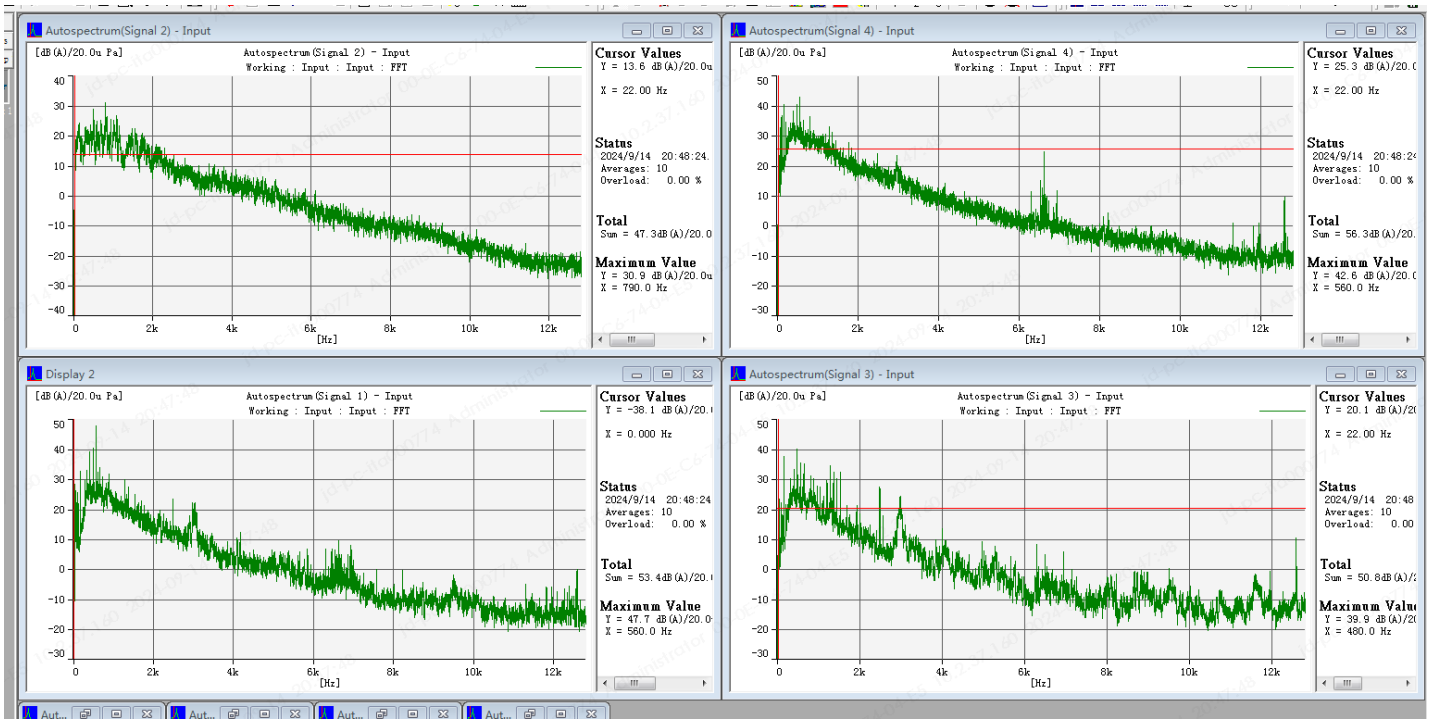


Heating | *Low Speed Setting*

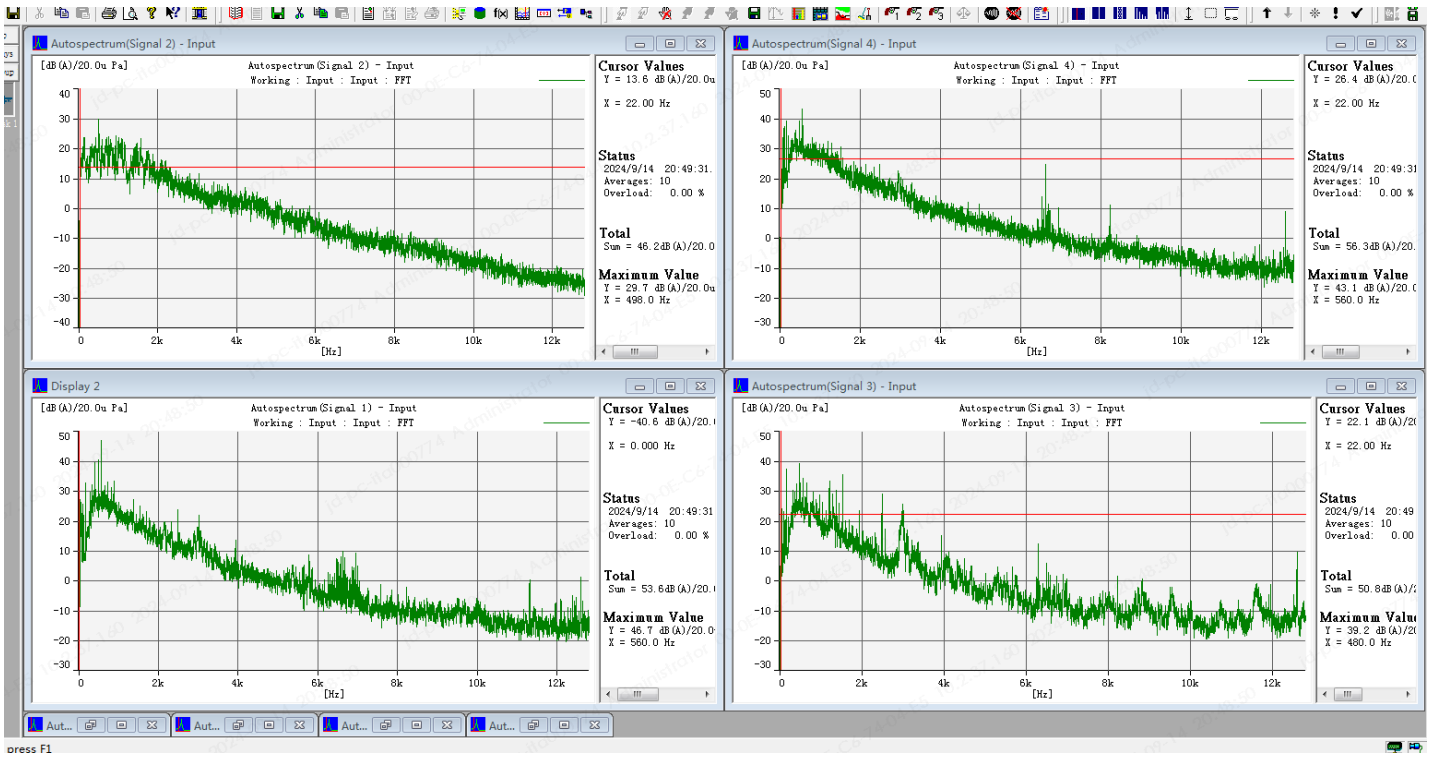


36K　ACiQ-36-AH-E-32 / ACiQ-36-HP-E-32

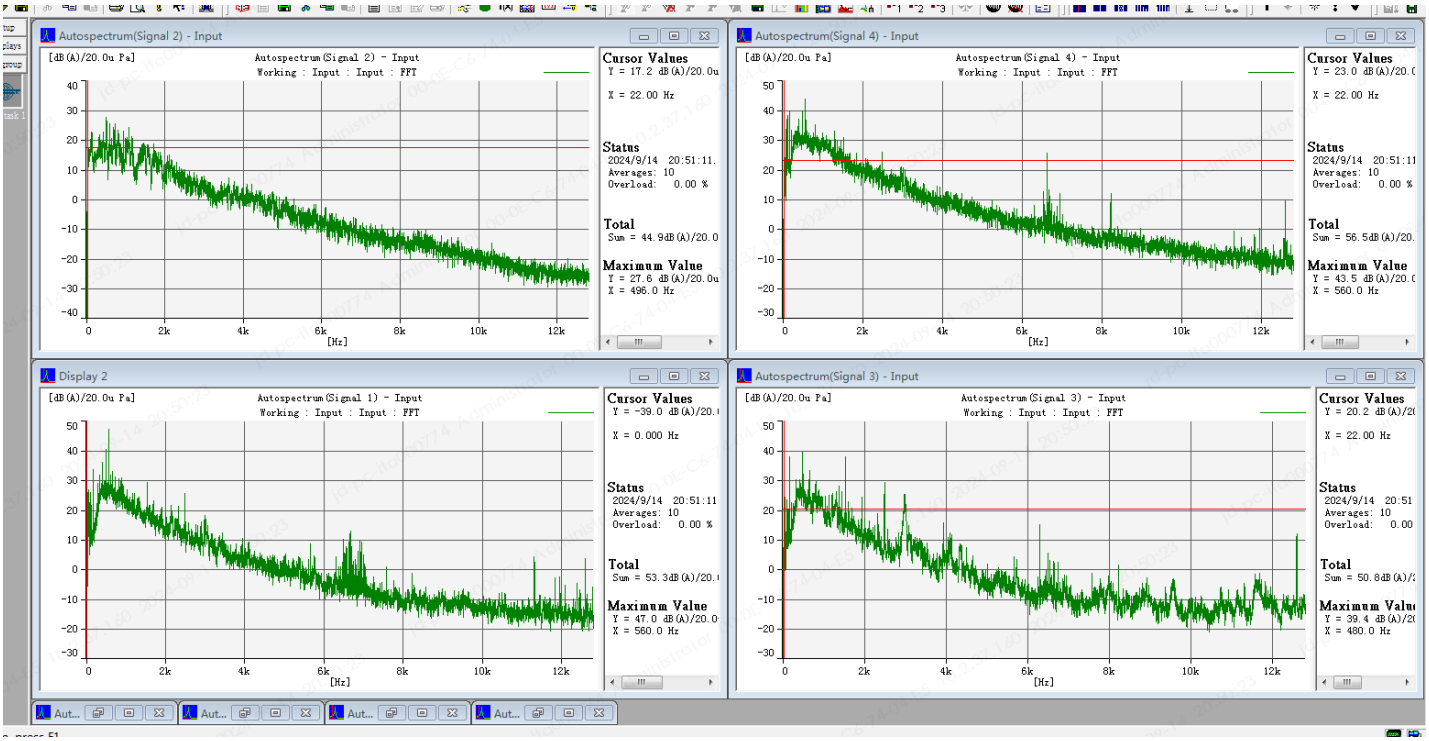
Cooling | *High Speed Setting*



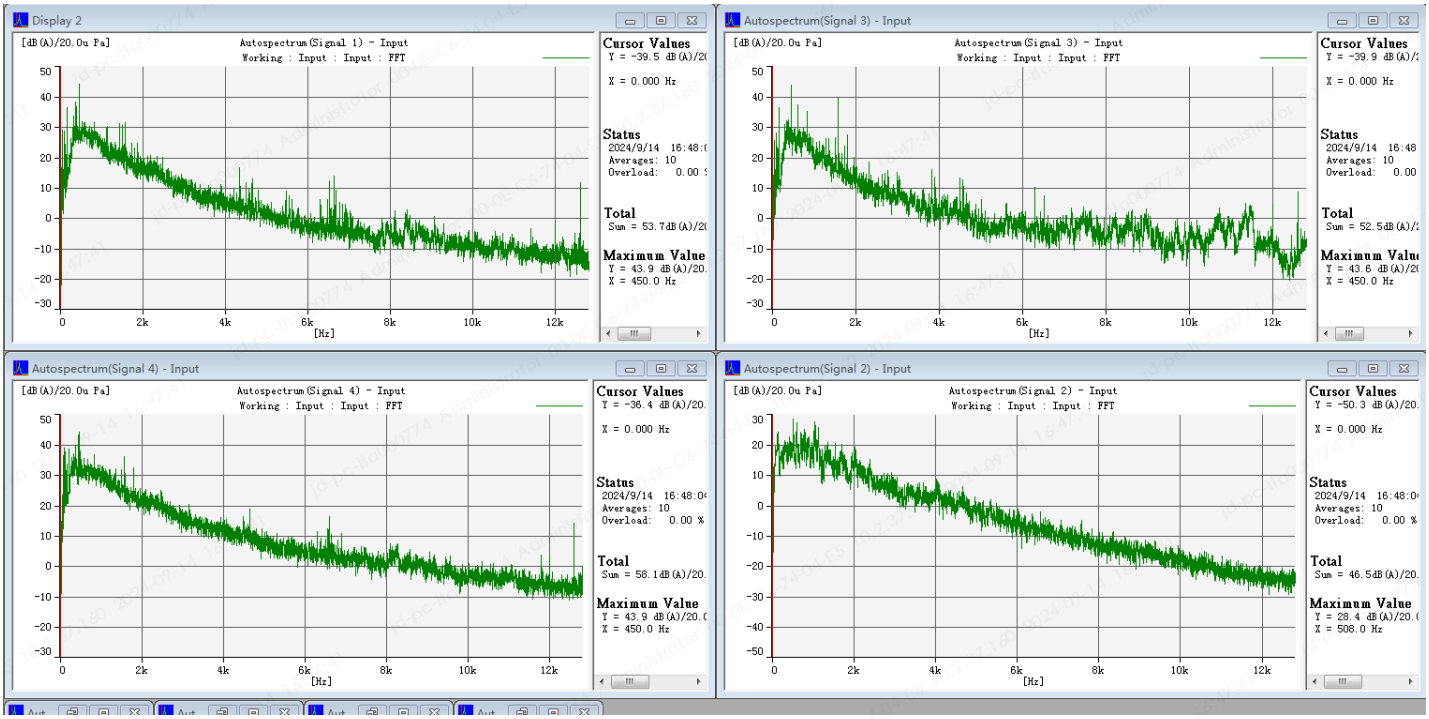
Cooling | *Medium Speed Setting*



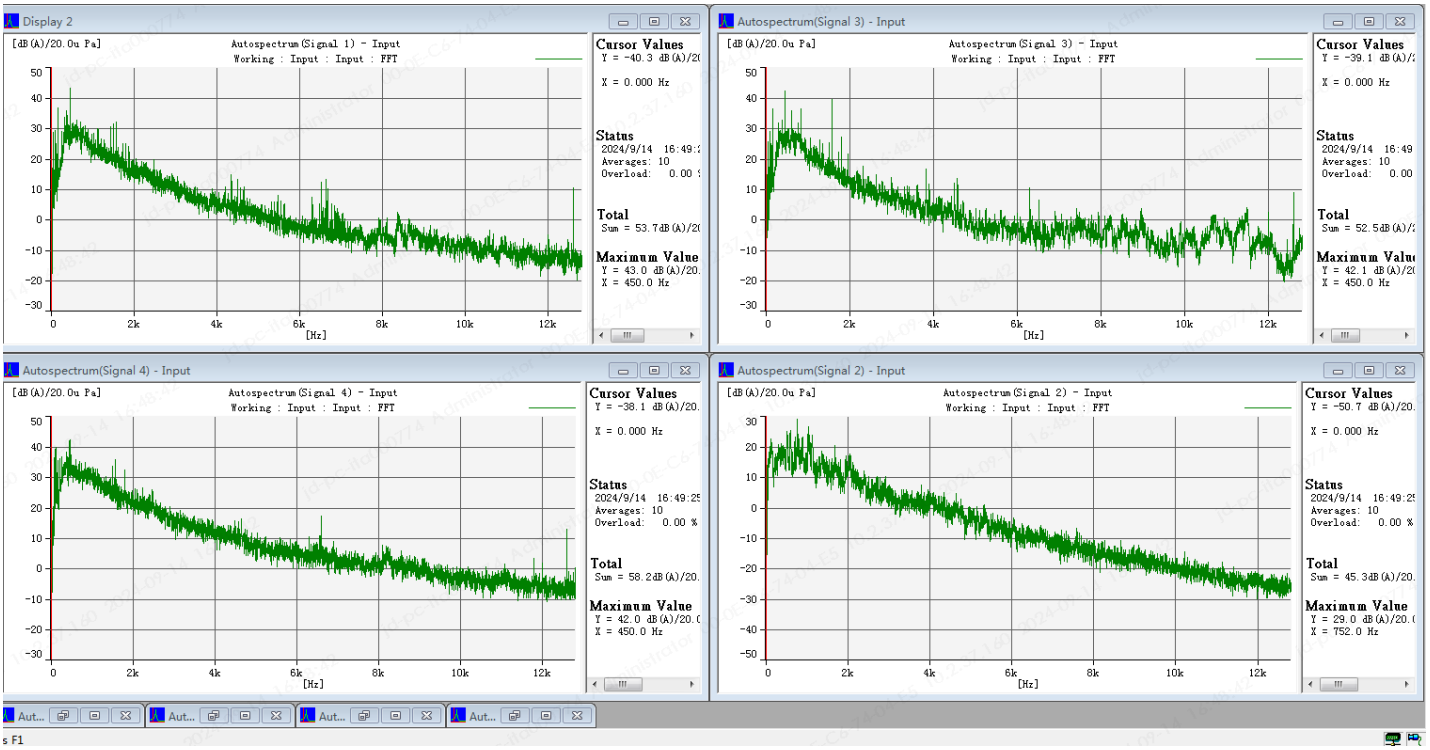
Cooling | *Low Speed Setting*



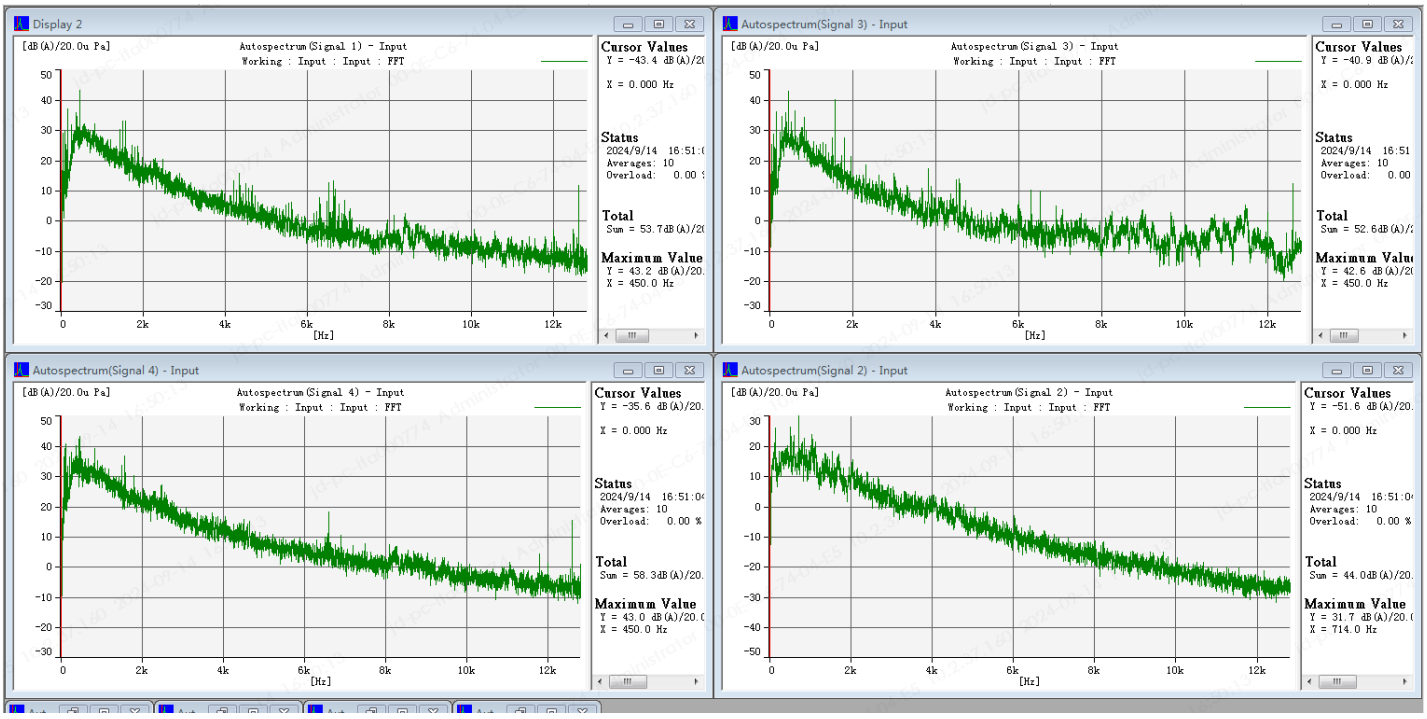
Heating | *High Speed Setting*



Heating | *Medium Speed Setting*

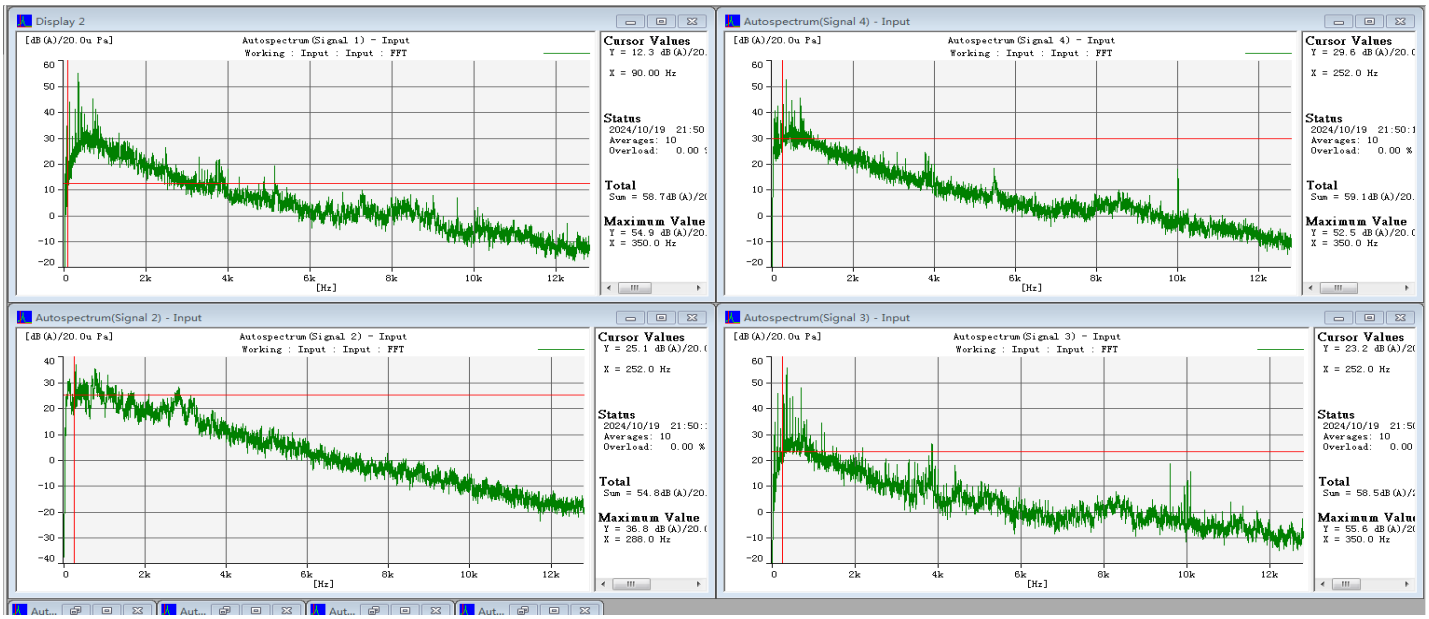


Heating | *Low Speed Setting*

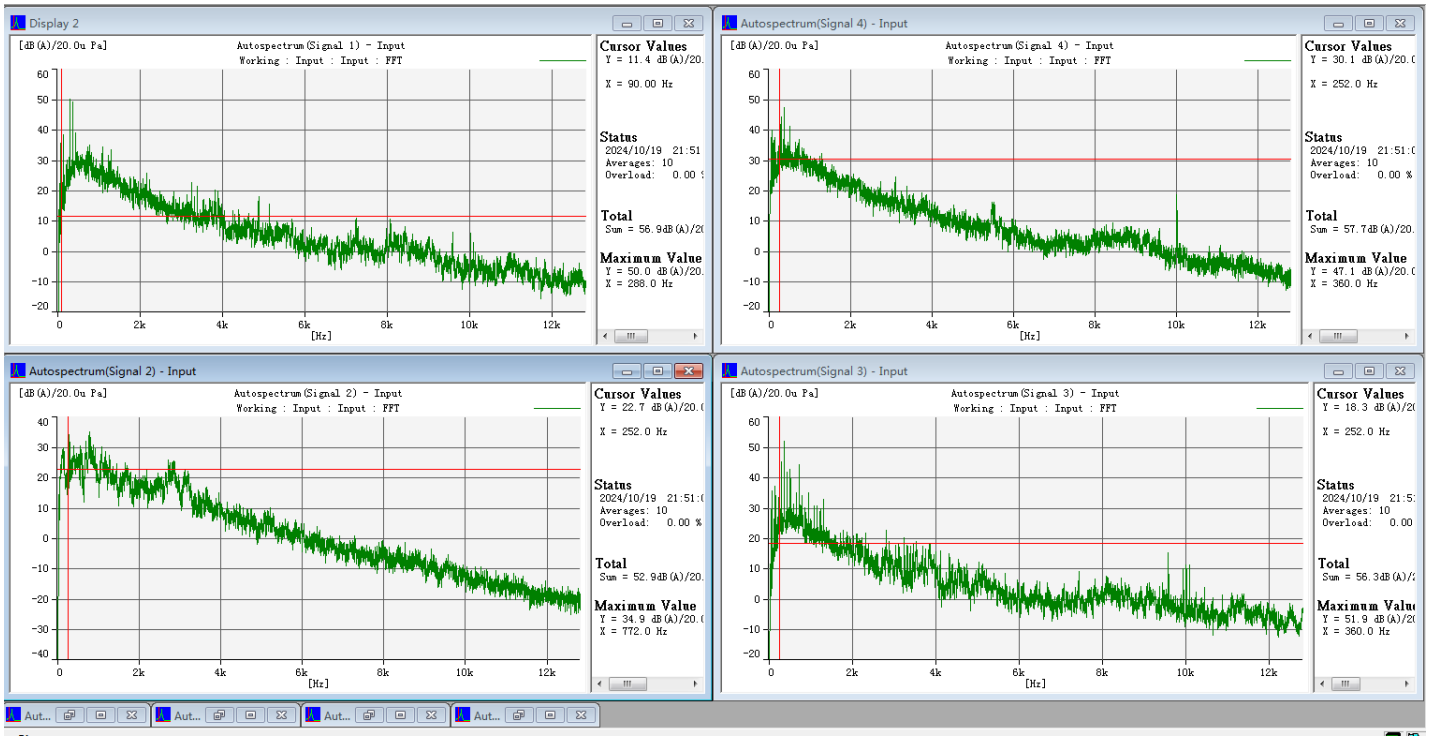


48K　ACiQ-48-AH-E-32 / ACiQ-48-HP-E-32

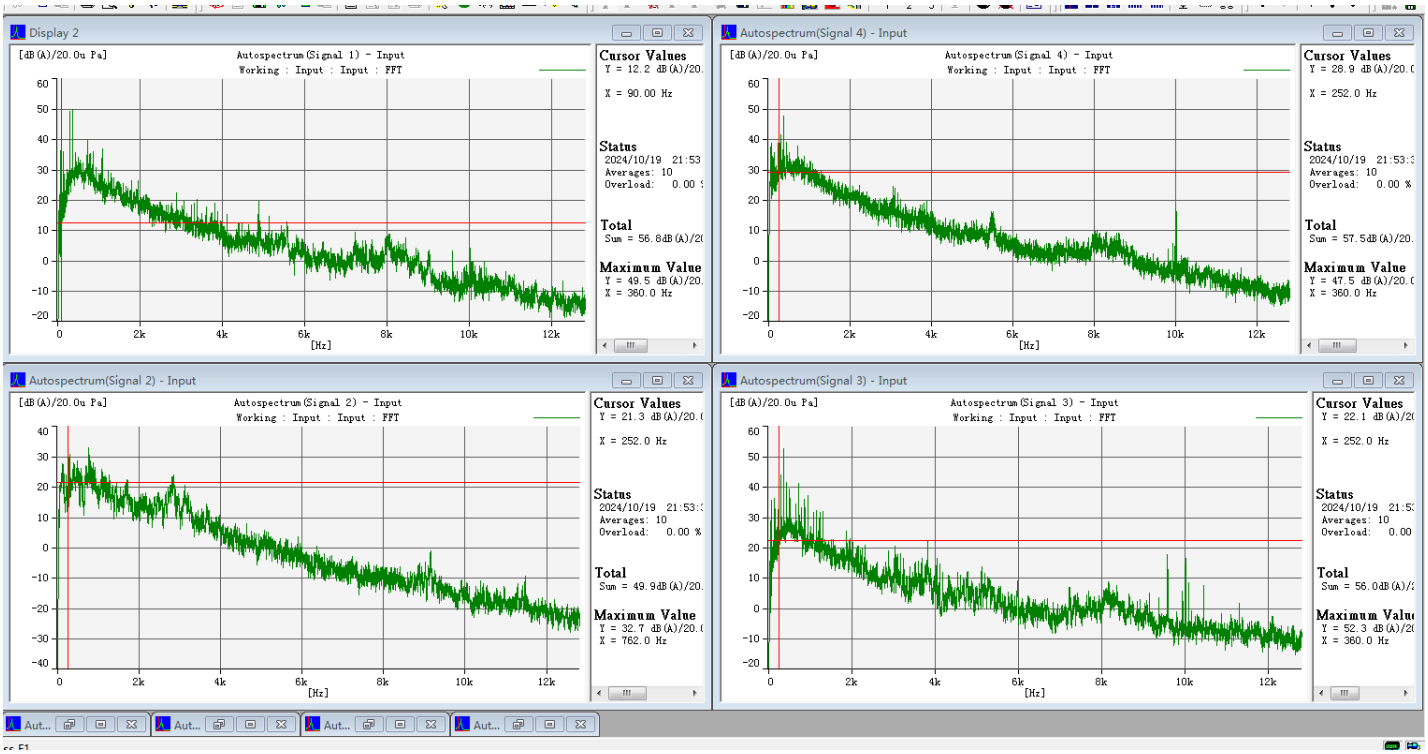
Cooling | *High Speed Setting*



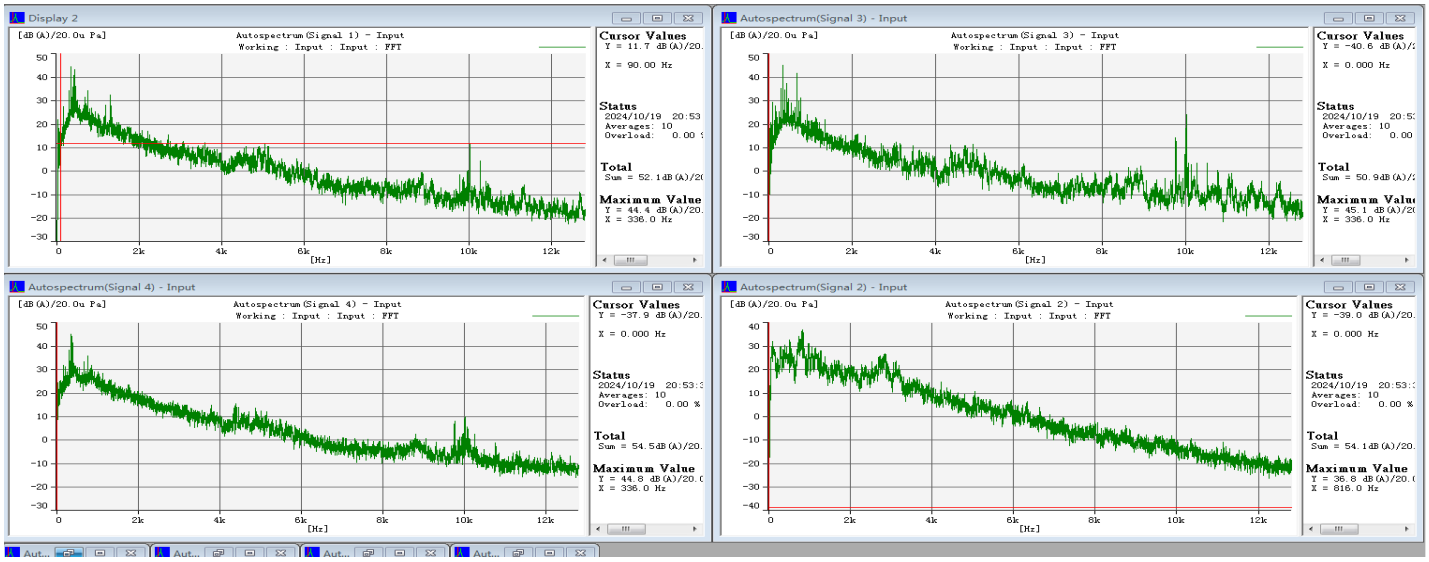
Cooling | *Medium Speed Setting*



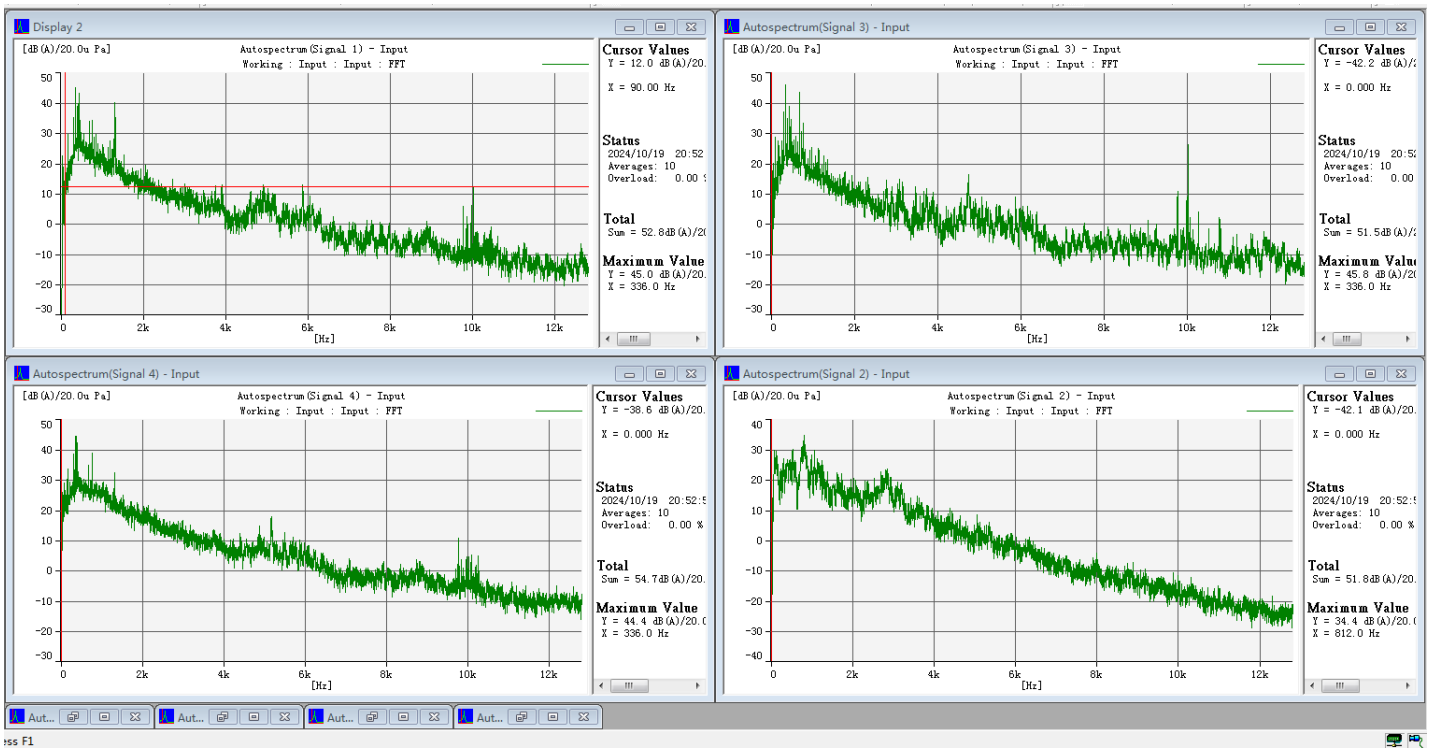
Cooling | *Low Speed Setting*



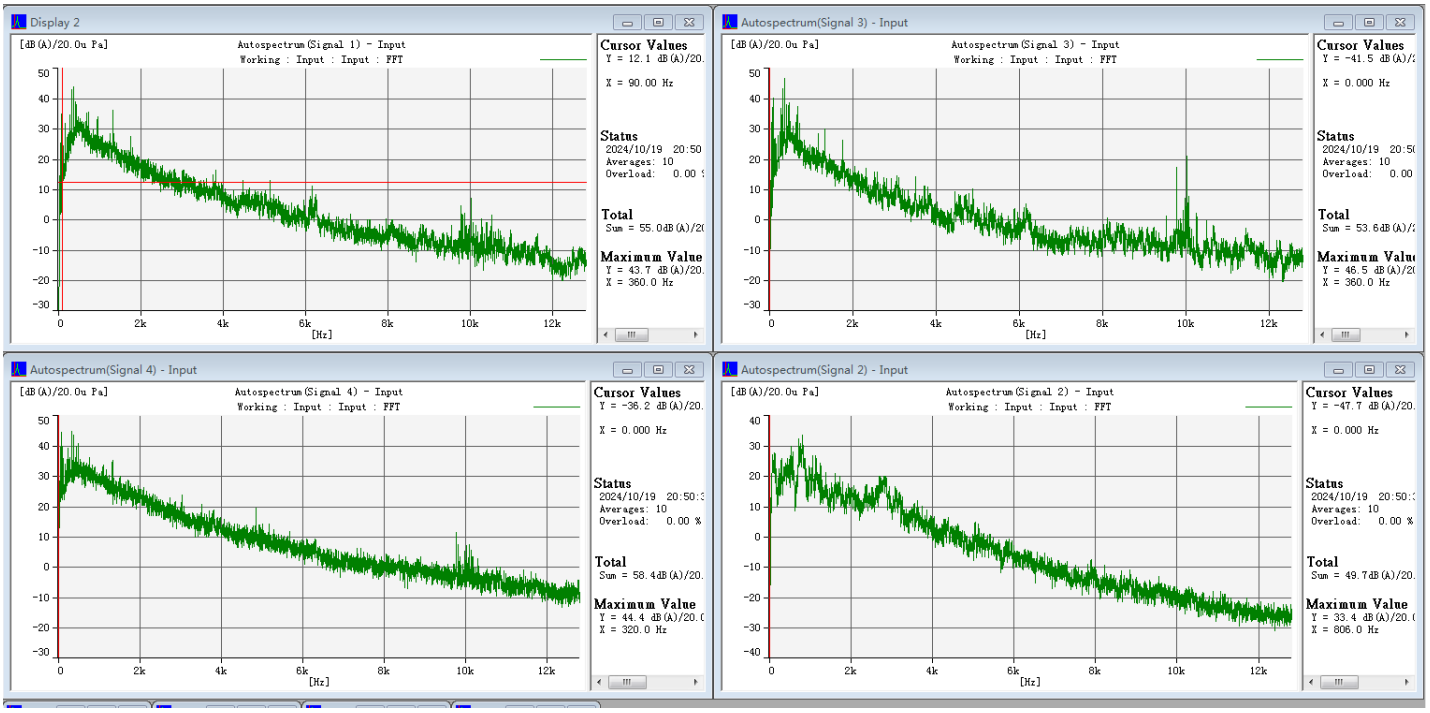
Heating | *High Speed Setting*



Heating | *Medium Speed Setting*

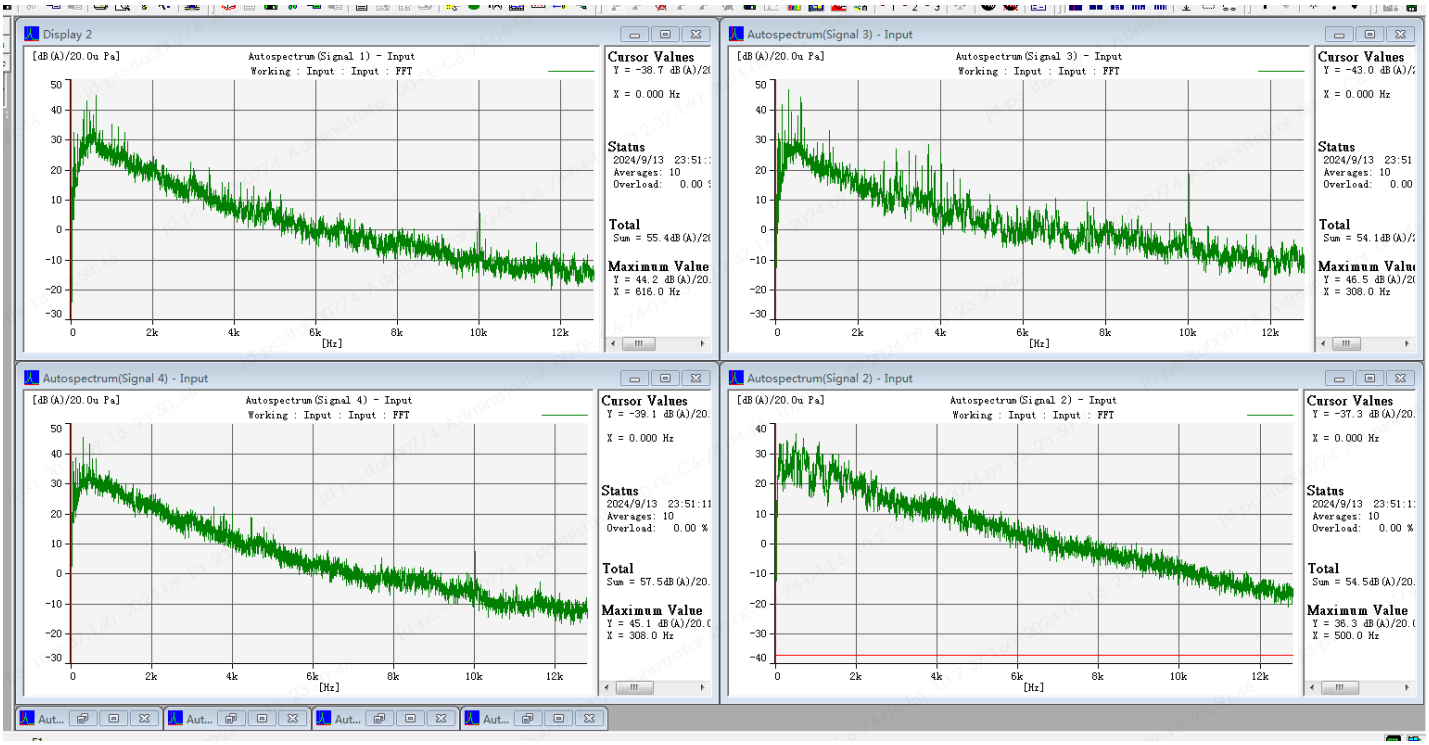


Heating | *Low Speed Setting*

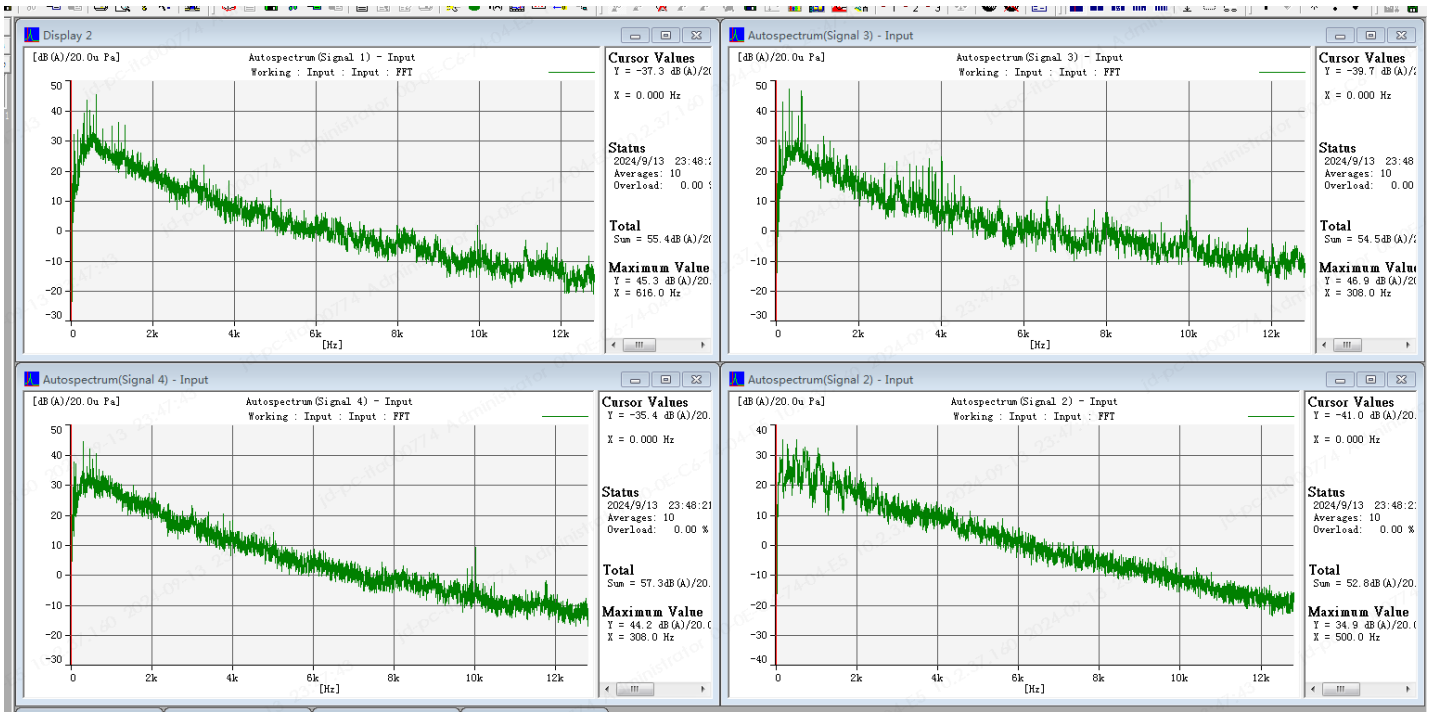


60K ACiQ-60-AH-E-32 / ACiQ-60-HP-E-32

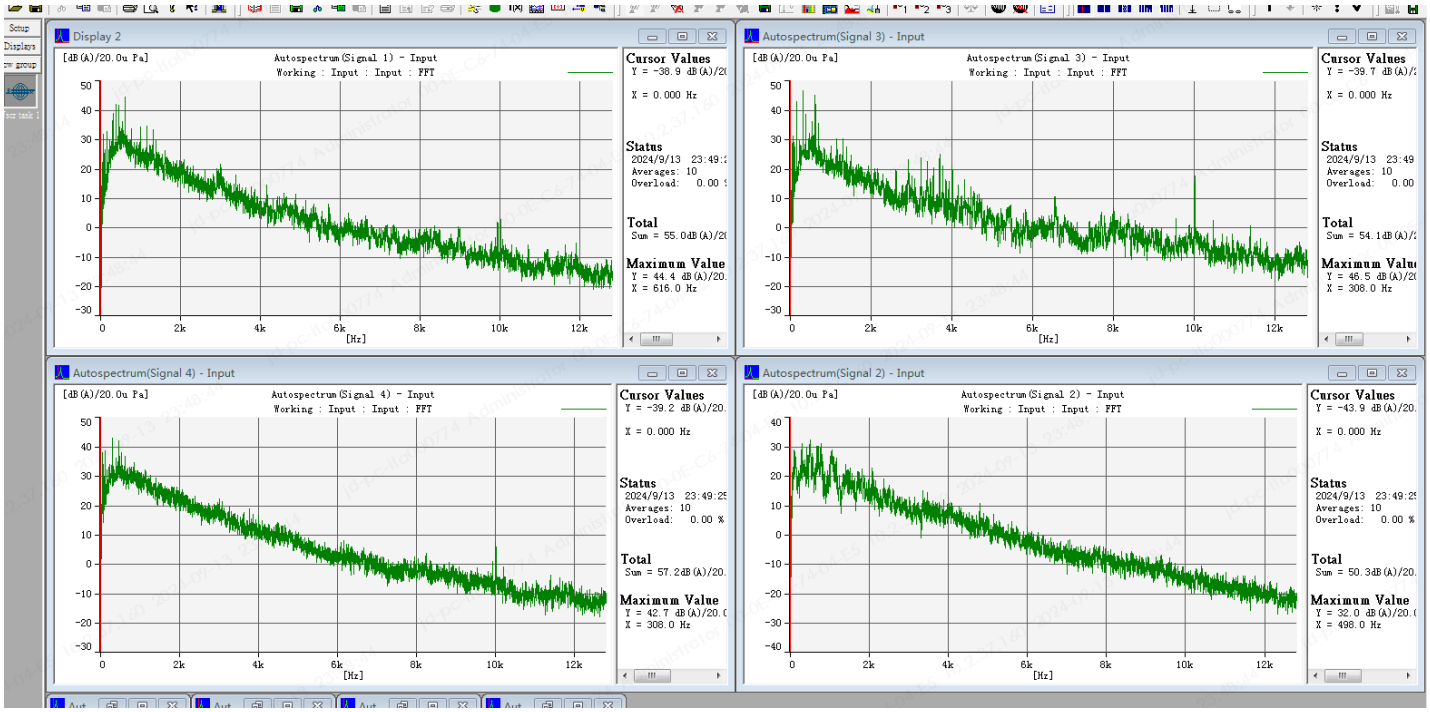
Cooling | *High Speed Setting*



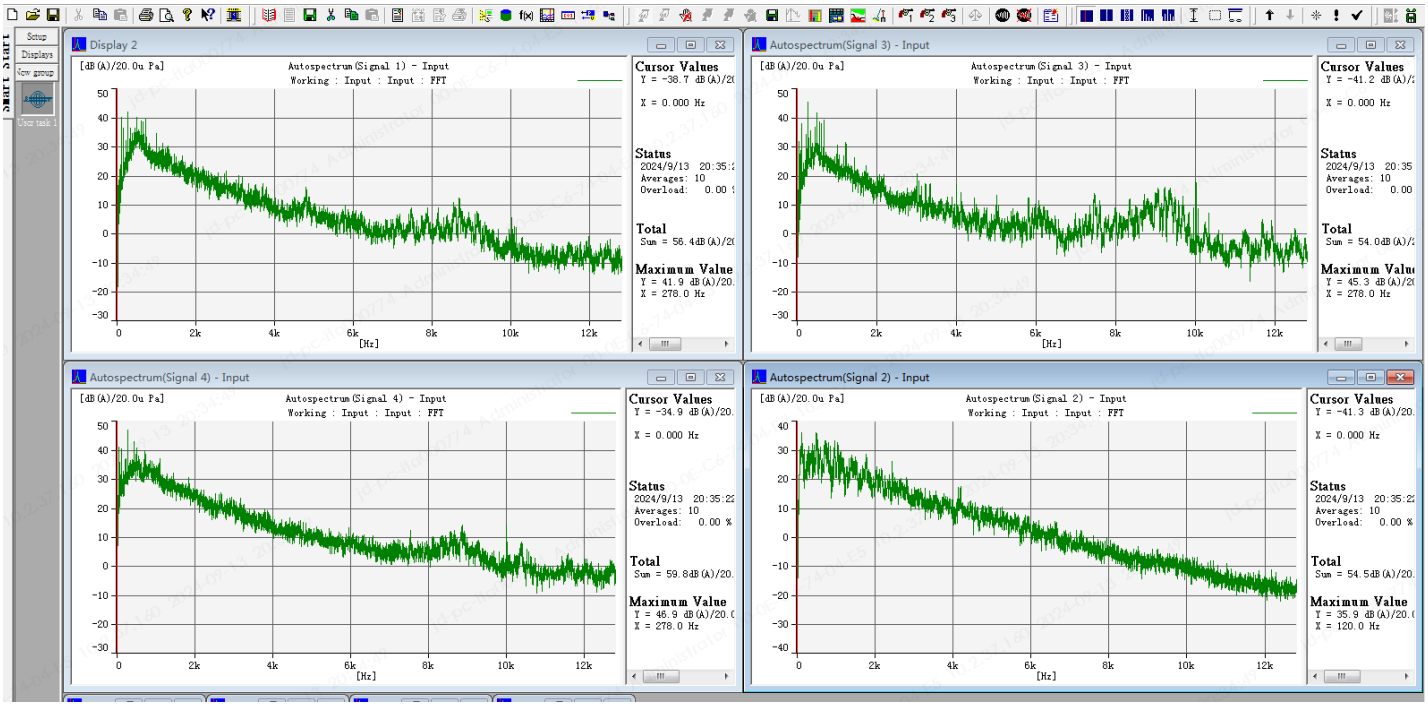
Cooling | *Medium Speed Setting*



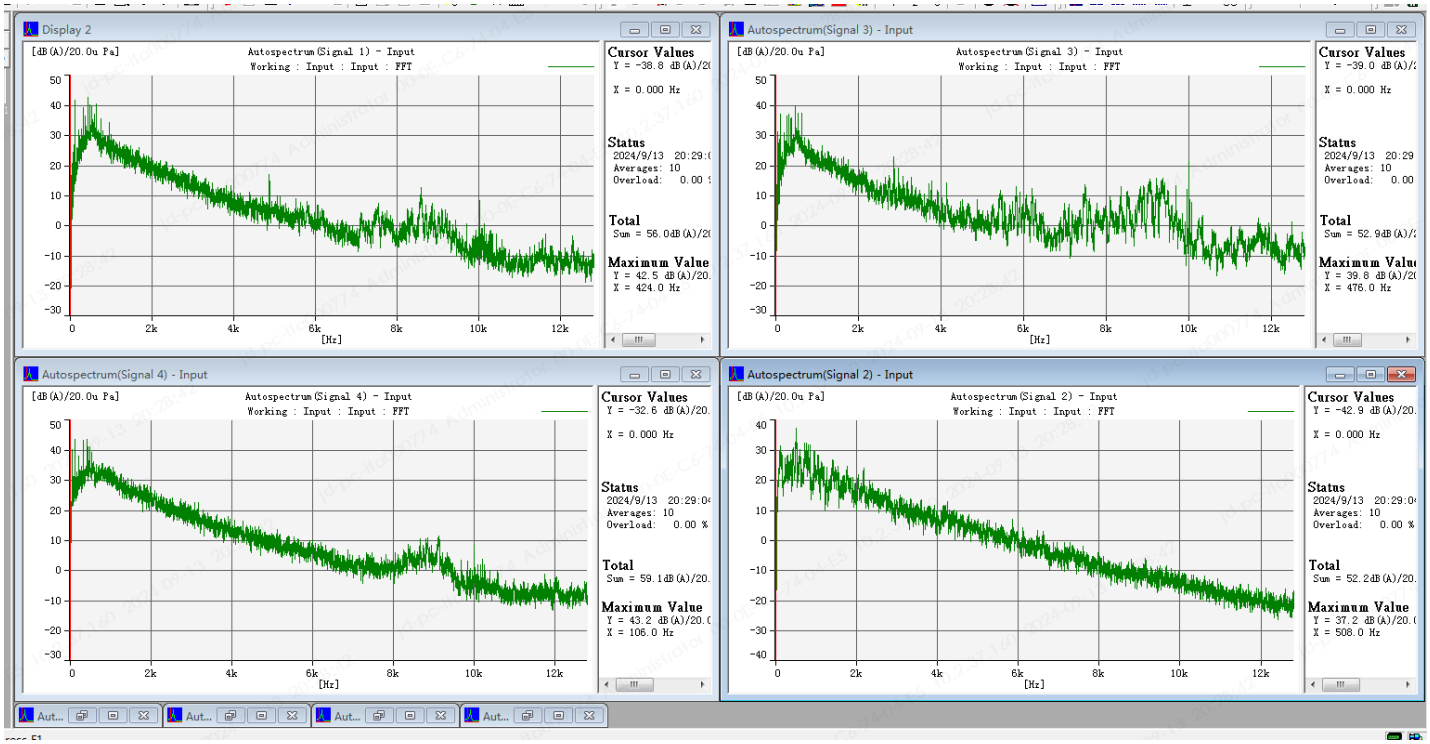
Cooling | *Low Speed Setting*



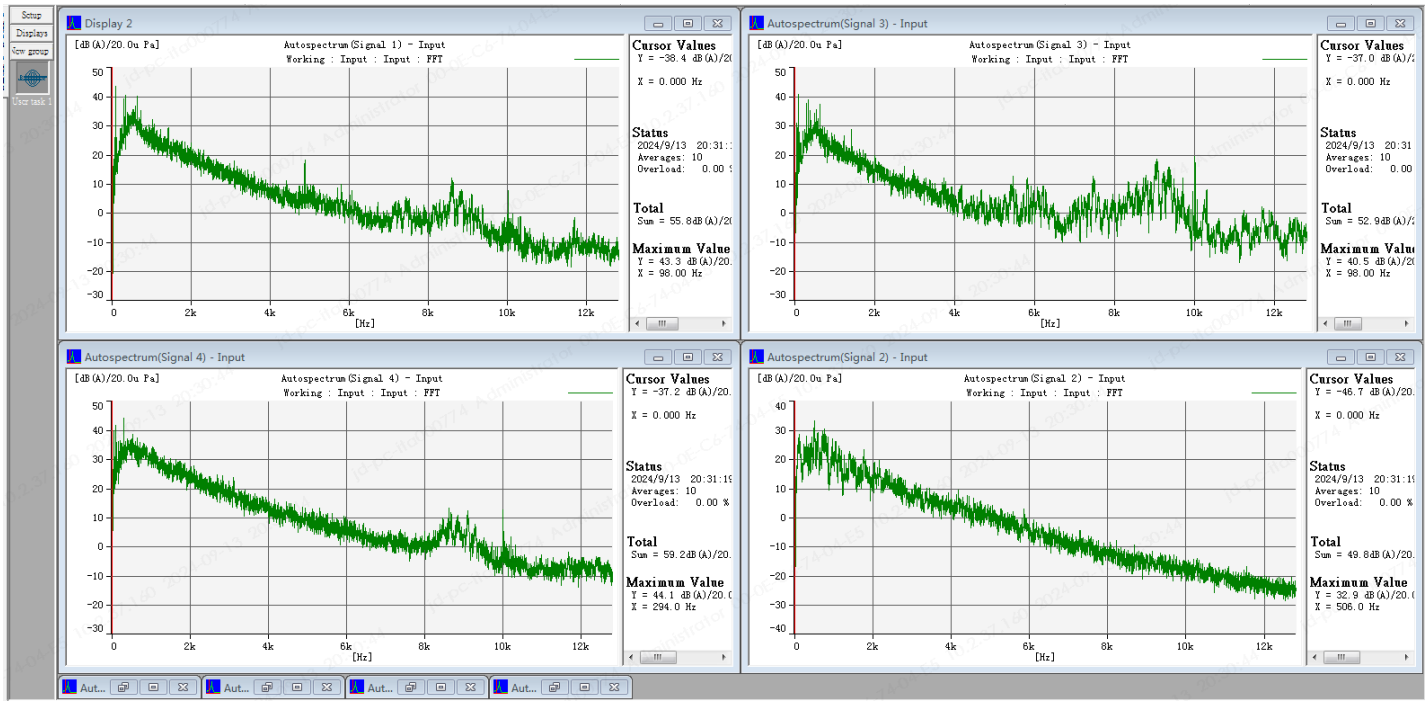
Heating | *High Speed Setting*



Heating | *Medium Speed Setting*



Heating | *Low Speed Setting*



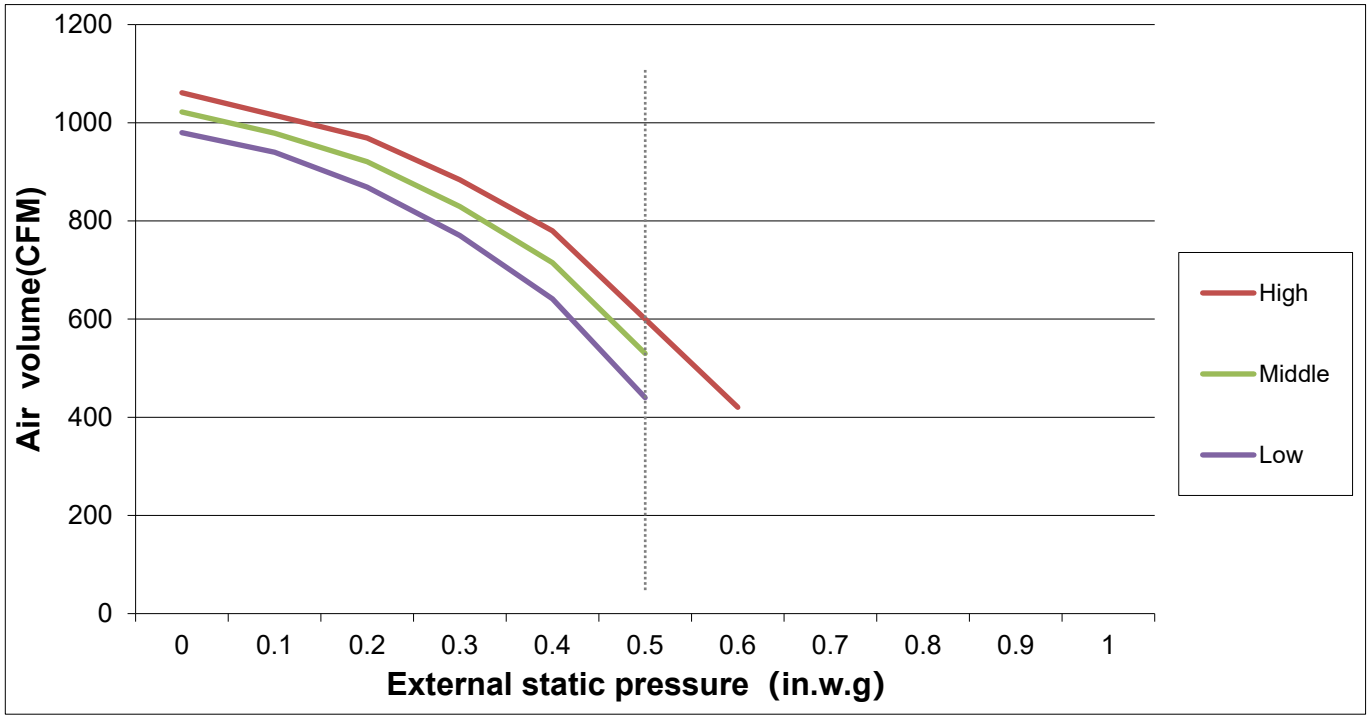
2. Static Pressure Air Volume Curve Graph

The air handler will be set to rated default (0.5in.W.C) from the factory，and the air volume change curve under different static pressures is as follows

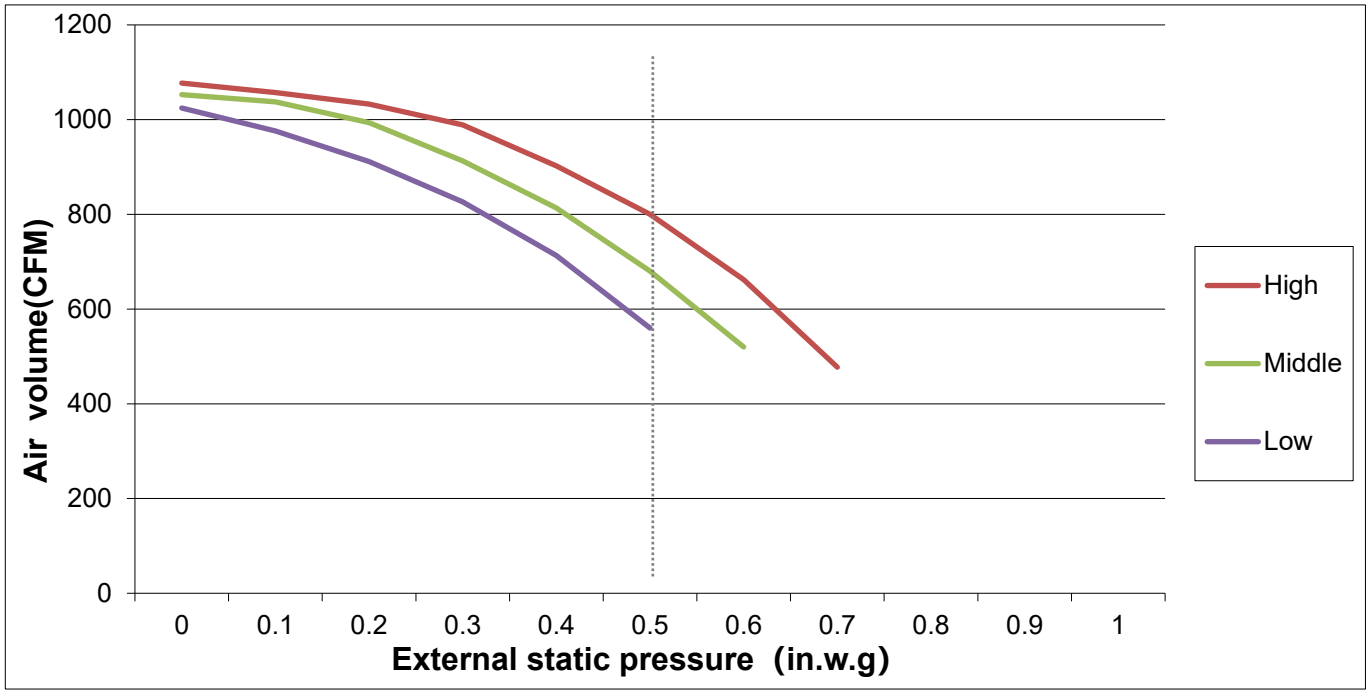
Remarks： According to the installation scenario, the air volume can be kept constant by adjusting the static pressure dial.

* The strong wind is only applicable under the condition of using the ACiQ line controller.

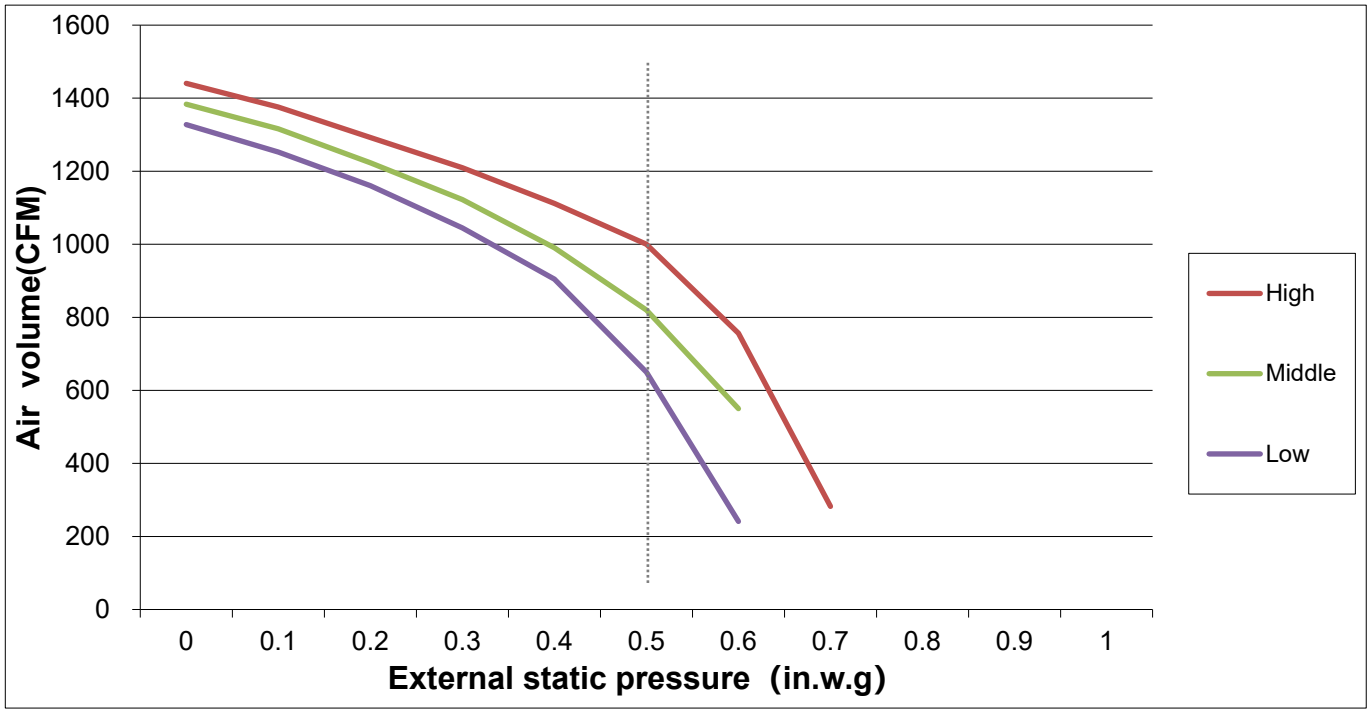
18K System



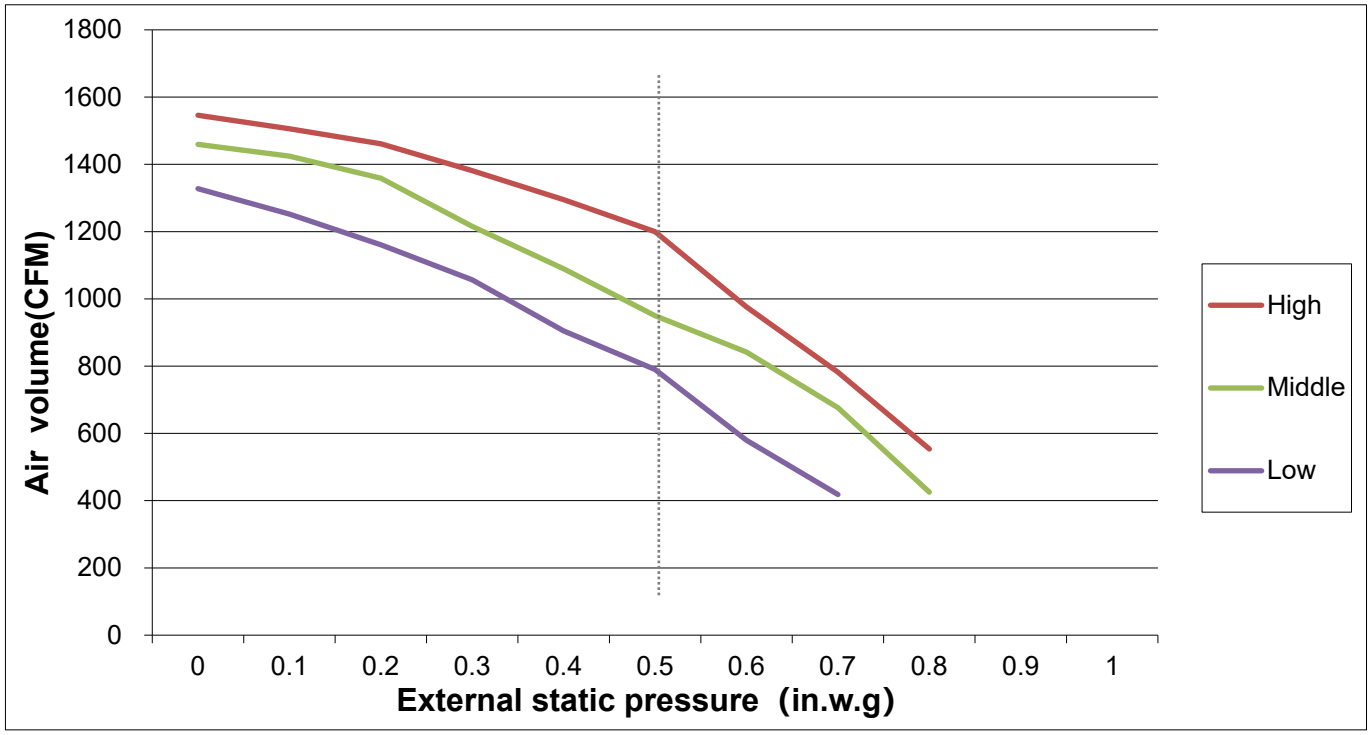
24K System



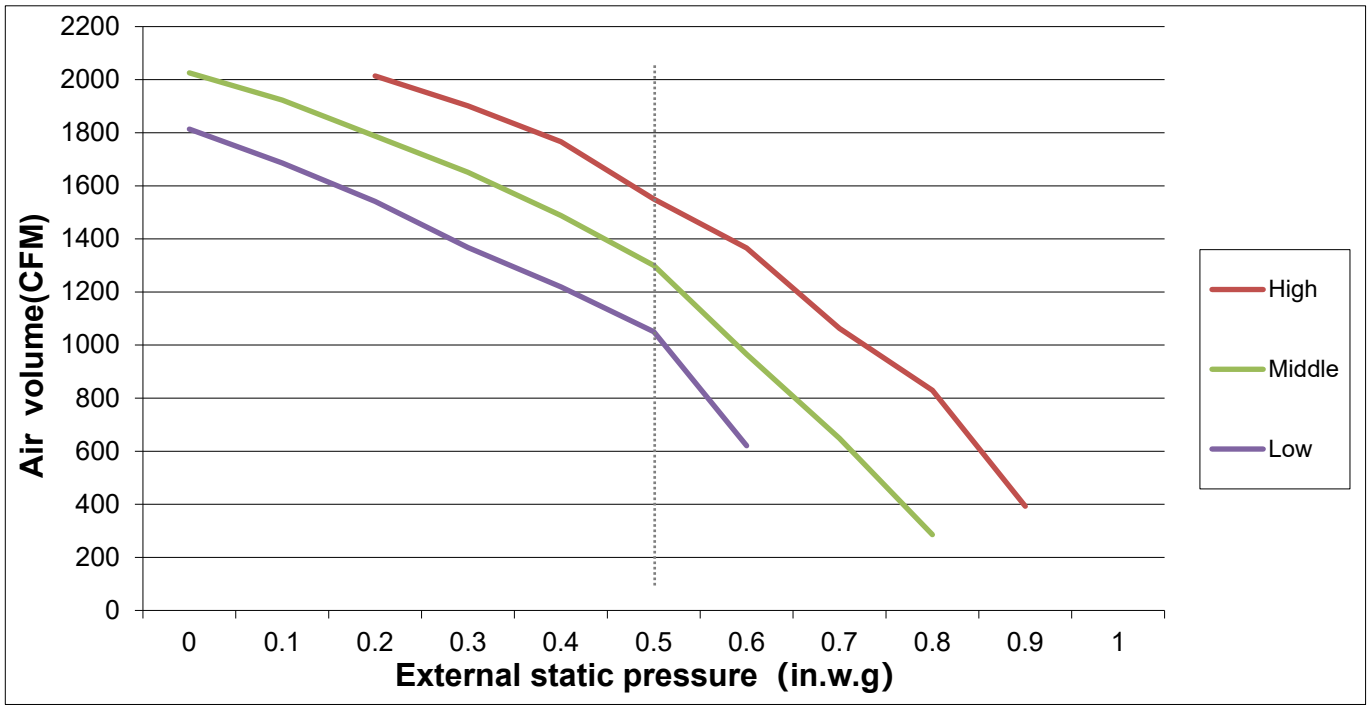
30K System



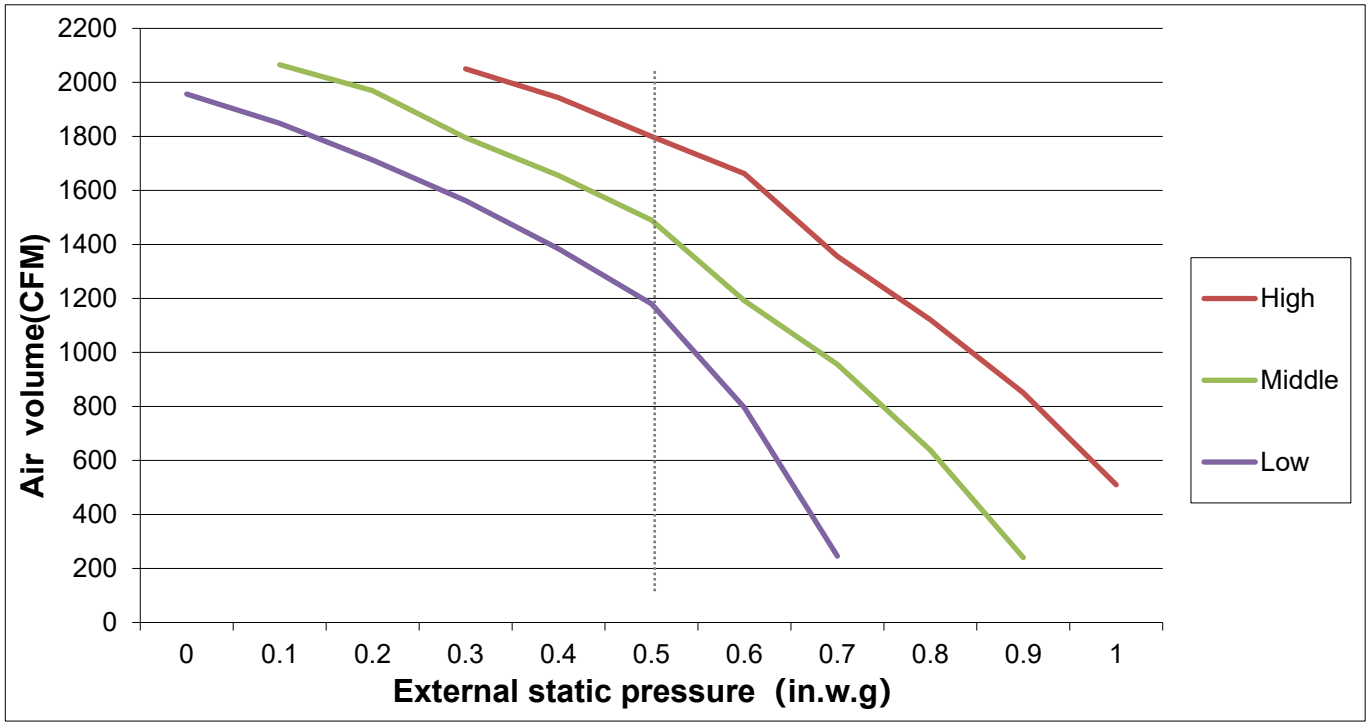
36K System



48K System



60K System



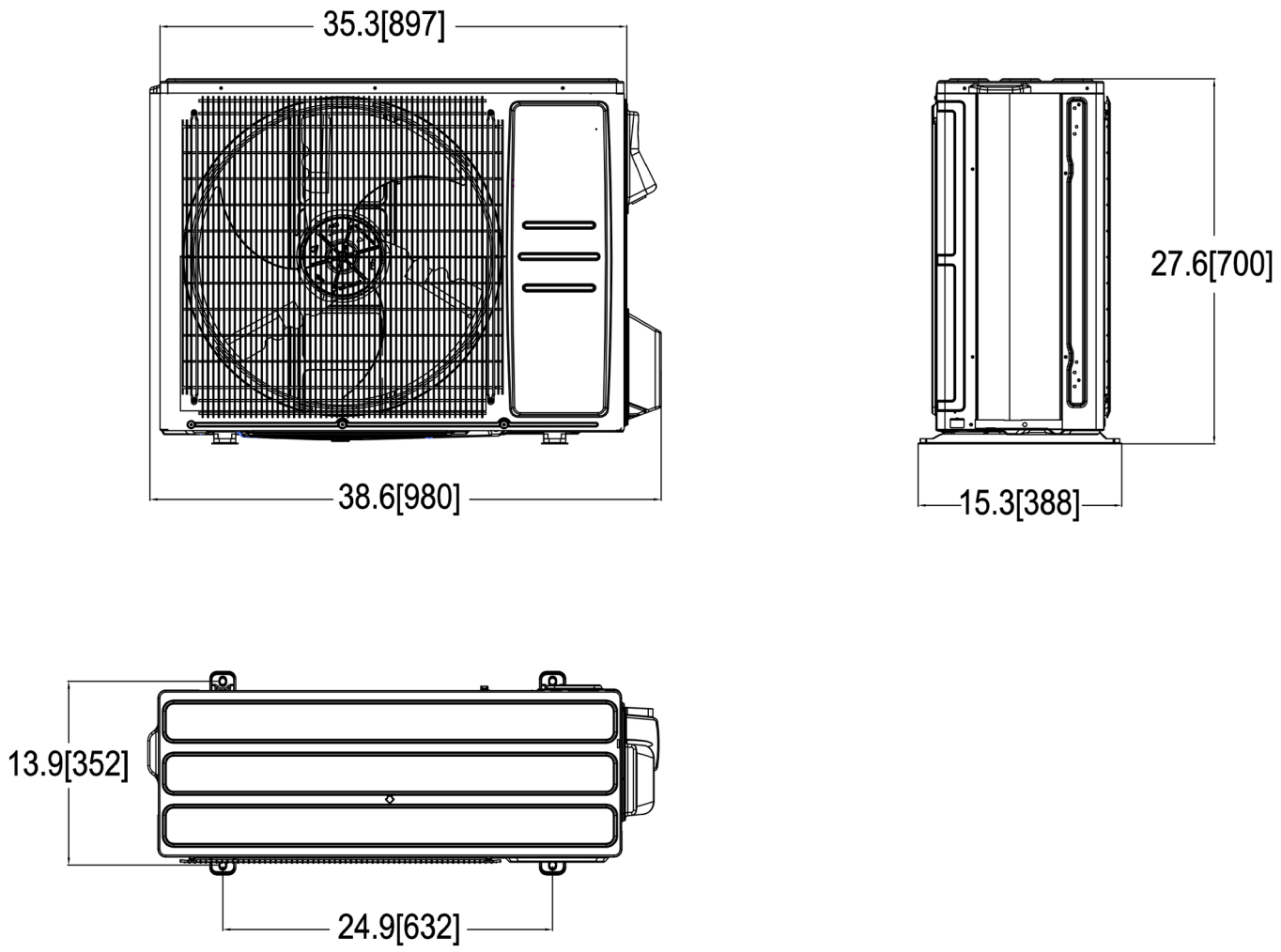
Section 4: Unit Dimensions

1. Outdoor Unit

1.1 Standard Series

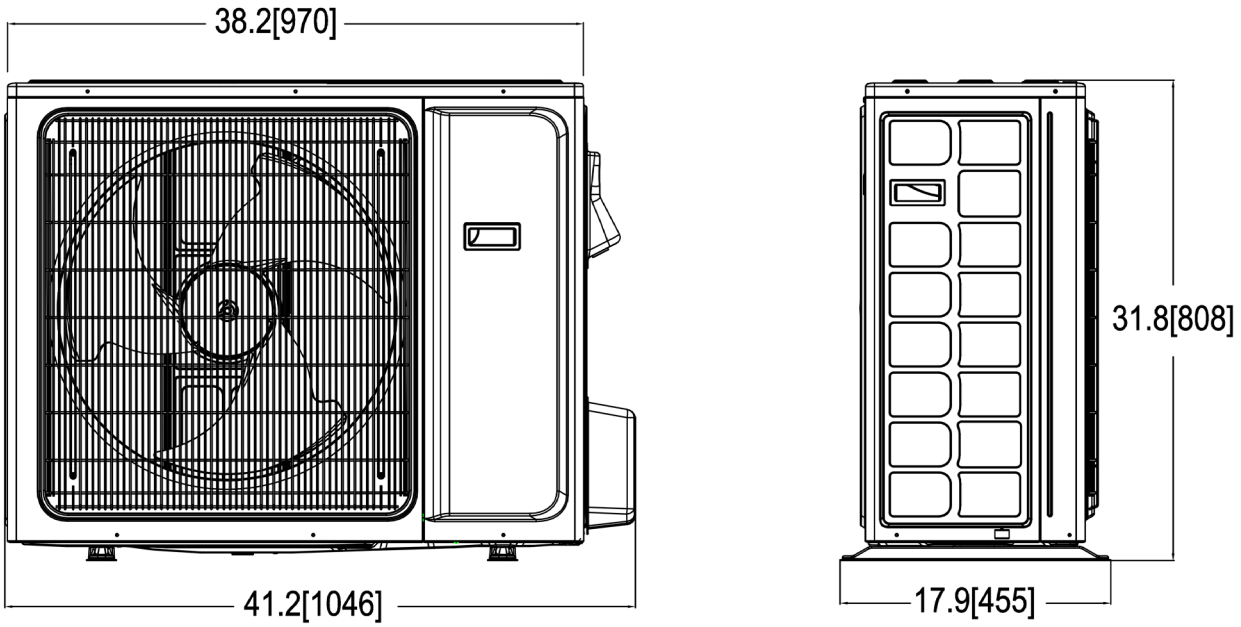
ACiQ-18-HP-E-32
ACiQ-24-HP-E-32

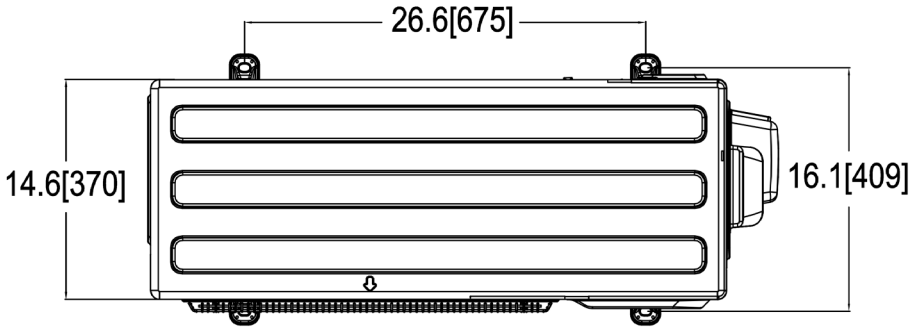
(unit:in.[mm])



ACiQ-30-HP-E-32
ACiQ-36-HP-E-32

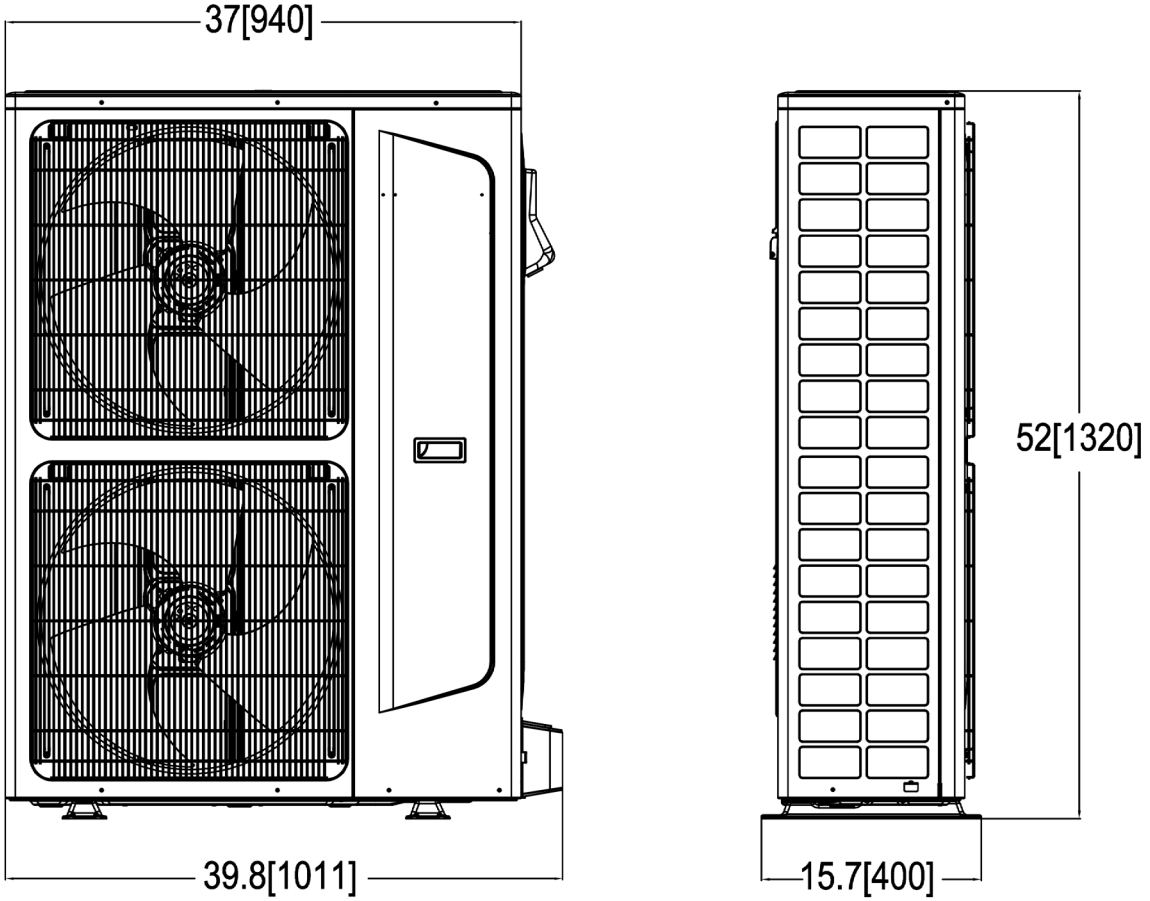
(unit:in.[mm])

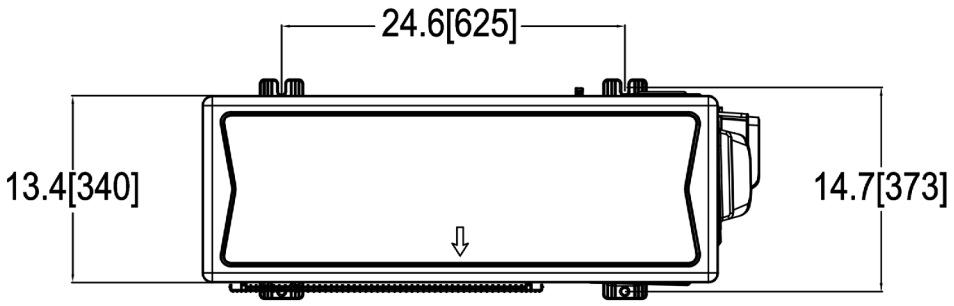




ACiQ-48-HP-E-32
ACiQ-60-HP-E-32

(unit:in.[mm])

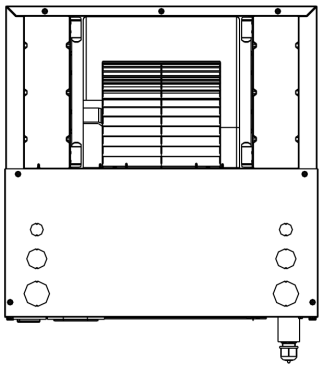


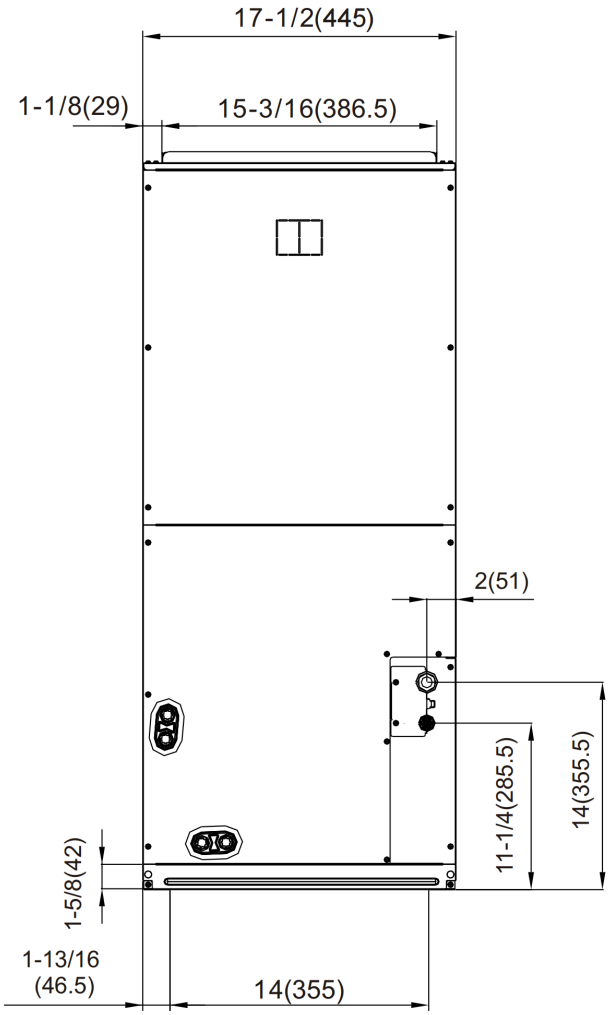


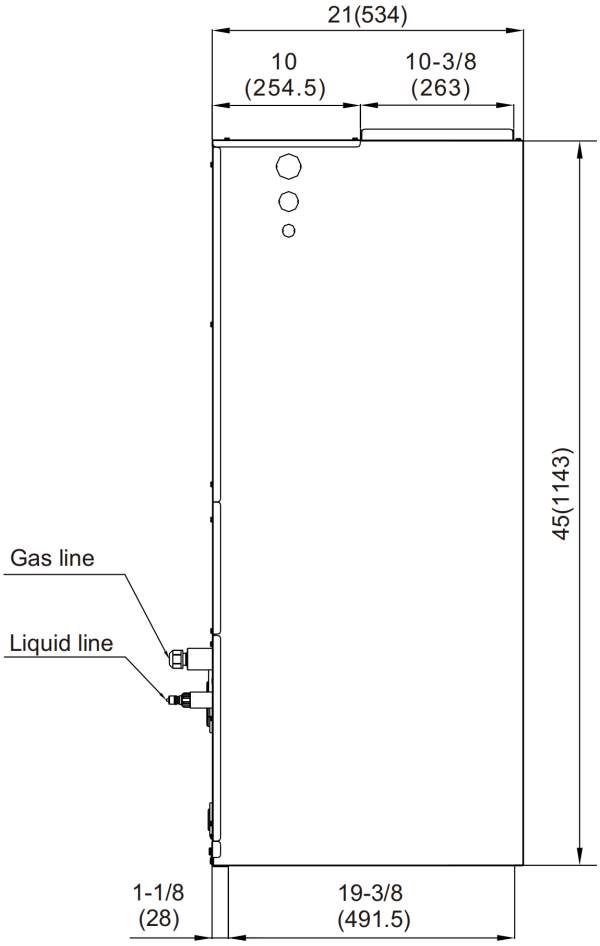
2. Indoor Unit

18K & 24K

(unit:in.[mm])

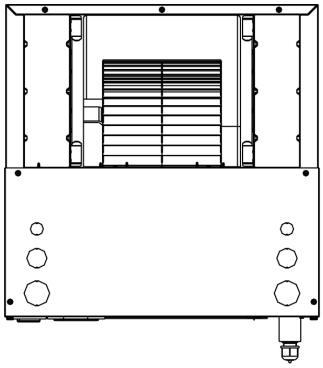


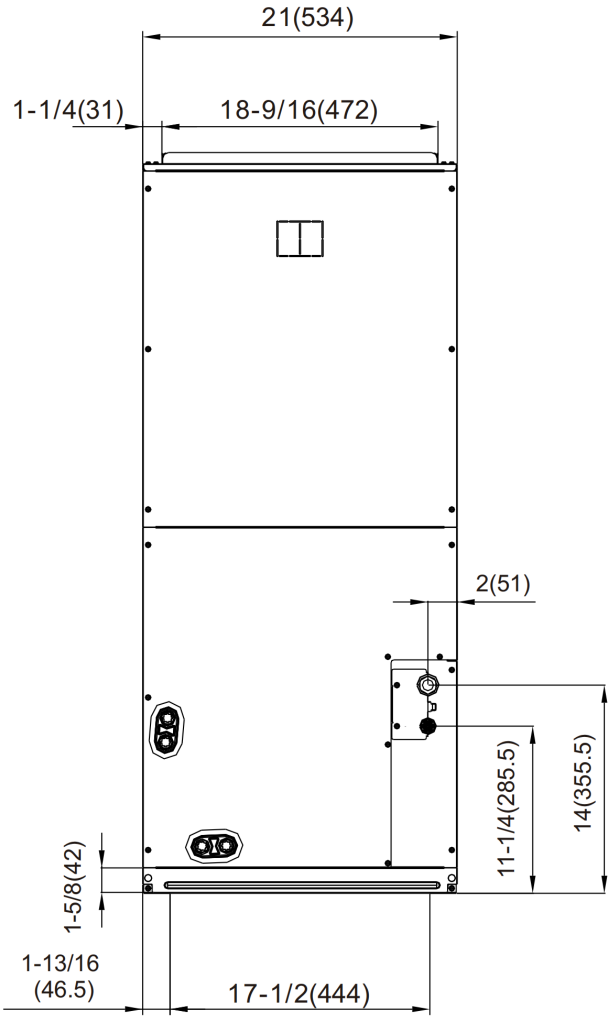


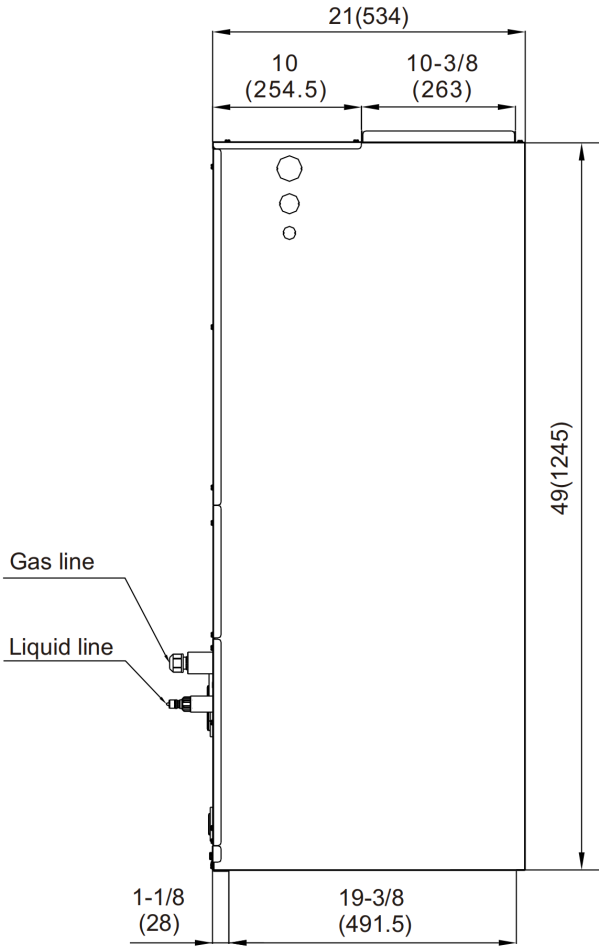


30K & 36K

(unit:in.[mm])

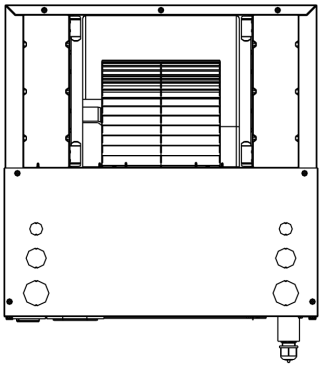


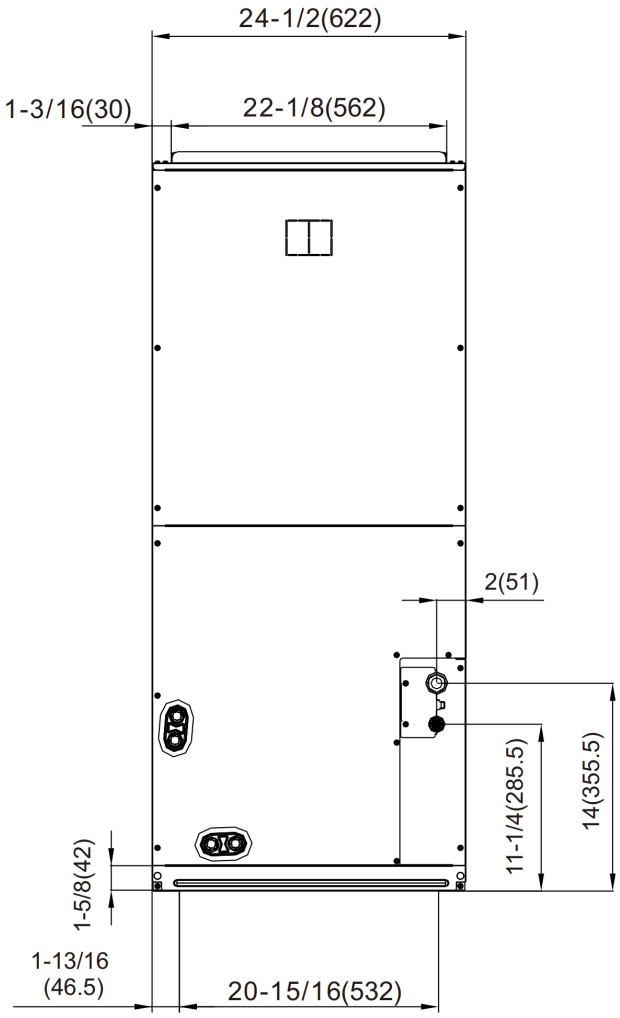


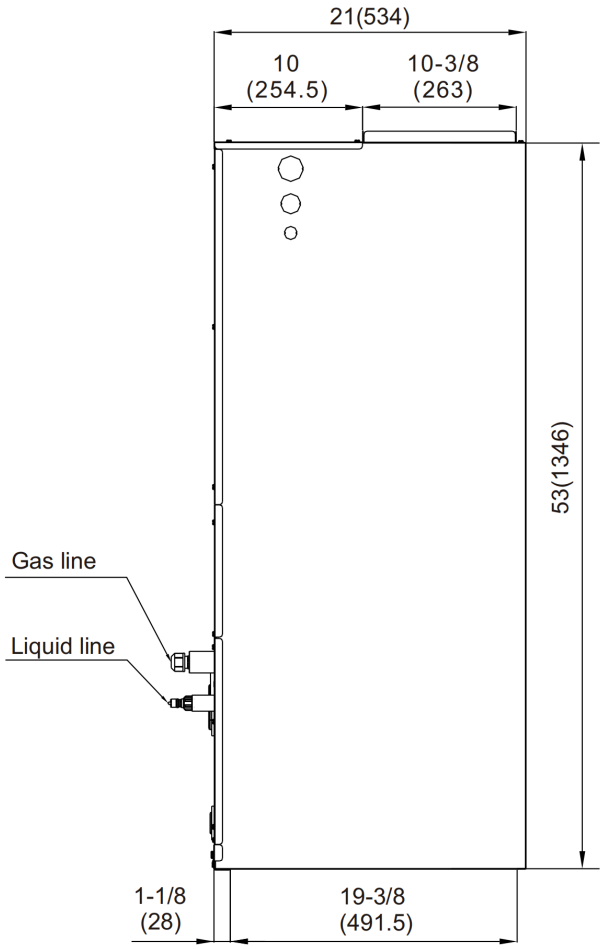


48K & 60K

(unit:in.[mm])





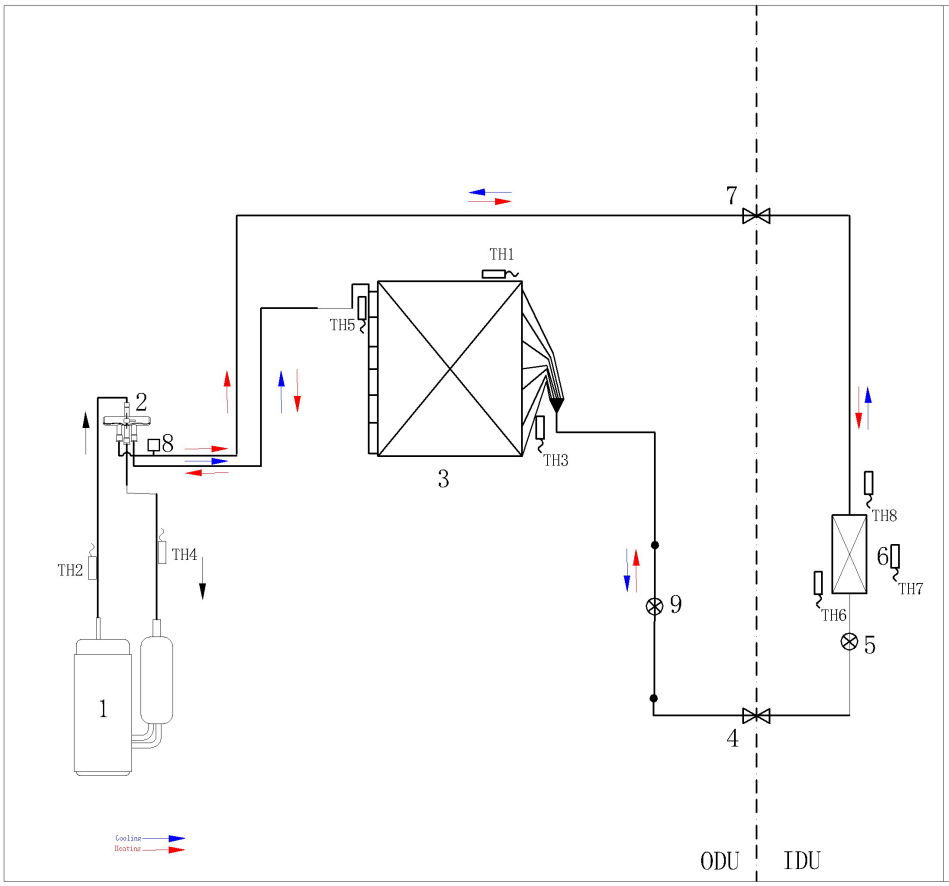


Section 5: Refrigerant System Design

1. Refrigerant System Diagram

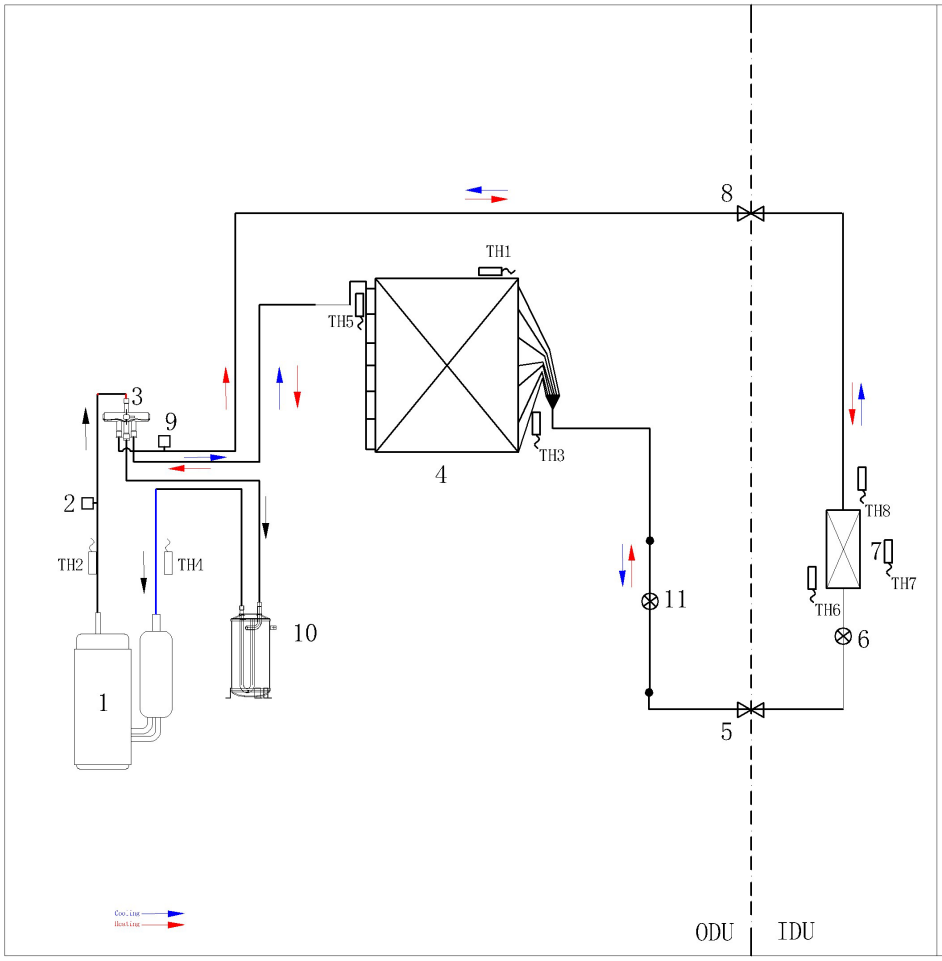
1.1 Standard Series

18K ACiQ-18-HP-E-32/ACiQ-18-AH-E-32
24K ACiQ-24-HP-E-32/ACiQ-24-AH-E-32



1 : Compressor
2 : Four-way valve
3 : ODU-heat exchanger
4 : Stop valve-liquid
5 : Coolng Electronic expansion valve
6 : IDU-heat exchanger
7 : Stop valve-gas
8 : Pressure sensor
9 : Heating Electronic expansion valve
TH1:Ambient temperature sensor
TH2:Discharge temperature sensor
TH3:Defrosting temperature sensor
TH4:Suction temperature sensor
TH5:Condenser-mid temperature sensor
TH6:Evaporator inlet temperature sensor
TH7:Evaporator-mid temperature sensor
TH8:Evaporator outlet temperature sensor

30K ACiQ-30-HP-E-32/ACiQ-30-AH-E-32
36K ACiQ-36-HP-E-32/ACiQ-36-AH-E-32
48K ACiQ-48-HP-E-32/ACiQ-48-AH-E-32
60K ACiQ-60-HP-E-32/ACiQ-60-AH-E-32



1 : Compressor
2 : High pressure switch
3 : Four-way valve
4 : ODU-heat exchanger
5 : Stop valve-liquid
6 : Coolng Electronic expansion valve
7 : IDU-heat exchanger
8 : Stop valve-gas
9 : Pressure sensor
10: Gas-liquid separator
11: Heating Electronic expansion valve
TH1:Ambient temperature sensor
TH2:Discharge temperature sensor
TH3:Defrosting temperature sensor
TH4:Suction temperature sensor
TH5:Condenser-mid temperature sensor
TH6:Evaporator inlet temperature sensor
TH7:Evaporator-mid temperature sensor
TH8:Evaporator outlet temperature sensor

2. Piping Length Specifications

2.1 Standard Series

Model	ODU		ACiQ-18-HP-E-32	ACiQ-24-HP-E-32	ACiQ-30-HP-E-32
	IDU		ACiQ-18-AH-E-32	ACiQ-24-AH-E-32	ACiQ-30-AH-E-32
Refrigerant Pipe	Liquid Side	In.[mm]	3/8[Φ9.52]	3/8[Φ9.52]	3/8[Φ9.52]
	Gas Side	In.[mm]	5/8[Φ15.88]	5/8[Φ15.88]	5/8[Φ15.88]
	Max. Length	ft[m]	98[30]	98[30]	98[30]
	Max. Height	ft[m]	49[15]	49[15]	49[15]

Model	ODU		ACiQ-36-HP-E-32	ACiQ-48-HP-E-32	ACiQ-60-HP-E-32
	IDU		ACiQ-36-AH-E-32	ACiQ-48-AH-E-32	ACiQ-60-AH-E-32
Refrigerant Pipe	Liquid Side	In.[mm]	3/8[Φ9.52]	3/8[Φ9.52]	3/8[Φ9.52]
	Gas Side	In.[mm]	5/8[Φ15.88]	3/4[Φ19.05]	3/4[Φ19.05]
	Max. Length	ft[m]	164[50]	164[50]	164[50]
	Max. Height	ft[m]	98[30]	98[30]	98[30]

Section 6: Electrical Information

1. Electrical Specifications

1.1 Indoor Unit

- The definition of power cord is the power supply cable from the isolating switch attached to the dedicated power supply to the indoor unit or outdoor unit. Interconnecting cable for the indoor and outdoor unit is the power cable that connects indoor unit and outdoor unit.
- Above-mentioned definitions are the specifications of power supply, power cord and interconnecting cable of indoor unit and outdoor unit of all different types of air conditioners.
- To avoid voltage drops, if the cross-sectional area of a power cable core is at its minimum size and the power cord is lengthened, you should opt for a larger power cable size. This ensures that the electrical system remains efficient and safe.

The wiring cable specification that is needed in the installation: (Recommended specifications)

Model	Power line (AWG)	Power connection line(AWG)	Communication (ft.(m))	Switch/fuse nominal value	Certification Type
18K ~ 60K	18	22	1640-7/16 (≤500)	15A	UL

- If other than uncoated (non-plated) 75°C copper wire (solid wire for 10 AWG and smaller, stranded wire for larger than 10 AWG) is used consult applicable tables of the National Electric Code (ANSI/NFPA 70).
- Specifications of circuit breaker are based on a working condition where the working temperature is 40°C. If working condition changes, please adjust the specifications according to national standards.

1.2 Outdoor Unit

- The definition of power cord is the power supply cable from the isolating switch attached to the dedicated power supply to the indoor unit or outdoor unit. Interconnecting cable for the indoor and outdoor unit is the power cable that connects indoor unit and outdoor unit.
- Above-mentioned definitions are the specifications of power supply, power cord and interconnecting cable of indoor unit and outdoor unit of all different types of air conditioners.

●To avoid voltage drops, when the cross sectional area of a power cable core reaches the minimum size, and the power cord is lengthened, you should choose another bigger power cable size.

The wiring cable specification that is needed in the installation: (Recommended specifications)

Series	Model	Recommended power cord (AWG)	Recommended communication cable	Switch/fuse nominal value(A)	Certification Type
Regular Series	ACiQ-18-HP-E-32	14	22AWG 1640ft (≤500m)	20	UL
	ACiQ-24-HP-E-32	12		25	
	ACiQ-30-HP-E-32	12		25	
	ACiQ-36-HP-E-32	12		30	
	ACiQ-48-HP-E-32	8		40	
	ACiQ-60-HP-E-32	8		45	

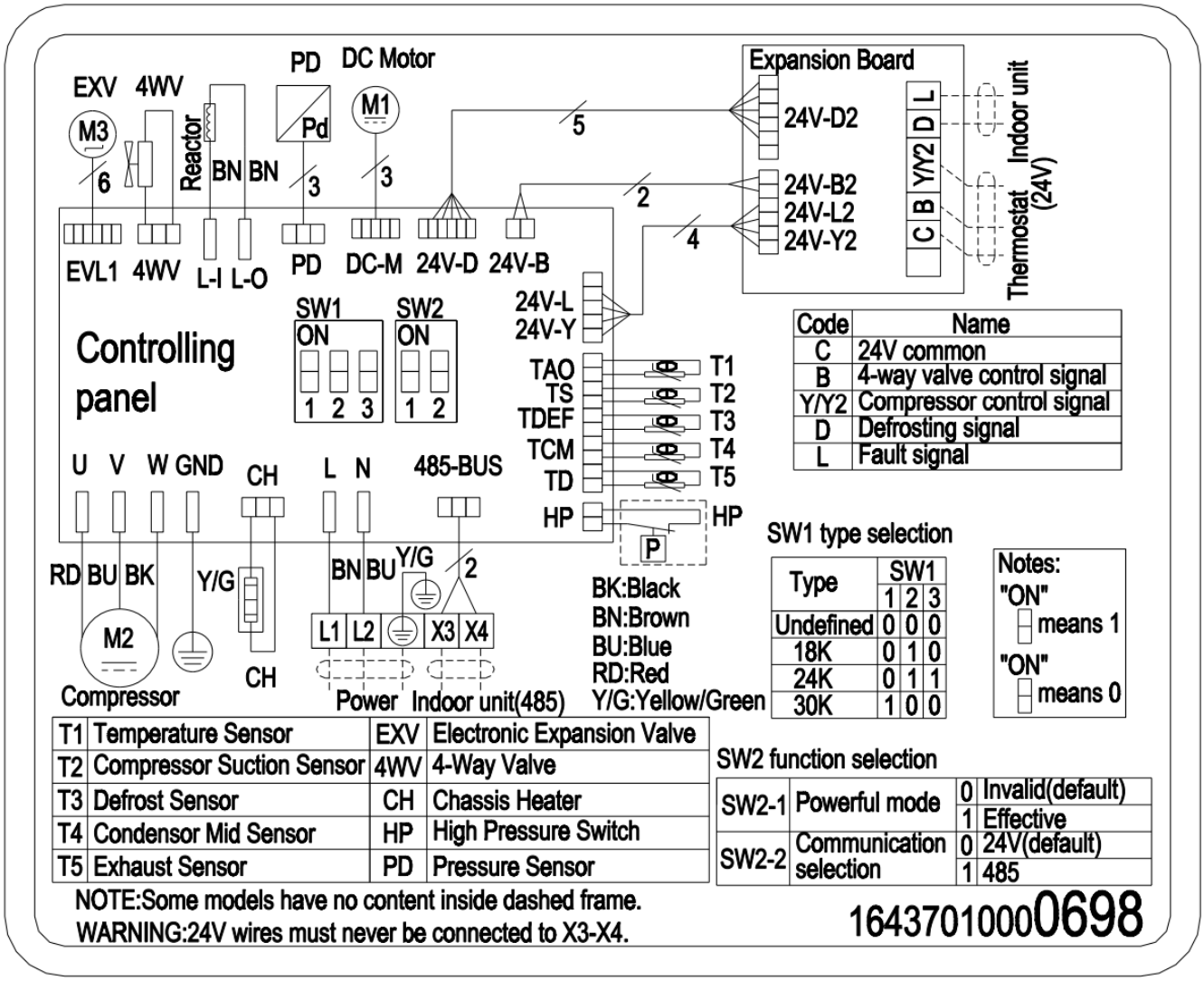
●If other than uncoated (non-plated) 75°C copper wire (solid wire for 10 AWG and smaller, stranded wire for larger than 10 AWG) is used consult applicable tables of the National Electric Code (ANSI/NFPA 70).

●Specifications of circuit breaker are based on a working condition where the working temperature is 40°C. If working condition changes, please adjust the specifications according to national standards.

2. Electrical Principle Diagram

2.1 Outdoor Unit

Standard Series: ACiQ-18-HP-E-32 & ACiQ-24-HP-E-32

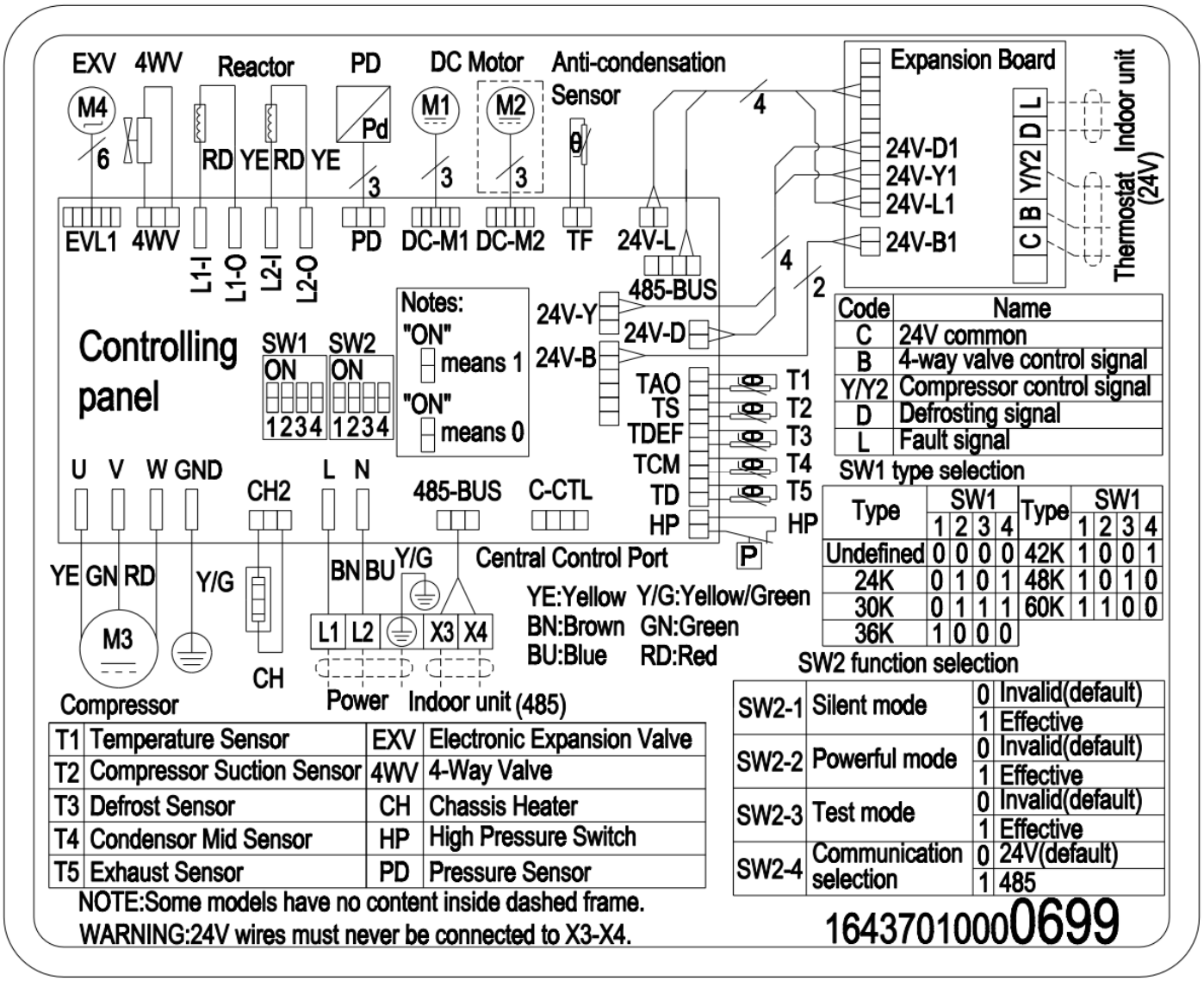


Remarks:

“SW2-2” for communication selection.

1. If the code is dialed to **0** (**24V(default)**), both 485 or 24V can be connected between the indoor units and outdoor units;
2. If the code is dialed to **1** (**485**), only 485 can be connected between the indoor units and outdoor units. If 24V is connected, it will cause communication failure;

Standard Series: ACiQ-30-HP-E-32, ACiQ-36-HP-E-32, ACiQ-48-HP-E-32, & ACiQ-60-HP-E-32



Remarks:

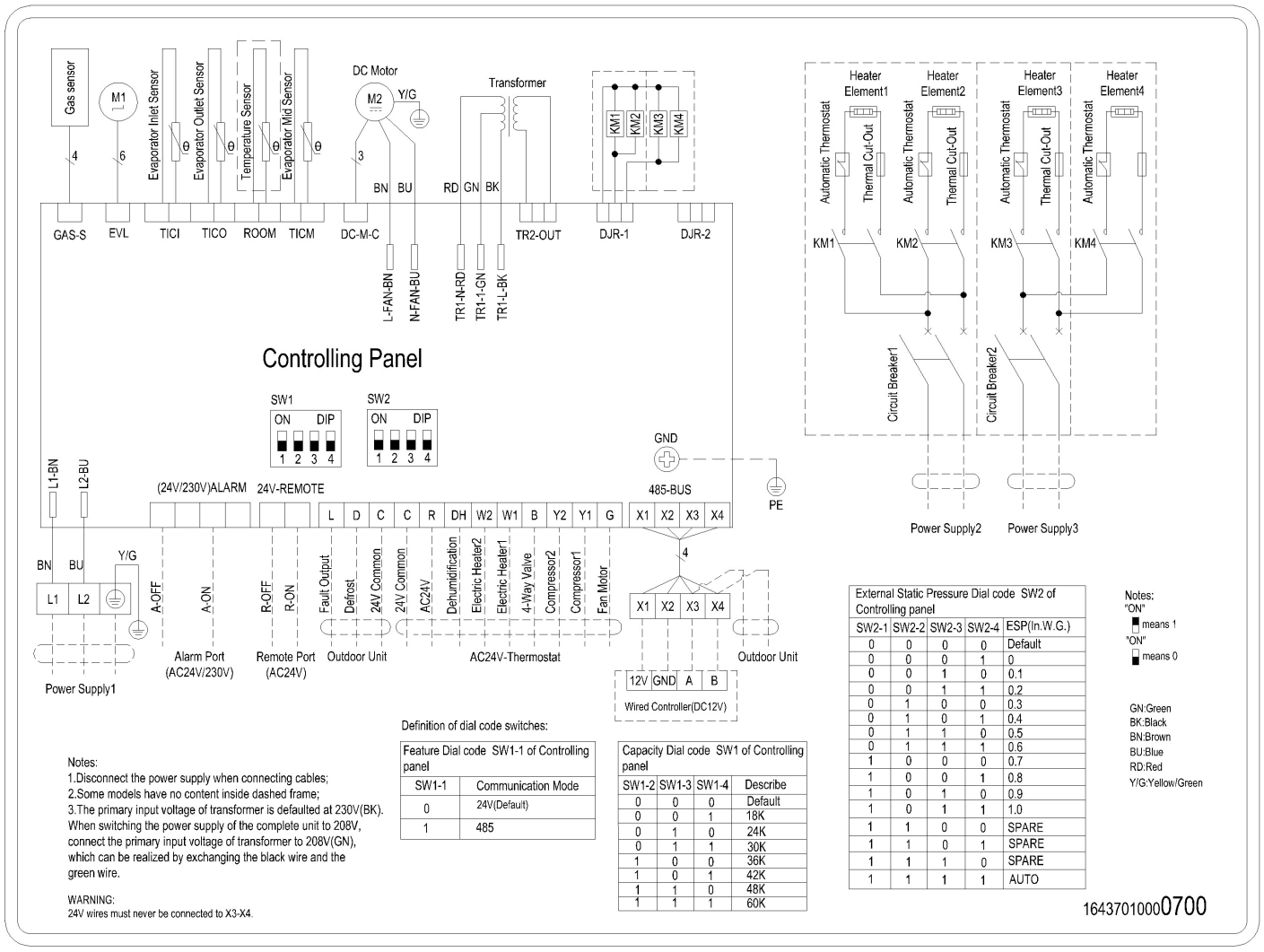
“SW2-4” for communication selection.

1. If the code is dialed to **0** (**24V(default)**), both 485 or 24V can be connected between the indoor units and outdoor units;

2.If the code is dialed to **1** (**485**), only 485 can be connected between the indoor units and outdoor units. If 24V is connected, it will cause communication failure;

2.2 Indoor Unit

Standard Series: ACiQ-18-AH-E-32, ACiQ-24-AH-E-32, ACiQ-30-AH-E-32, ACiQ-36-AH-E-32、ACiQ-48-AH-E-32, ACiQ-60-AH-E-32



Remarks:

“SW1-1” for communication selection.

1. If the code is dialed to **0** (**24V(default)**), both 485 or 24V can be connected between the indoor units and outdoor units;

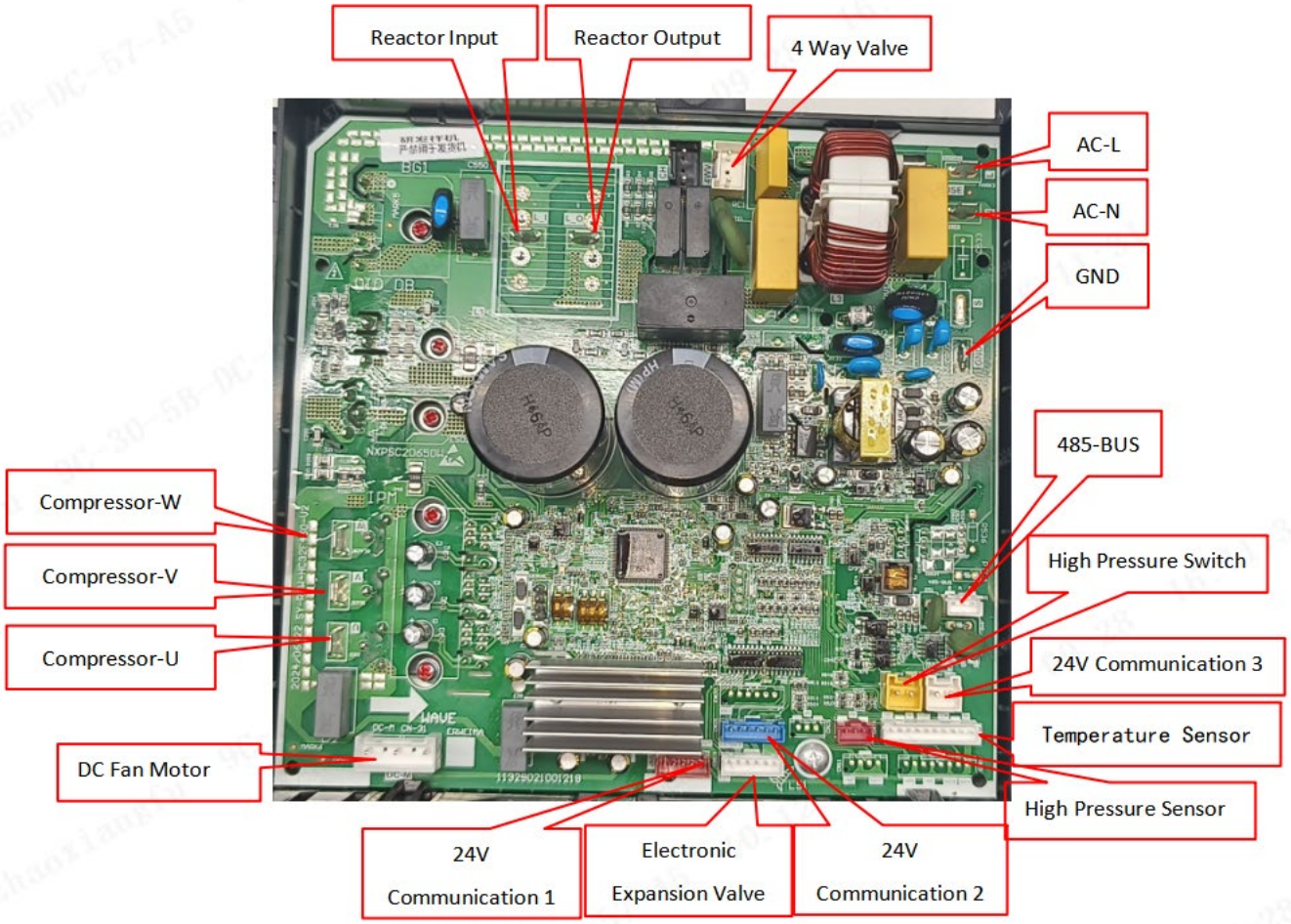
2.If the code is dialed to **1** (**485**), only 485 can be connected between the indoor units and outdoor units. If 24V is connected, it will cause communication failure;

3. PCB Image

3.1 Regular Series

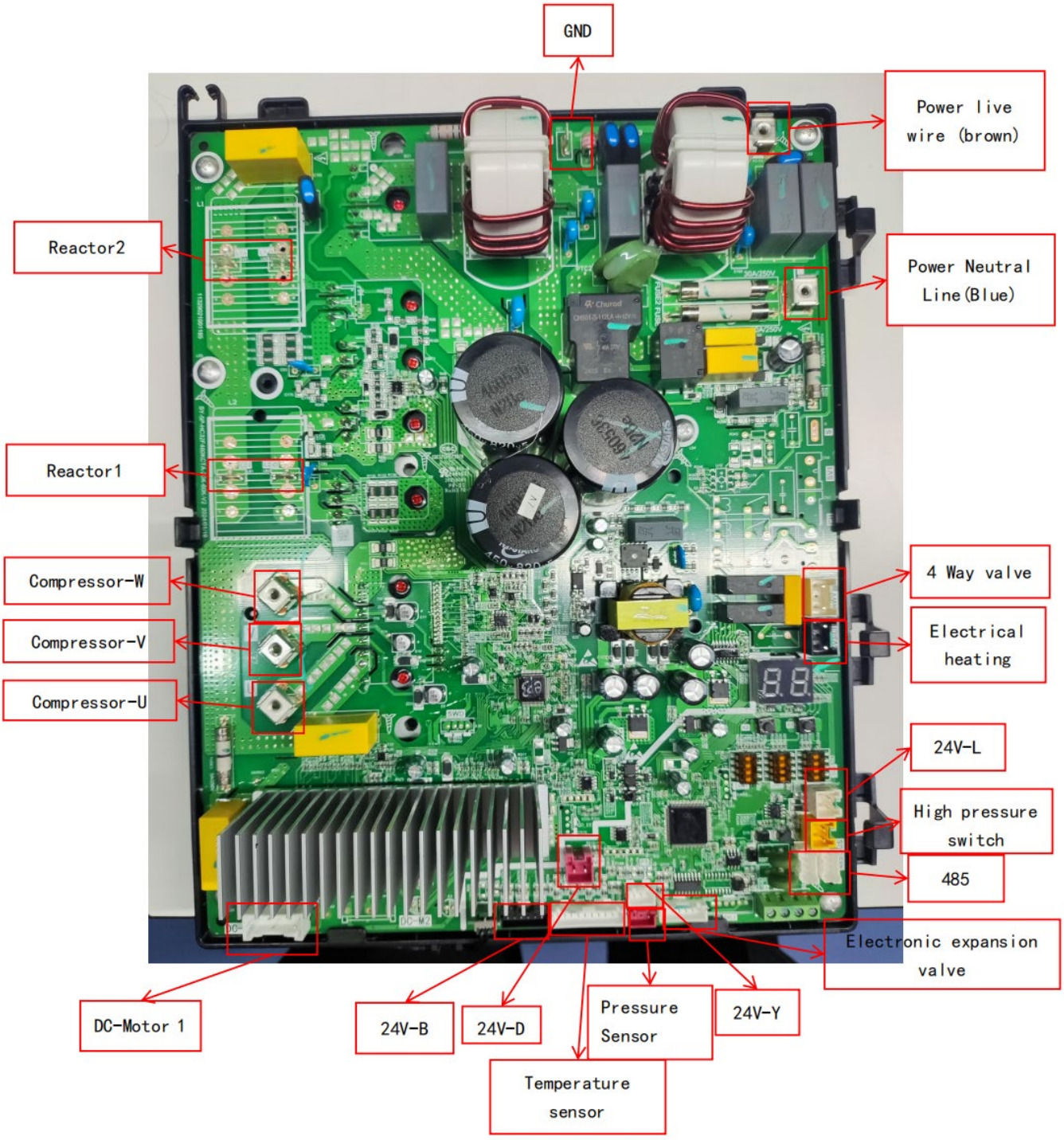
Outdoor Unit **18K & 24K**

11222550000102 Main control PCB R DYW-BP-DC2-1T1(24K)-E1(SY)



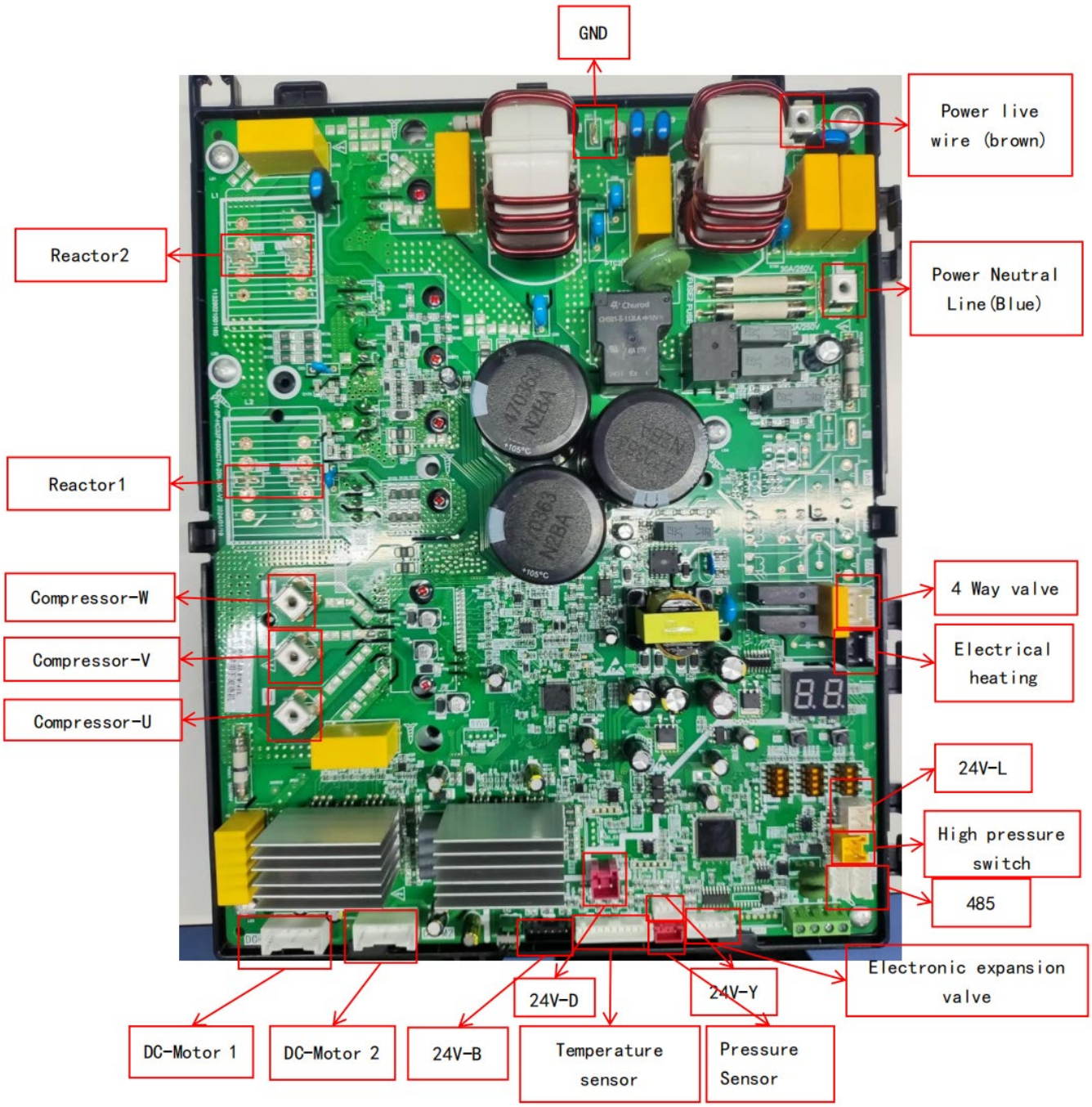
Outdoor Unit 30K & 36K

11222543000161 Driver PCB CJ QD-12301FKTM240D43UKP 36K-1(SY)



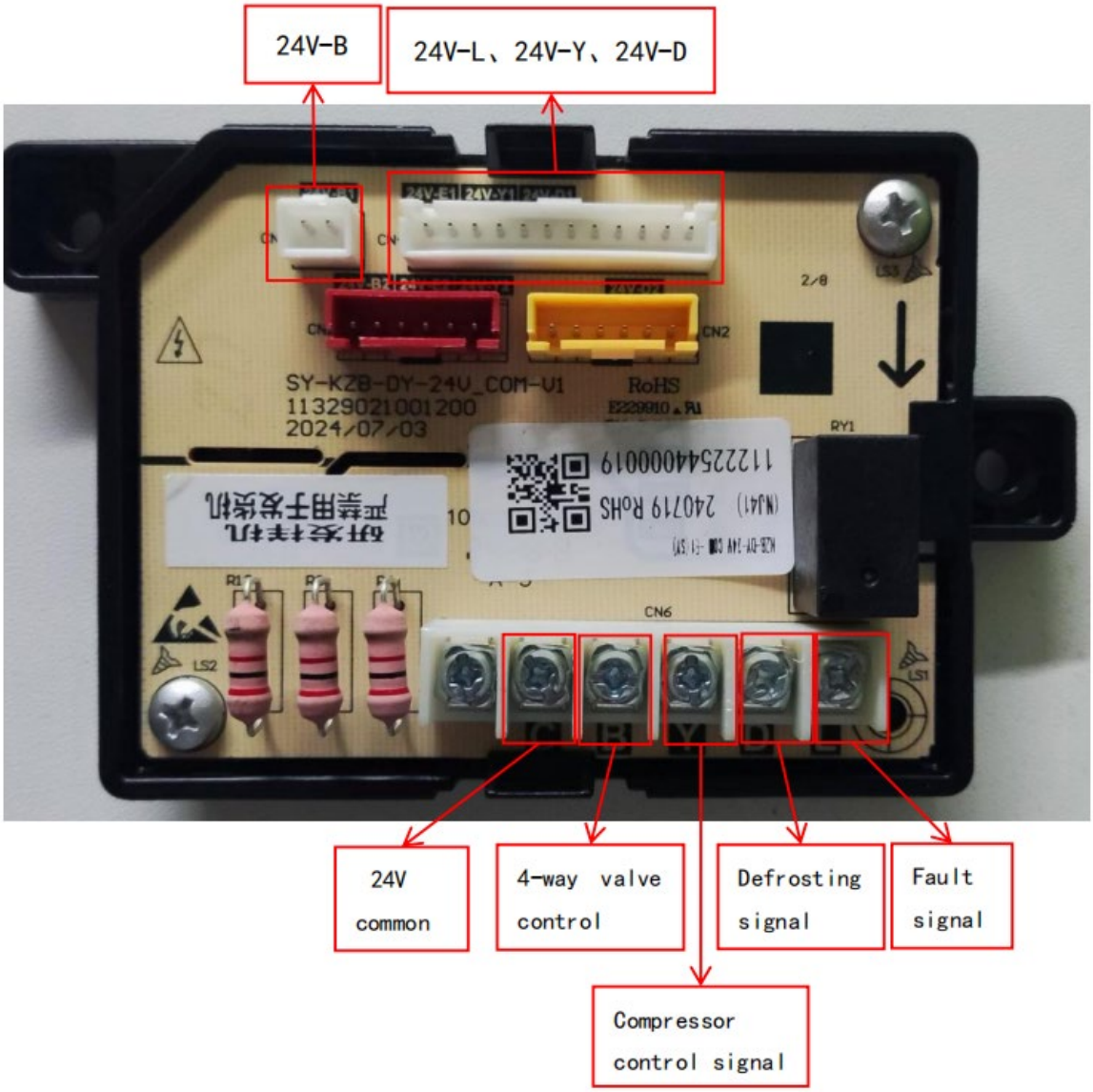
Outdoor Unit 48K & 60K

11222543000160 Driver PCB CJ QD-12322FKTF420D64UMVA 60K-1(SY)



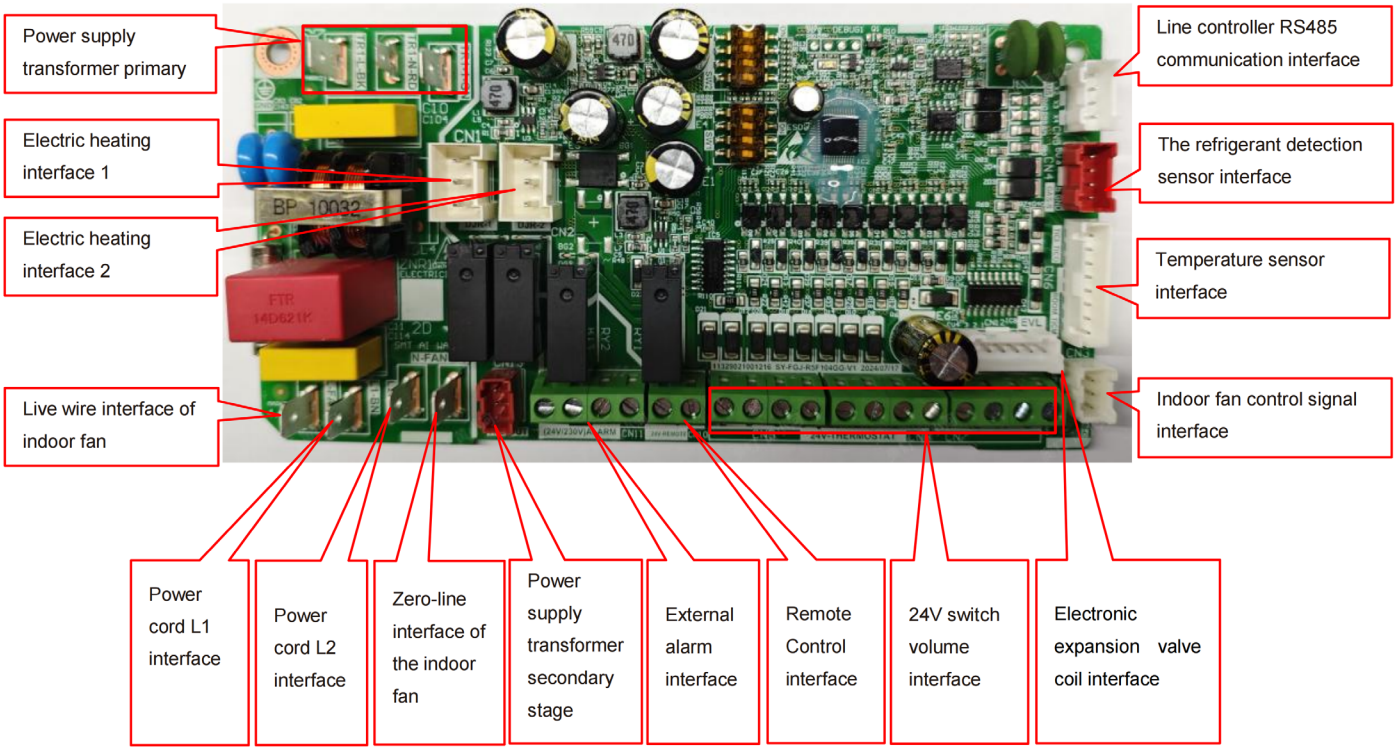
Outdoor Unit **18K, 24K, 30K, 36K, 48K, & 60K**

11222544000019 Expansion board CJ KZB-DY-24V_COM-E1(SY)



Indoor Unit 18K, 24K, 30K, 36K, 48K, & 60K

11222541000154 Control PCB CJ DYG-1H-DC02-E1(SY)

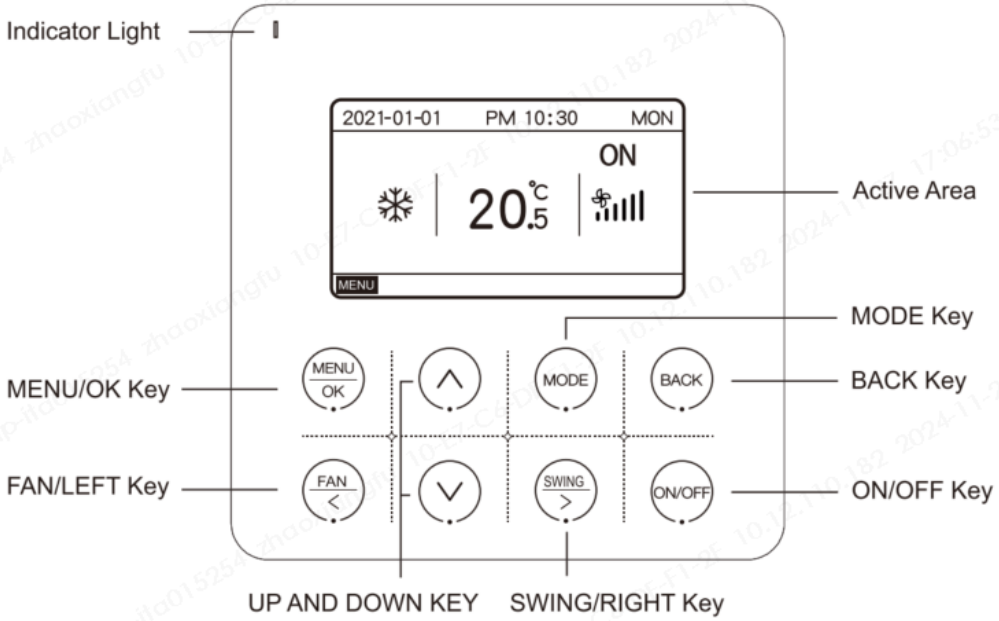


Section 7: Functions and Control

1.Controller Overview

Wired Controller XK-06

Overview

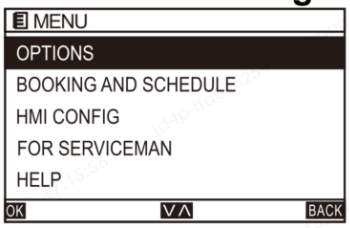
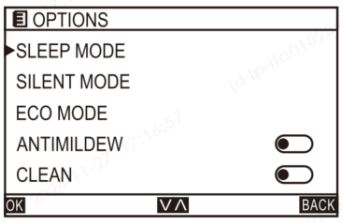


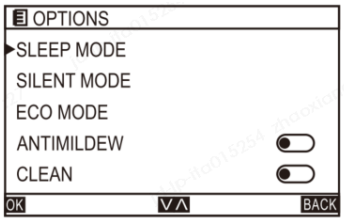
Main functions

- 8-key touch button input
- Display the failure of main controller
- LCD+white backlight

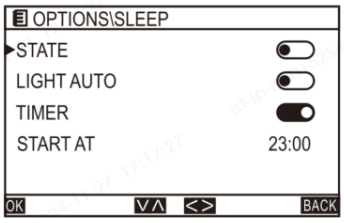
Icon Explanation

Icon	Name	Icon	Name	Icon	Name
	Cooling		Fan speed		Filter need
	Heating		Swing	50%	Power limit
	Dry		Sleep		Time booking
	Fan		Anti-mildew		WIFI
	Auto		Clean		Screen lock
	ECO		Fault		

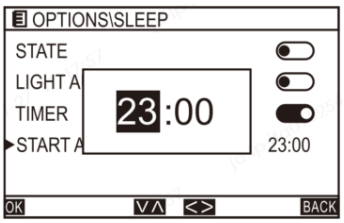
Function
1.Power【On/Off】 Press the【ON/OFF Key】, Control the unit on and off.
2.Mode Setting When the unit is running, press 【MODE/OK Key】, the running mode will switch according to the following order: AUTO → COOL → DRY → FAN → HEAT → Hot water heating → AUTO The initial setting temperature for each mode is 24 ℃, and there is no temperature setting and automatic wind under FAN mode. This is only for illustration, please refer to the actually displayed interfaces as final.
3.Temperature Setting When the unit is running, press " ∧ " or " ∨ " to increase or decrease the setting temperature by 0. 5℃ or 1℃/1℉.
4.Fan Setting When the unit is running, press 【FAN/LEFT Key】to switch fan speed in the following order: 4-gear of fan speed: Auto→Low→Medium→High→Super-high→Auto 6-gear of fan speed: Auto→Low→Med-Low→Medium→Med-High→High→Super-high→Auto Only Low is available under DRY mode, and there is no Auto setting under FAN mode.
5.Swing Setting When the unit is running, press 【SWING/RIGHT Key】to enter or cancel up and down swing. At the time of opening up and down swing," " is lighting. At the time of closed, swing icon will disappear.
6.Function Setting  On the home screen, press 【MENU/OK Key】 to enter the menu page. Switch to different sub menu by pressing " ∧ " or " ∨ ".
6.1 OPTIONS **6.1.1 SLEEP MODE**  On the MENU page, select OPTIONS and press the【MENU/OK Key】to enter the OPTIONS page. Switch to different sub menu by pressing " ∧ " or " ∨ ".



On the OPTIONS page, select SLEEP and press the【MENU/OK Key】to enter the SLEEP page.
Switch to different sub menu by pressing " ^ " or " v ".

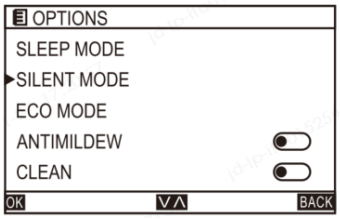


Select STATE and press the" < "or " > " to set On/Off.
Select LIGHT AUTO and press the" <"or " >" to set On/Off.
Select TIMER and press the" < "or " > " to set On/Off.

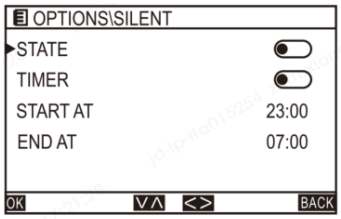


Select START AT and press the【MENU/OK Key】to start the time setting.
Press the" < "or " > " to select hour/minute, and press the " ^ "or " v " to set the clock.

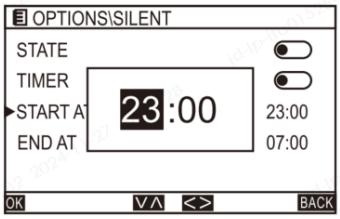
6.1.2 SILENT MODE



On the OPTIONS page, select SILENT and press the【MENU/OK Key】to enter the SILENT page.
Switch to different sub menu by pressing " ^ " or " v ".

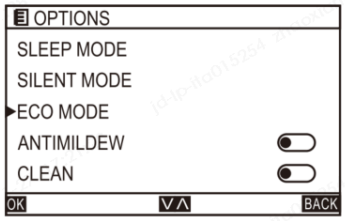


On the SILENT page, select STATE and press the" < "or " > " to set On/Off.
On the SILENT page, select TIMER and press the" < "or " > " to set On/Off.

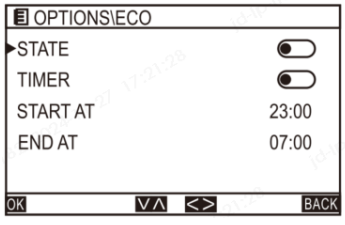


On the SILENT page, select START AT and press the【MENU/OK Key】to set the start time.
On the SILENT page, select END AT and press the【MENU/OK Key】to set the end time.
Press the" < "or " > " to select hour/minute, and press the " ^ "or " v " to set the clock.

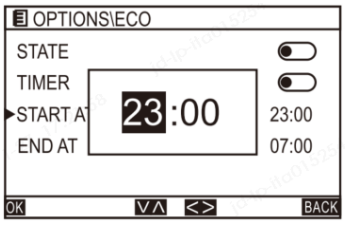
6.1.3 ECO MODE



On the OPTIONS page, select ECO and press the【MENU/OK Key】to enter the ECO page.
Switch to different sub menu by pressing " ^ " or " v ".

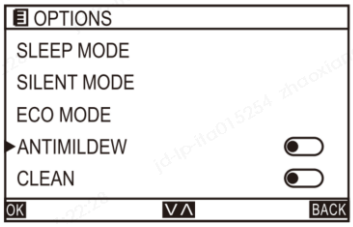


On the ECO page, select STATE and press the " < "or " > " to set On/Off.
On the ECO page, select TIMER and press the " < "or " > " to set On/Off.



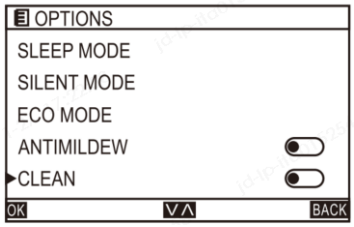
On the ECO page, select START AT and press the【MENU/OK Key】to set the start time.
On the ECO page, select END AT and press the【MENU/OK Key】to set the end time .
Press the" ❮ "or " ❯ " to select hour/minute, and press the " ^ "or " v " to set the clock.

6.1.4 ANTIMILDEW



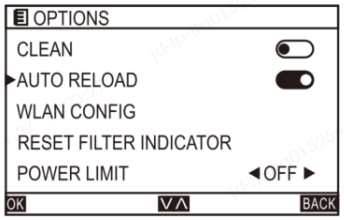
On the OPTIONS page, select ANTI-MILDEW and press the " ❮ "or " ❯ " to set On/Off.

6.1.5 CLEAN



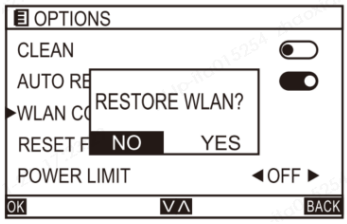
On the OPTIONS page, select CLEAN and press the " ❮ "or " ❯ " to set On/Off.

6.1.6 AUTO RELOAD

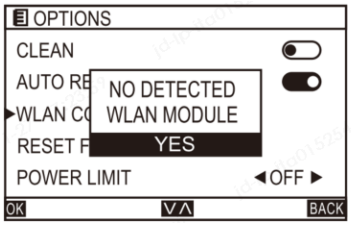


On the OPTIONS page, select AUTO RELOAD and press the " ❮ "or " ❯ " to set On/Off.

6.1.7 WLAN CONFIG

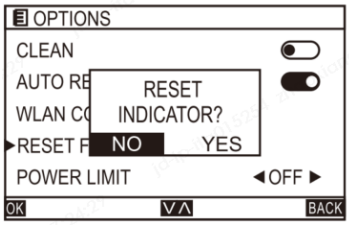


On the OPTIONS page, select WLAN CONFIG and press the【MENU/OK Key】.
Press the" ❮ "or " ❯ " to select YES/NO.

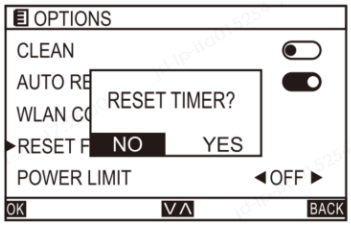


If the IDU is not connected to the WLAN Module, a prompt as shown in the figure will appear.
If the WLAN Module is connected successfully, " ᯤ "will be displayed on the home page.

6.1.8 RESET FILTER INDICATOR

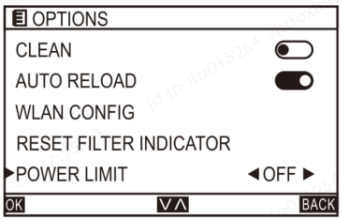


When the " ▦ " is dispiayed, select RESET FILTER INDICATOR on the OPTIONS page and press the【MENU/OK Key】to reset indicator.



When the " ▦ " is disappeared, select RESET FILTER INDICATOR on the OPTIONS page and press the【MENU/OK Key】to reset timer.

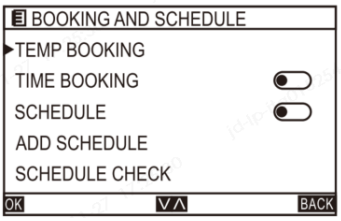
6.1.9 POWER LIMIT



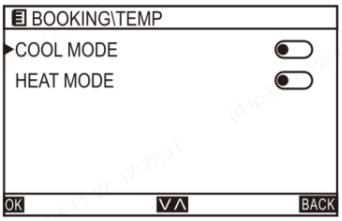
On the OPTIONS page, select POWER LIMIT and press the " ❮ "or " ❯ " to select the different level according to the following order:
OFF→30%→40%→50%→60%→70%→80%→90%→100%→OFF

6.2 BOOKING AND SCHEDULE

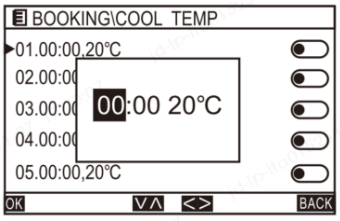
6.2.1 TEMP BOOKING



On the MENU page, select BOOKING AND SCHEDULE and press the【MENU/OK Key】to enter the BOOKING AND SCHEDULE page. Switch to different sub menu by pressing " ⮝ " or " ⮟ ".

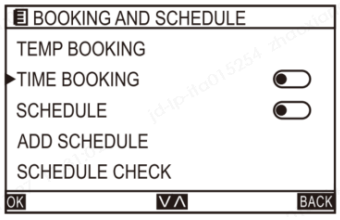


On the BOOKING AND SCHEDULE page, select TEMP BOOKING and press the【MENU/OK Key】to enter the TEMP BOOKING page. Switch to different sub menu by pressing " ⮝ " or " ⮟ ".

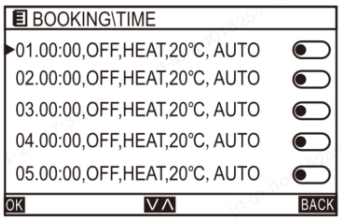


On the TEMP BOOKING page, select COOL MODE/HEAT MODE and press the【MENU/OK Key】to enter the COOL MODE/HEAT MODE page.
Press the" ❮ "or " ❯ " to set the temperature and timing time.

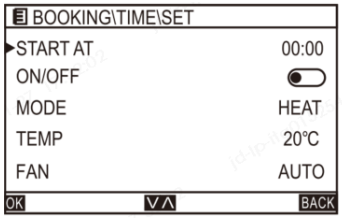
6.2.2 TIME BOOKING



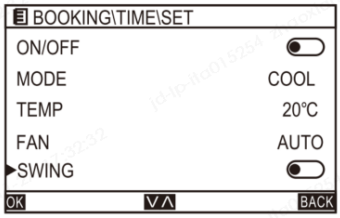
On the BOOKING AND SCHEDULE page, select TIME BOOKING and press the【MENU/OK Key】to enter the TIME BOOKING page. Switch to different sub menu by pressing " ⮝ " or " ⮟ ".



On the TIME BOOKING page, select any one and press the【MENU/OK Key】to enter the SET page.
Switch to different sub menu by pressing " ^ " or " v ".

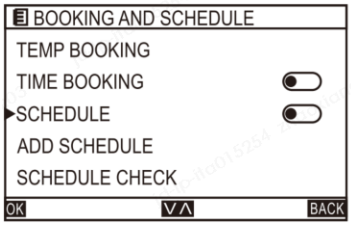


On the SET page, select START AT and press the【MENU/OK Key】to start the time setting. Press the" < "or " > " to select hour/minute, and press the " ^ "or " v " to set the clock.

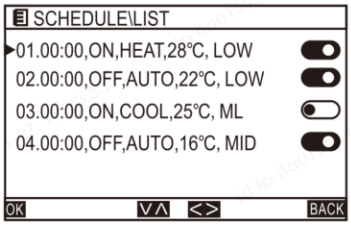


Select ON/OFF and press the" < "or " > " to set the IDU On/Off.
Select MODE and press the" < "or " > " to select the IDU operation mode.
Select TEMP and press the" < "or " > " to set the IDU temperature.
Select FAN and press the" < "or " > " to set the IDU fan speed.
Select SWING and press the" < "or " > " to set the IDU swing.

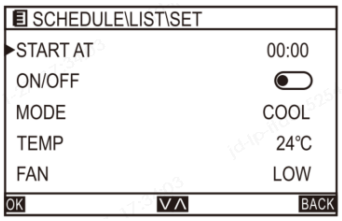
6.2.3 SCHEDULE



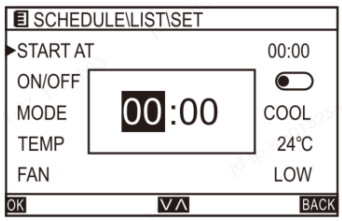
On the BOOKING AND SCHEDULE page, select SCHEDULE and press the【MENU/OK Key】to enter the SCHEDULE page.
Switch to different sub menu by pressing " ^ " or " v ".



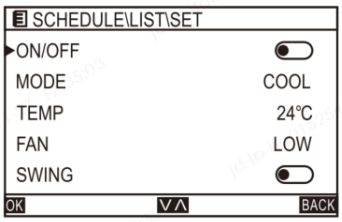
On the SCHEDULE page, select any one and press the【MENU/OK Key】to enter the LIST page.
Switch to different sub menu by pressing " ^ " or " v ".



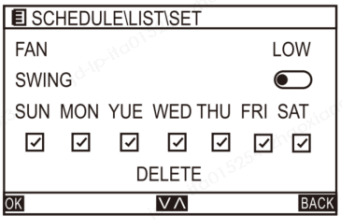
On the LIST page, select any one and press the【MENU/OK Key】to enter the SET page.
Press the" < "or " > " to select hour/minute, and press the " ^ "or " v " to set the clock.



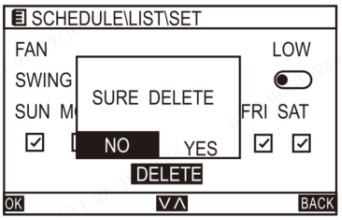
On the SET page, select START AT and press the【MENU/OK Key】to start the time setting. Press the" < "or " > " to select hour/minute, and press the " ^ "or " v " to set the clock.



Select ON/OFF and press the" ❮ "or " ❯ " to set the IDU On/Off.
Select MODE and press the" ❮ "or " ❯ " to select the IDU operation mode.
Select TEMP and press the" ❮ "or " ❯ " to set the IDU temperature.
Select FAN and press the" ❮ "or " ❯ " to set the IDU fan speed.
Select SWING and press the" ❮ "or " ❯ " to set the IDU swing.

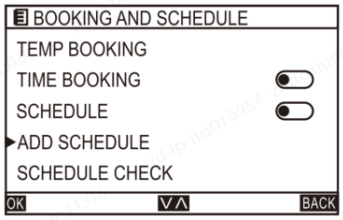


Select WEEK and press the【MENU/OK Key】whether to select.
" ☑ " means valid.

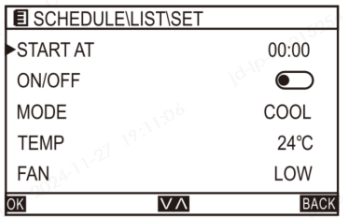


Select DELETE and press the【MENU/OK Key】, the following prompts will appear.
Press the" ❮ "or " ❯ " to select YES/NO.

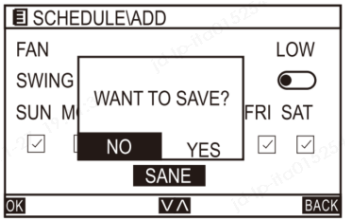
6.2.4 ADD SCHEDULE



On the BOOKING AND SCHEDULE page, select ADD SCHEDULE and press the【MENU/OK Key】to enter the ADD SCHEDULE page.
Switch to different sub menu by pressing " ⌃ " or " ⌄ ".

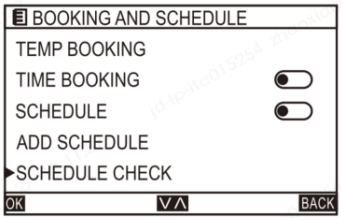


The setting method is the same as the SCHEDULE setting.

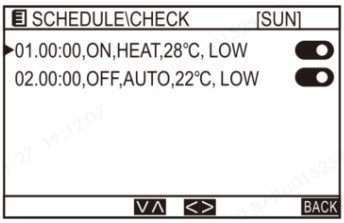


When the settings are complete, select SAVE by pressing the " ⌃"or " ⌄", and press the【MENU/OK Key】, the following prompts will appear.
Select YES, then the settings are valid, otherwise, it does not take effect.

6.2.5 SCHEDULE CHECK

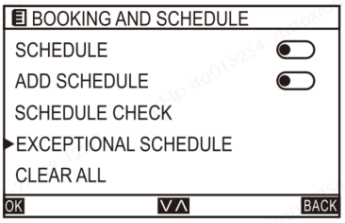


On the BOOKING AND SCHEDULE page, select SCHEDULE CHECK and press the【MENU/OK Key】to enter the SCHEDULE CHECK page.
Switch to different sub menu by pressing " ⌃ " or " ⌄ ".

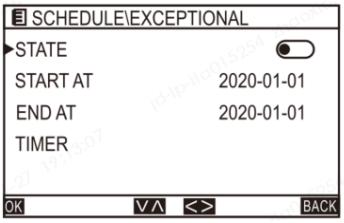


On the SCHEDULE CHECK page, switch weekly schedule by press the " ❮ "or " ❯ ".
The weekly schedule is displayed on the title bar, and the page is displayed according to the content of the schedule setting.

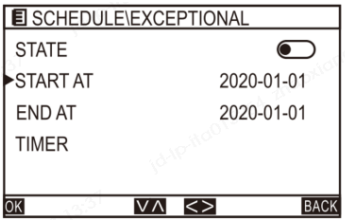
6.2.6 EXCEPTIONAL SCHEDULE



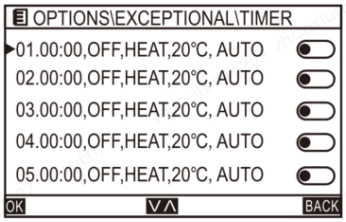
On the BOOKING AND SCHEDULE page, select EXCEPTIONAL SCHEDULE and press the【MENU/OK Key】to enter the EXCEPTIONAL SCHEDULE page.
Switch to different sub menu by pressing " ⌃ " or " ⌄ ".



On the EXCEPTIONAL page, select STATE and press the " ❮ "or " ❯ " to set On/Off.

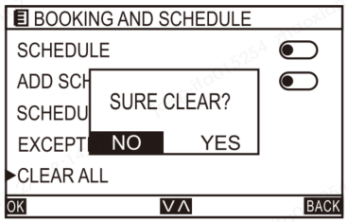


On the EXCEPTIONAL page, select START AT and press the【MENU/OK Key】to set the start time.
On the EXCEPTIONAL page, select END AT and press the【MENU/OK Key】to set the end time.



Press the" ❮ "or " ❯ " to select year/month/day, and press the " ⌃ "or " ⌄ " to set the date.
The setting method is the same as the SCHEDULE setting.

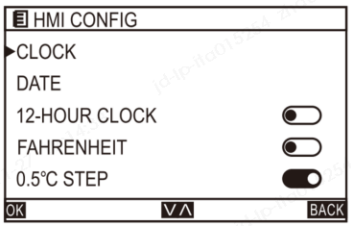
6.2.7 CLEAR ALL



On the BOOKING AND SCHEDULE page, select CLEAR ALL and press the【MENU/OK Key】,the following prompts will appear.
Press the" ❮ "or " ❯ " to select YES/NO.

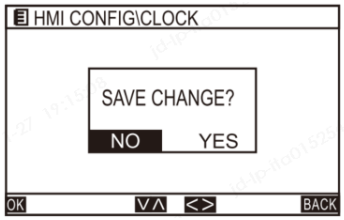
6.3 HMI CONFIG

6.3.1 CLOCK



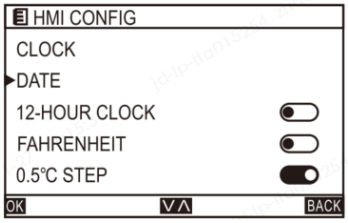
On the MENU page, select HMI CONFIG and press the【MENU/OK Key】to enter the HMI CONFIG page.
Switch to different sub menu by pressing " ⌃ " or " ⌄ ".

On the HMI CONFIG page, select CLOCK and press the【MENU/OK Key】to set the time. Press the" ❮ "or " ❯ " to select hour/minute/ second, and press the " ⌃ "or " ⌄ " to set the clock.

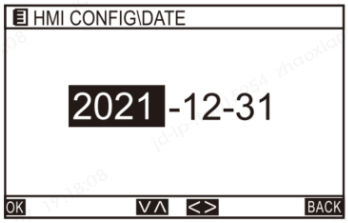


After the clock is changed, press the【MENU/OK Key】,the following prompts will appear. Press the" ❮ "or " ❯ " to select YES/NO.

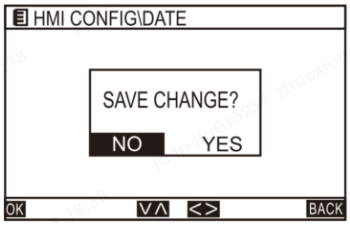
6.3.2 DATE



On the HMI CONFIG page, select DATE and press the【MENU/OK Key】to enter the DATE page.
Switch to different sub menu by pressing " ⌃ " or " ⌄ ".

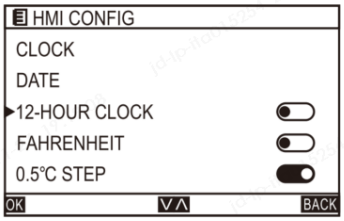


On the DATE page, press the" ❮ "or " ❯ " to select year/month/day, and press the " ⌃ " or " ⌄ " to set the date.



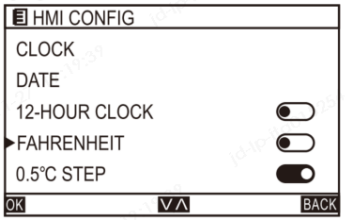
After the date is changed, press the【MENU/OK Key】,the following prompts will appear. Press the" ❮ "or " ❯ " to select YES/NO.

6.3.3 12-HOUR CLOCK



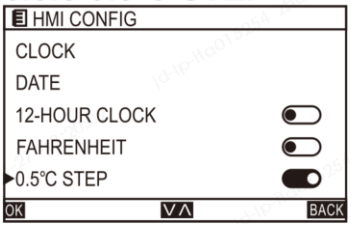
On the HMI CONFIG page, select 12-HOUR CLOCK and press the " ❮ "or " ❯ " to set On/Off.

6.3.4 FAHRENHEIT



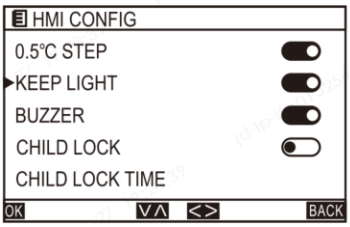
On the HMI CONFIG page, select FAHRENHEIT and press the " ❮ "or " ❯ " to set On/Off.

6.3.5 0.5℃ STEP



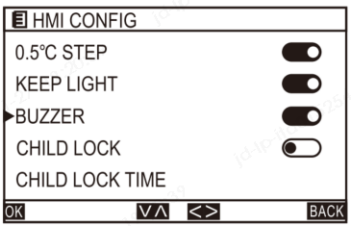
On the HMI CONFIG page, select 0.5℃ STEP and press the " ❮ "or " ❯ " to set On/Off.

6.3.6 KEEP LIGHT



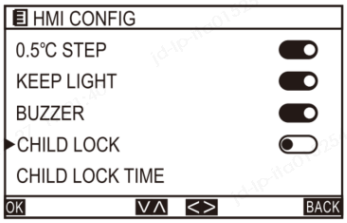
On the HMI CONFIG page, select KEEP LIGHT and press the " ❮ "or " ❯ " to set On/Off.

6.3.7 BUZZER



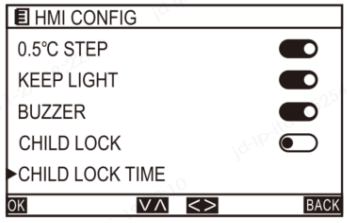
On the HMI CONFIG page, select BUZZER and press the " ❮ "or " ❯ " to set On/Off.

6.3.8 CHILD LOCK



On the HMI CONFIG page, select CHILD LOCK and press the " ❮ "or " ❯ " to set On/Off.

6.3.9 CHILD LOCK TIME

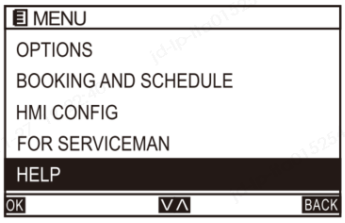


On the HMI CONFIG page, select CHILD LOCK TIME and press the " ❮ "or " ❯ " to set the time. The time range is 10~120s (default 60s).

6.4 FOR SERVICEMAN

Enter FOR SERVICEMAN page requires the password, and this only for serviceman.

6.5 HELP



On the MENU page, select HELP and press the 【MENU/OK Key】to enter the HELP page.

More information please refer to Wired Controller Installation & User's Manual.

2. Functions & Control Description

2.1 Abbreviation and Meaning

TA: Indoor ambient temperature (compensated indoor ambient temperature (rounded))
T: Indoor ambient temperature (uncompensated indoor ambient temperature (rounded)
TE: Indoor evaporator temperature
Tset: Set temperature (after sleep compensation and strong compensation)
TAO: Outdoor ambient temperature
TDEF: Defrosting temperature
TCM: Outdoor coil middle temperature
TD: Exhaust temperature
TS: Suction temperature

2.2 24V Control

Compatible with both 24V control and 485 communication control, when there are two types of control signals present, 24V control is preferred.

1) 24V Control logic

Indoor unit 24V connector

Connector	Purpose
R	24V AC power supply
C	24V Common
G	Fan Control
Y1	Low cooling
Y2	High cooling
B	Heating reversing Valve
W1	Stage 1 Electric Heating
W2	Stage 2 Electric Heating
DH	Dehumidification
D	Defrosting signal
L	Fault signal

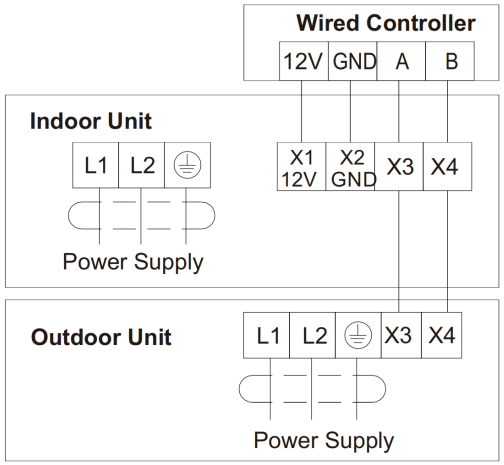
Outdoor unit 24V connector

Connector	Purpose
C	24V Common
Y/Y2	High cooling
B	Heating reversing Valve
D	Defrosting signal
L	Fault signal

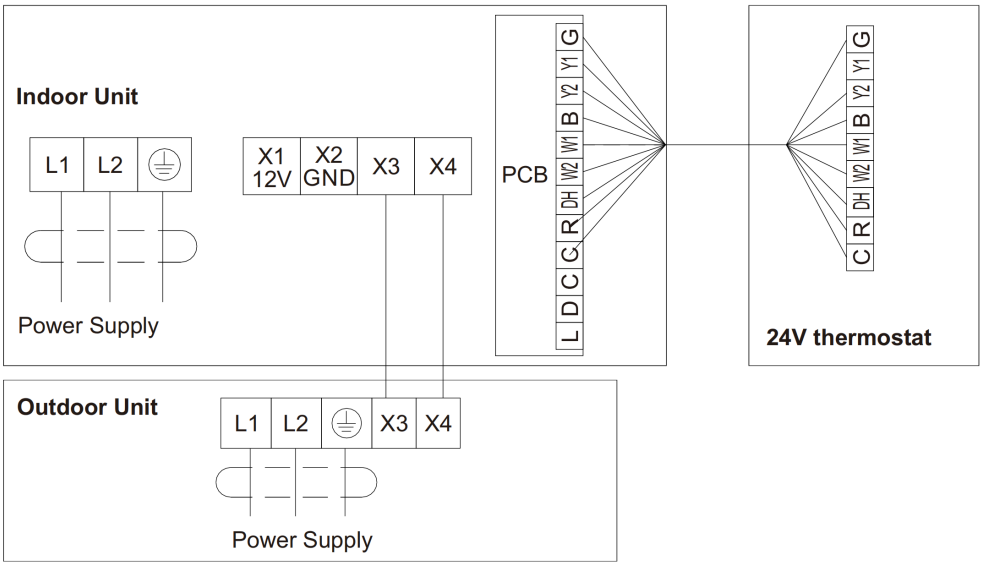
NOTE: When outdoor defrosts, D of outdoor unit will send 24V signal to avoid cold winds.
NOTE: When refrigerant leakage in the indoor unit, L of the indoor unit will send 24V signal to shut down the Outdoor unit

2) RS485 Communication and 24V Control wiring

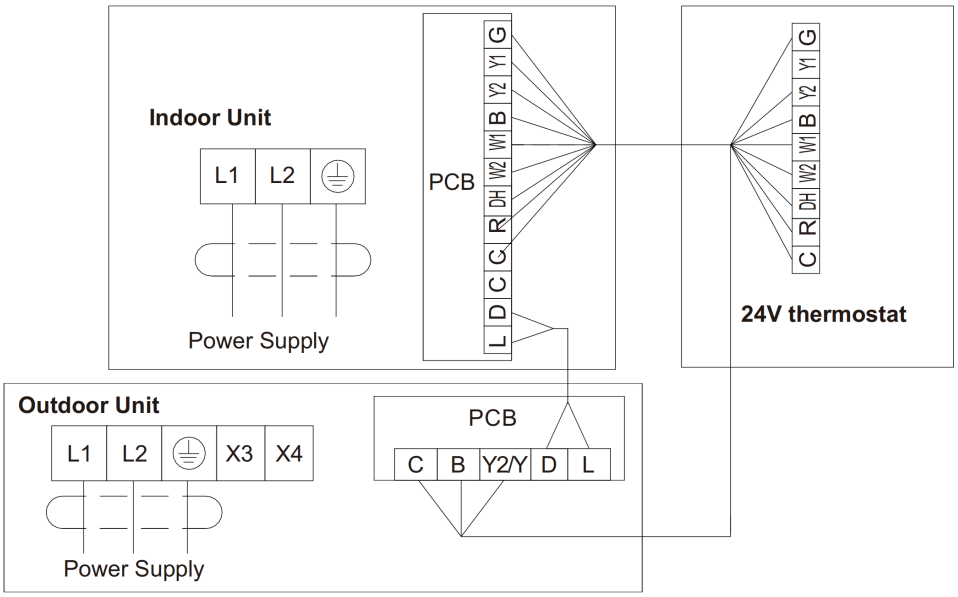
Rs485 Communication



Rs485 communication with 24V thermostat



24V Communication



3) 24V control operation mode

Mode	24V input terminal							
	G	Y1	Y2	B	W1	W2	DH	Fan speed
OFF	0	0	0	0	0	0	0	OFF
FAN	1	0	0	*	*	*	0	High
	*	0	0	*	*	*	1	LOW
COOLING	*	1	0	0	*	*	0	Med
	*	*	1	0	*	*	0	High
Dehumidification	*	1	0	0	*	*	1	Low
		*	1		*	*		
HEATING	*	1	0	1	0	0	*	Med
	*	*	1	1	0	0	*	High
HEATING+ Electric heater kit 1	*	1	0	1	1	0	*	High
		*	1					
HEATING+ Electric heater kit 1+ Electric heater kit 2	*	1	0	1	*	1	*	High
		*	1					

Note: 1: 24V signal； 0: No 24V signal； *: 1 or 0.
The AHU will turn off if the 24V input cannot meet the table.
Electric heating cannot be turned on when not in the heating mode.

2.3 ESP adjust

The air handler is equipped with an adjustable static pressure setting.

The static pressure can be changed by dip the SW2 in the indoor PCB. The available settings are shown in the table below.

External Static Pressure Dial code SW2 of Controlling panel				
ESP(In.WG)	SW2-1	SW2-2	SW2-3	SW2-4
Default	0	0	0	0
0	0	0	0	1
0.1	0	0	1	0
0.2	0	0	1	1
0.3	0	1	0	0
0.4	0	1	0	1
0.5	0	1	1	0
0.6	0	1	1	1
0.7	1	0	0	0
0.8	1	0	0	1
0.9	1	0	1	0
1.0	1	0	1	1

The air handler will be set to default (0.50 ESP) from the factory

2.4 Ventilation mode

1) After the ventilation mode is turned on, the IDU fan operates at the set wind speed, the compressor and ODU fan are shut down, the wired control displays the current ambient temperature,and the temperature setting on the remote control is not adjustable;

2) Wind speed range: strong wind, high-speed wind, medium-speed wind, low-speed wind, automatic wind;

3) In this mode, there is a timer power-off memory (if any)

2.5 Cooling mode

1) The Tset range of wired controller is 60.8℉~89.6℉(16℃~32℃)

2) Wind speed range: strong wind, high-speed wind, medium speed wind, low-speed wind, automatic wind;

3) In this mode, there are timer, sleep , power-off memory (if any), ECO function;

4) Compressor start: The IDU start, and the temperature meets the TA -Tset >= 32.9℉(0.5℃);

5) Compressor shutdown: The IDU shut down or temperature meets the TA-Tset<=28.4℉(-2℃);

6) Compressor operating frequency: Within 5 minutes of starting the compressor, it is the initial frequency control stage. After 5 minutes, it enters the evaporation pressure closed-loop control stage. The frequency is adjusted according to the evaporation pressure , and the upper limit of operating frequency is affected by the outdoor environmental temperature;

7) Electronic expansion valve: Control according to the initial opening within 3 minutes of startup, and enter the closed-loop control of the suction and exhaust super heat after 3 minutes;

8) Four way valve: Keep closed;

9) Outdoor fan: Determine the starting speed of the outdoor fan based on the outdoor ambient temperature. After 30 seconds, the outdoor fan enters the condensation temperature closed-loop speed control.

2.6 Heating mode

1) The Tset range of wired controller is 60.8℉~89.6℉(16℃~32℃)

2) Wind speed range: strong wind, high-speed wind, medium speed wind, low-speed wind, silent wind, automatic wind;

3) In this mode, there are timer, sleep power-off memory (if any), and ECO function;

4) Compressor start: The IDU is turned on, and the temperature meets the Tset - T A>=32.9℉(0.5℃);

5) Compressor shutdown: The IDU is turned off, or temperature meets the Tset - T A<=28.4℉(-2℃);

6) Compressor operating frequency: the compressor starts within 5 minutes for the initial frequency control stage, 5 minutes after entering the condenser pressure closed-loop control stage, the frequency is adjusted with the icon denser pressure, the upper limit of the operating frequency is affected by the outdoor environment temperature;

7) Electronic expansion valve: Control according to the initial opening within 3 minutes of startup, and enter the closed-loop control of the suction and exhaust super heat after 3 minutes;

8) Four-way valve: Keep open

9) Outdoor fan: The starting speed of the outdoor fan is determined based on the outdoor ambient temperature. After 30 seconds, it enters the speed closed-loop control and adjusts the speed according to the condensation temperature or pressure

2.7 Dehumidification mode

1) The Tset range of wired controller is 60.8℉~89.6℉(16℃~32℃);

2) The wind speed is forced to blow low,regardless of whether the compressor is running;

3) In this mode, there are timer, sleep power-off memory (if any), and ECO function;

2.8 Automatic mode

After the air conditioner enters automatic mode, according to △T(△T =TA-Tset) and TAO judgment the operating mode .Within 20 seconds, it will be forced to blow low air in ventilation mode, and then the air conditioner will run in the selected mode,and the wind speed is set by the wired controller

After selecting the mode, it will not change with changes in indoor temperature. After turning off, the operating mode will be re selected when turning on. The rules for determining the operating mode are as follows:

When TAO ≤55.4℉(13℃), operate in heating mode,

When 55.4℉(13℃)<TA<80.6℉(27℃), according to △T judgment the operating mode,

When TA≥80.6℉(27℃),operate in cooling mode,

In this mode, there are timer, sleep, and power-off memory (reserved)

2.9 Anti cold air control

When starting the heating system, stopping the machine at the temperature point to resume heating, and defrosting, when the compressor starts running, blow low-speed air for a maximum of 2 minutes to prevent blowing cold air and affecting user comfort.

2.10 Blowing waste heat control

Stop heating at the temperature point, stop heating, and stop the compressor. After the compressor stops running, the IDU fan runs at low speed for a maximum of 30 seconds.

After that, the IDU fan stops running, allowing excess heat in the air conditioner to be blown out to prevent safety issues.

Attention: If the electric heating has been turned on for at least 3 minutes during the heating operation, the internal fan needs to run for at least 60 seconds before stopping, starting from when the electric heating is turned off

2.11 Intelligent defrosting control

Run in heating mode, and the outside will detect frost formation. When the compressor runs continuously for 5 minutes, the exhaust temperature and outdoor coil temperature are detected to be too low, and the defrost will be carried out

After the heating enters defrosting, the electric heating is immediately turned off. After about 1 minute, the IDU fan stops, after exiting the defrosting process, the function is executed according to the normal heating function.

2.12 Sleep function:

1. Sleep function can be set during automatic, cooling, dehumidification, and heating operation.

2. After entering the sleep function, the air conditioner automatically adjusts the operating temperature and wind speed, and turns off the lights. After exiting sleep, run in normal mode.

2.13 Timer function:

When turned on, the timer can be set to turn off, and when turned off, the timer can be set to turn on. After the scheduled time, it will automatically shut down or turn on.

Set the timing interval based on the wired controller.

2.14 Power failure memory control function

The air conditioner is set default with power-off memory function from the factory, it can be canceled by setting the 8 # parameter through the remote control.

The contents of power-off memory: power on/off, operating mode, wind speed, set temperature.

After successfully setting the power-off memory, the internal unit will run in the pre power-off running state when powered on again.

If there is 24V control, 24V control takes priority and does not execute power down memory.

2.15 Seven levels of limiting electricity usage

Note: When there is no 485 communication between the IDU and ODU, this function is invalid. Whether the ODU communication protocol supports RS485 communication shall prevail.

The power limit ratio of the air conditioning unit can be set through the wired controller to control the whole unit's power consumption. Currently, the wired controller allows a power limit range of 30% -100%(OFF→30%→40%→50%→60%→70%→80%→90%→OFF). When the power limit is below 50% during heating operation, the IDU is not allowed to turn on the auxiliary electric heating.

1) Starting conditions:

In cooling and heating modes (excluding cooling and heating in automatic mode), when receiving a power limit signal from the wired controller, the IDU will send the corresponding power limit ratio to the ODU.

2) Exit conditions:

When shutting down, switching to mode, or testing mode, this function will be exited.

2.16 Chassis electrical heating

1) Starting conditions:

The ODU has a chassis heating belt;

When the compressor is turned on, and the outdoor ambient temperature is ≤ 0 ℃, the chassis electrical heating function is turned on.

2) Duration:

Once the chassis electrical heating stops, it will stop for at least 4 minutes.

The chassis electrical heating must run for at least 4 minutes before it is turned off.

3) Exit conditions:

When the outdoor ambient temperature is＞0 ℃, the chassis electrical heating function is turned off.

2.17 Protection function

【1】 Indoor sensor on/short circuit protection

1) When a short circuit of the indoor temperature sensor is detected for 3 consecutive seconds, a short circuit fault of the temperature sensor is reported.

2) When the temperature sensor is detected to be restored, clear the fault.

3) The fault codes can be found in the fault code table for each model.

【2】 Indoor fan fault feedback protection

1) When the indoor motor is started and no pulse signal feedback from the indoor motor is detected or the speed is less than 100rpm for a period of time, a fan fault is reported, and the controller enters standby mode. At the same time, the digital tube indicates the corresponding fault code.

2) After the fault is reported, the shutdown command is received. After the air conditioning is turned off for a period of time, the fault is resolved.

3) The fault codes can be found in the fault code table for each model.

【3】 Communication fault protection

Internal and external communication fault detection:

When there is an internal and external communication fault, it lasts for 90 seconds and the display light board reports "E5" fault code;

When 24V control (factory default): the power supply defaults to blocking 485 communication faults,when 485 signals are detected from the internal and external units, subsequent communication faults will be detected normally.

When 485 communication: normally check communication faults.

【4】 Sensor fault handling

When there is a malfunction of the IDU temperature sensor, the IDU may not stop and some functions can continue to operate, but a fault code will be displayed to notify after-sales maintenance.

【5】 Query function

IDU can remember 3 historical faults, and can be queried through the line controller.

Please refer to the instruction manual of the line controller for specific operations.

【6】 Refrigerant leakage protection

When the concentration of refrigerant leakage detected reaches a certain value, refrigerant leakage protection occurs.

1) If the electric auxiliary heating is running, turn off the electric auxiliary heating.

2) The indoor unit’s fan will operate at a strong wind speed to increase the circulating air volume and dilute the refrigerant concentration.

3) The line controller will display a refrigerant leakage fault.

4) If 485 communication wiring is used,the outdoor unit will shutdown after receiving a fault. If 24V control is used,the 24V fault signal L will output a 24V signal,which can be used to control the shutdown of the outdoor unit(with 24V function).

5) At the same time,the alarm output signal will be closed,and you need to connect an alarm device to remind.

6) When the refrigerant concentration is detected to be below a certain value for 300 consecutive seconds, the fault will be cleared and normal operation will restore.

Note:

●If refrigerant leakage protection is found,please open the doors and windows.Do not cut off the power or use open flames until the fault signal disappears and the fan resumes normal operation.

●If there is a refrigerant leakage protection(AF),it needs to be repaired before use.

●If the refrigerant sensor malfunctions,please replace it with a refrigerant sensor of the same model and do not use sensors of other specifications and types.When replacing,please install the refrigerant sensor in the original installation position.

●The refrigerant sensor normal service life is 15 years.

●If there is a refrigerant leak and manual release of the fault.protection is required,the air conditioning operation mode needs to be switched from other modes to fan mode.When the refrigerant concentration drops to the safe concentration,the fault protection is released,and the protection will not be released in other modes.

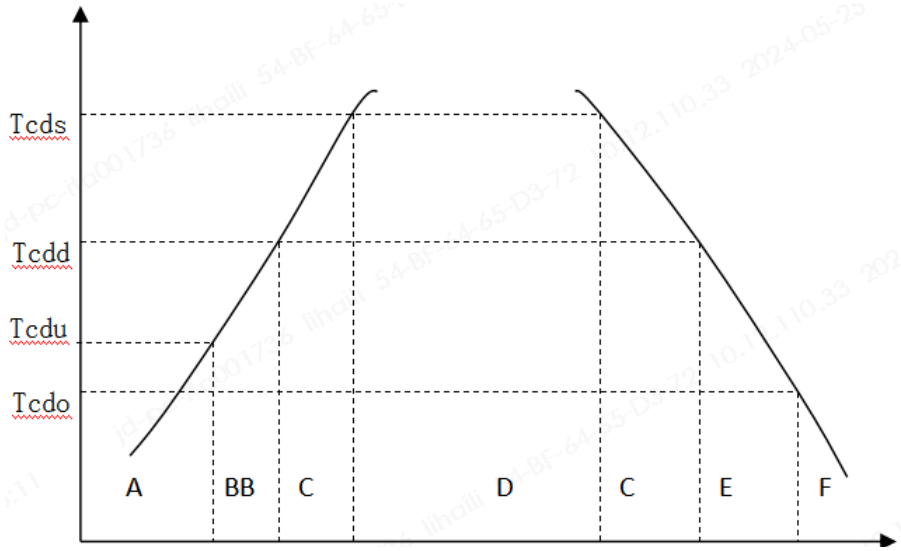
【7】 Refrigerant sensor malfunction

If no refrigerant sensor data is detected or a fault signal is detected from the refrigerant sensor, a refrigerant sensor fault will be reported[A0],control the electric auxiliary heating to turn off, keep the outdoor unit turning off, keep the indoor unit’s fan operating at a strong speed when turned on, or keep it

turning off when turned off.

When receiving refrigerant sensor data without any faults, restore normal operation.

【8】 Exhaust temperature protection



When the exhaust temperature is in the A and F zone, the compressor frequency is automatically controller.

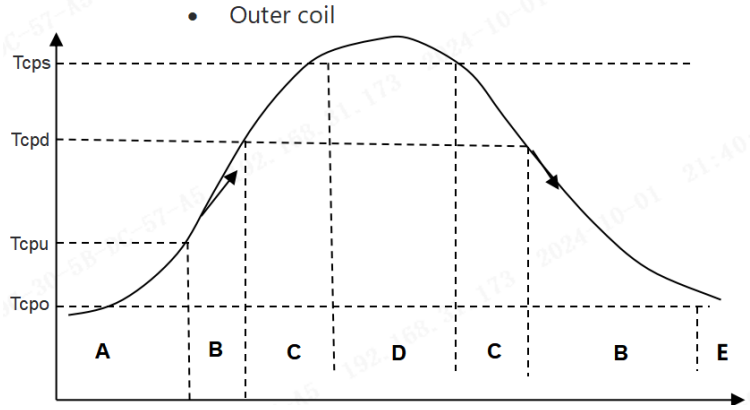
When the exhaust temperature is in area B and E, do not increase the compressor frequency, and the compressor runs at the current frequency.

When the exhaust temperature is in the C zone, reduce the frequency to protect the compressor.

When the exhaust temperature is in area D, and the compressor runs continuously for more than 1 minute, immediately stop the compressor.

When the exhaust temperature is in the F zone, remove the protection.

【9】 Cooling outdoor overload protection



A zone: No restrictions

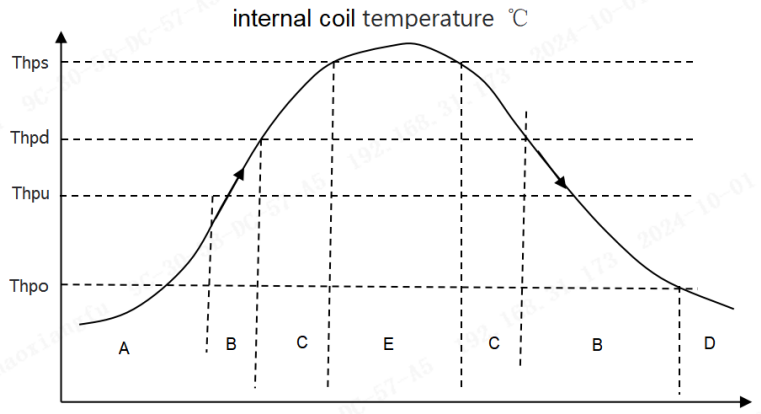
B zone：When the temperature of the outdoor heat exchanger rises by greater than or equal to Tcpu, the compressor frequency cannot rise

C zone：When the temperature of the outdoor heat exchanger rises by greater than or equal to Tcpd, reduce the frequency to protect the compressor.

D zone：When the temperature of the outdoor heat exchanger rises by greater than or equal to Tcps, and the compressor is shut down immediately after continuous operation for a period of time，Compressor frequency reduction and shutdown.

E zone：Exit the protected program.

【10】 Heating indoor overheat protection



A zone: No restrictions.

B zone：When the temperature or pressure of the indoor heat exchanger rises by greater than or equal to Thpu, the compressor frequency cannot rise.

C zone：When the temperature or pressure of the indoor heat exchanger rises by greater than or equal to Thpd, reduce the frequency to protect the compressor

When the heat exchanger temperature or pressure is below Thpo, remove the protection.

When the compressor runs continuously for a period of time，and the temperature or pressure of the indoor heat exchanger rises by greater than or equal to Thps, the compressor is immediately shutdown.

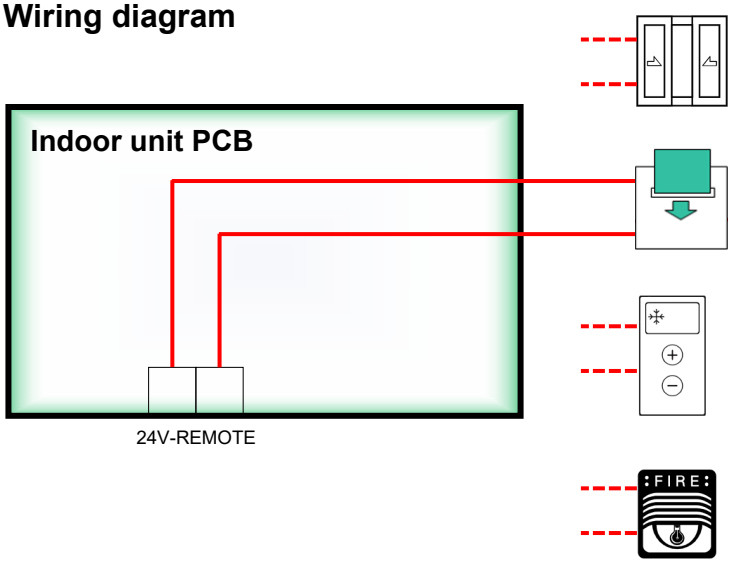
【11】 Pressure switch protection

High pressure switch protection

When the high-pressure pressure switch is detected to be disconnected for 5 seconds, the protection shuts down;

3. Dry contact function

Wiring diagram



① **Window linkage mode**
Parameter : **EE#17-1**

② **Room card function**
Parameter : **#1-Room card**
#2-Free room card mode1 **#3-Free room**

③ **Remote control mode**
Parameter : **EE#17-0**

④ **Fire alarm linkage mode**
Parameter : **EE#17-2**

Room Card Function：

Start Condition		Dry contact closure lasts for 5 seconds, or dry contact disconnection lasts for 60 seconds.	
PARA	Set mode	Contact Status	Mode Description
#1	**Room card mode**	Closure	In this state, the IDU can accept control commands from the control end for control.
		Disconnection	IDU immediately turns off, and timer and sleep function shutdown. In this state,the IDU can't receive control commands from the control terminal and remains turned off.
#2	**Free room card mode 1**	Closure	In this state, the IDU can accept control commands from the control end for control.
		Disconnection	During operation, if the contact changes from closure to open, the IDU immediately turns off, and timer and sleep function shutdown. In this state, the IDU can still receive control commands from the control terminal for further control.
#3	**Free room card mode 2**	Closure	In this state, the IDU can accept control commands from the control end for control.
		Disconnection	If the power failure memory function is turned on when powered on or the room card changes from closure to open and the current mode is not heating or automatic startup mode, it will switch to fan mode with low-speed operation. Otherwise, the IDU will switch to shutdown mode. In this state, the IDU can still receive control commands from the control terminal for further control.
End Condition		Dry contacts no longer perform closing or opening actions.	

Determine the operating status of the indoor unit by setting the EE17 # parameters (**0** for remote control mode; **1** for window linkage mode; **2** for fire alarm linkage mode) and passive contact status.

Remote Control Mode：

PARA	Function	Contact Status	Mode Description
17#-0	**Remote control mode**	Start Condition	Dry contact closure lasts for 5 seconds, or dry contact disconnection lasts for 5 seconds.
		Closure	Performing shutdown, IDU can receive commands from the control terminal for control.
		Disconnection	Performing starting up.
		End Condition	Dry contacts no longer perform closing or opening actions

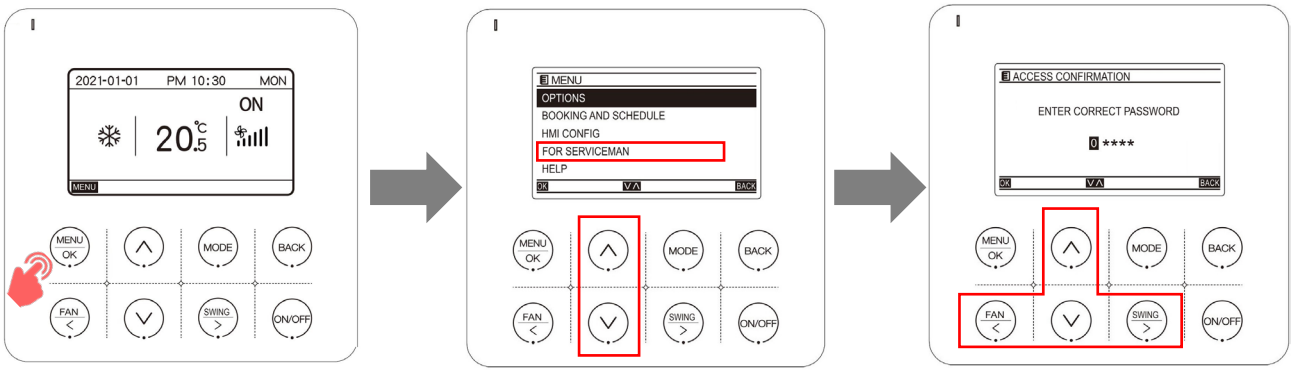
Window Linkage Mode：

PARA	Function	Contact Status	Mode Description
17#-1	**Window linkage mode**	Start Condition	Dry contact closure lasts for 60 seconds, or dry contact disconnection lasts for 5 seconds
		Closure (open the window)	Immediately switch to shutdown mode, IDU can receive commands from the control terminal for control.
		Disconnection (close the window)	If there is no control terminal command, restore the state before closing; If there is a control command, keep the control command executing.
		End Condition	Dry contacts no longer perform closing or opening actions.

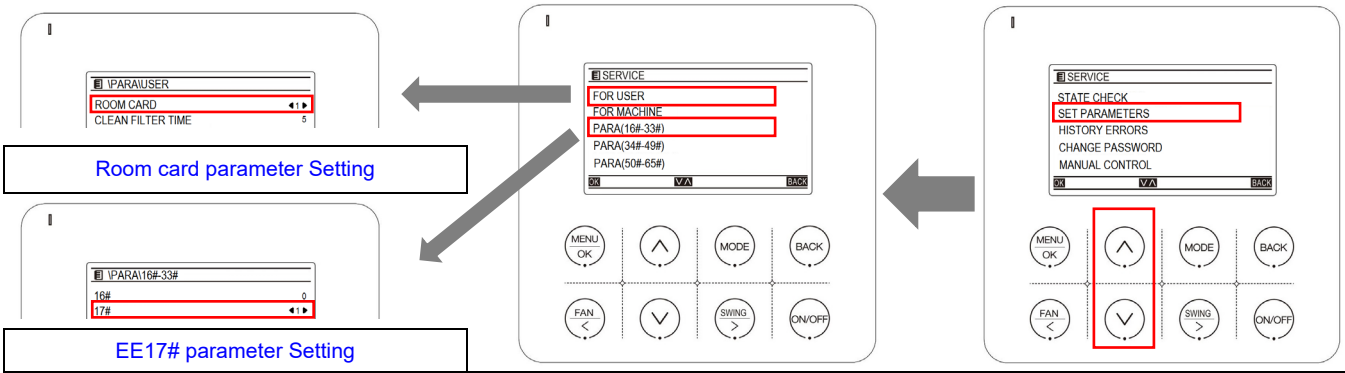
Fire Alarm Linkage Mode：

PARA	Function	Contact Status	Mode Description
17#-2	**Fire alarm linkage mode**	Start Condition	Dry contact closure lasts for 5 seconds, or dry contact disconnection lasts for 5 seconds
		Closure (fire alarm triggered)	Immediately switch to shutdown mode, IDU can not receive commands from the control terminal for control.
		Disconnection (fire alarm lifted)	Maintain the shutdown state, the IDU can receive commands from the control terminal.
		End Condition	Dry contacts no longer perform closing or opening actions.

Parameter Setting



1.Press **MENU**	2.Press ∧ or ∨ , select **FOR SERVICEMAN**, press **MENU**	3.Press ∧ or ∨ to change number Press FAN < or SWING > to switch position Input **8888**, press **MENU**



Room card parameter Setting

EE17# parameter Setting

6.Parameter Setting	5.select **FOR USER** enter **ROOM CARD** or select **PARA(16#-33#)** enter **EE#17**	4.Press ∧ or ∨ , select **SET PARAMETERS**, press **MENU**

4. Parameters Setting

IDU's parameters can be set by wired controller XK-06.

For after-sales (**IDU after a new PCB was replaced, IDU parameters setting is necessary**).

4.1 Parameter setting table

Parameters / IDU type	【04】	【05】	【06】	【07】	【12】	【15】
	Model of IDU	Capacity of IDU	Wind speed ESP selection	Working mode of ODU fan	Model series	Selection of room sensor
Regular Series						
ACiQ-18-AH-E-32	71	18	5	1	1	1
ACiQ-24-AH-E-32	71	24	5	1	1	1
ACiQ-30-AH-E-32	71	30	5	1	1	1
ACiQ-36-AH-E-32	71	36	5	1	1	1
ACiQ-48-AH-E-32	71	48	5	1	1	1
ACiQ-60-AH-E-32	71	60	5	1	1	1

Note:

【04】：Model of IDU

【05】：Capacity of IDU

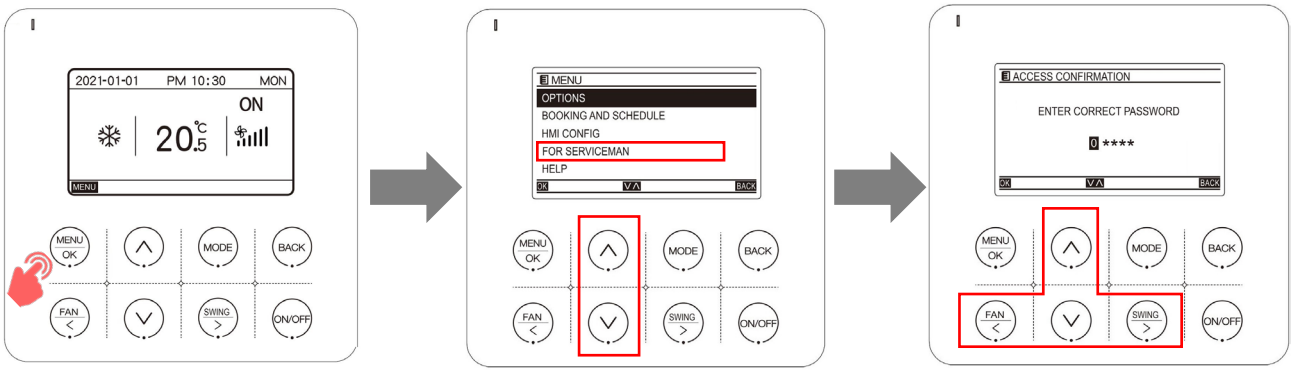
【06】：Wind speed ESP selection

【07】：Working mode of ODU fan

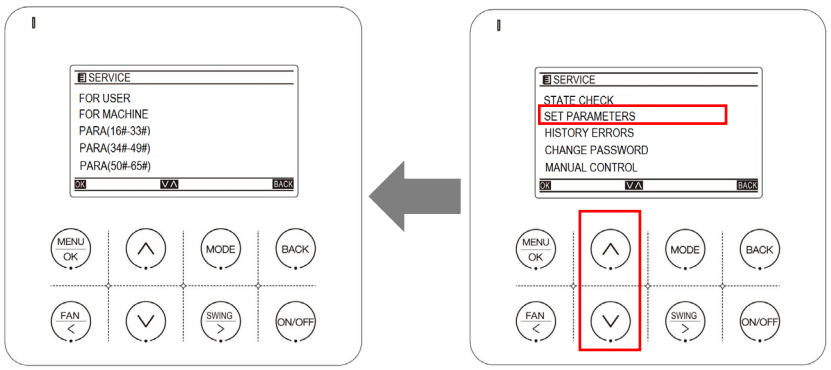
【12】：Model series

【15】：Selection of air return temperature sensor; 00 – sensor in indoor unit, 01—Sensor in wired controller

4.2 Parameter setting by XK-06



1.Press **MENU**	2.Press ∧ or ∨, select **FOR SERVICEMAN**, press **MENU**	3.Press ∧ or ∨ to change number Press FAN or SWING to switch position Input **8888**, press **MENU**



5.SET **PARAMETERS**	4.Press ∧ or ∨, select **SET PARAMETERS**, press **MENU**

Section 8: Troubleshooting

1. IDU Error code table

No.	PCB lamp display	Line controller	Fault
1	0 (Light keep out)	【-】	Normal (485/24V signal received)
2	The light stays on for five minutes	【-】	Normal (485/24V signal not received)
3	Lights blink once and stop for eight seconds	【A9】	485 Communication abnormal between the ODU and IDU
4	Lights blink twice and stop for eight seconds	【AA】	Fault with the wired controller communication
5	Lights flash three times and stop for eight seconds	【A6】	Fault with the fan motor of IDU
6	Lights blink four times and stop for eight seconds	【A0】	Fault with the refrigerant sensor
7	Lights blink five times and stop for eight seconds	【AF】	Refrigerant leakage protection
8	Lights flash six times and stop for eight seconds	【A1】	Fault with the room temperature sensor on the IDU
9	Lights blink seven times and stop for eight seconds	【A2】	Fault with the temperature sensor in the Middle evaporator of IDU
10	Lights blink eight times and stop for eight seconds	【A3】	IDU coil pipe inlet temperature sensor failure
11	Lights blink eight times and stop for eight seconds	【A4】	IDU coil pipe outlet temperature sensor failure
12	Lights blink nine times and stop for eight seconds	【AE】	Operation mode abnormal
13	Lights blink ten times and stop for eight seconds	See external machine malfunction	Fault with ODU

2. ODU Error code table

No.	PCB lamp display	PCB digital tube / line controller	Fault
1	【0 】(Light keep out)	Digital tube display 【01】 The wired controller does not display	Normal, compressor shutdown (IDU and ODU using 485 communication)
2	Keep on for 5 minutes after power-on or off after receiving 24V control	Digital tube display 【00】 The wired controller does not display	Normal, compressor shutdown (IDU and ODU do not use 485 communication)
3	【0】 (Light keep out)	Digital tube displays ***Compressor frequency.*** The wired controller does not display	Normal compressor running
4	【2】	【A9】	Communication failure between IDU and ODU
5	【17】 【12】	【36】	Fault with the low voltage protection
6	【11】 【13】	【35】	Fault with the over-electric current protection
7	【26】	【B4】/【H4】	Low pressure switch protection
	【29】	【B1】/【H1】	High pressure switch protection
8	【22】	【E8】	Fault with anti-high temperature protection of IDU in heating model
9	【21】	【39】	Protection of compressor driving module for excessive temperature
10	【18】	【C1】	Fault with the Enviromental temperature sensor(Tao) on the ODU
11	【10】	【E8】	Fault with overload protection of IDU in cooling model
12	【28】	【C6】	Fault with the suction temperature Sensor
13	【9】	【E3】	Compressor discharge temperature too high protection
14	【30】	【E1】	Fault of four-way valve
15	【19】	【C8】	Fault with the temperature sensor (Tcm) on the ODU
16	【31】	【C2】	Fault with the defrosting temperature Sensor on the outdoor unit
17	【6】	【3B】/【3H】(FAN 1) 【5B】/【5H】(FAN 2)	Fault with fan motor of ODU
18	【24】		
19	【14】		
20	【7】		
21	【1】	【D7】/【J7】	Fault with the ODU EPROM
22	【27】		
23	【20】	【C3】	Fault with the discharge temperature sensor
24	【31】	【B4】/【H4】	Fault with the low-pressure switch
25	【4】	【3E】	Compressor failed to start

26	【5】		
27	【8】	【3F】	Compressor drive PFC hardware protection
28	【16】		
29	【3】	【31】	Compressor drive Module IPM protection
30	【25】		
31	【15】		
32	/	【D3】/【J3】	Communication error between the driver PCB and main PCB
33	/	【32】	Fault with the inverter module protection
34	/	【37】	Fault with the modular temperature sensor
35	/	【F1】	Fault with the pressure sensor
36	/	【F6】	Low pressure too low protection
37	/	【E9】	Drive module temperature too low protection
38	/	【B5】/【H5】	Refrigerant shortage protection

3. Fault Analysis Table

3.1 Temp. sensor fault

Code display in wired controller	Fault code description	Possible reason
A1	Fault with the room Temp. sensor on the IDU	• Damage of the room temperature sensor on the wired controller • Damage of the wired controller • Damage of the main PCB on the indoor unit
A2	Fault with the temp. sensor in the middle evaporator of IDU	• Damage of the temperature sensor on the indoor unit • Poor contact of the temperature sensor on the indoor unit • Damage of wiring of the temperature sensor on the indoor unit • Damage of the main PCB on the indoor unit
A3	IDU coil pipe inlet Temp.sensor failure	• Damage of the pipe inlet temperature sensor on the indoor unit • Poor contact of the pipe inlet temperature sensor on the indoor unit • Damage of wiring of the pipe inlet temperature sensor on the indoor unit • Damage of the main PCB on the indoor unit
A4	IDU coil pipe outlet Temp. sensor failure	• Damage of the pipe outlet temperature sensor on the indoor unit • Poor contact of the pipe outlet temperature sensor on the indoor unit • Damage of wiring of the pipe outlet temperature sensor on the indoor unit • Damage of the main PCB on the indoor unit
C1	Fault with the environmental temperature sensor on the outdoor unit	• Damage of the Environmental temperature sensor on the outdoor unit • Poor contact of the Environmental temperature sensor on the outdoor unit • Damage of wiring of the Environmental temperature sensor on the outdoor unit • Damage of the main PCB on the outdoor unit
C2	Fault with the defrosting temperature sensor on outdoor	• Damage of the temperature sensor on the outdoor unit • Poor contact of the temperature sensor on the outdoor unit • Damage of wiring of the temperature sensor on the outdoor unit • Damage of the main PCB on the outdoor unit
C3	Fault with the discharge temperature sensor	• Damage of the discharge temperature sensor on the outdoor unit • Poor contact of the discharge temperature sensor on the outdoor unit • Damage of wiring of the discharge temperature sensor on the outdoor unit • Damage of the main PCB on the outdoor unit
C6	Fault with the suction temperature sensor	• Damage of the suction temperature sensor on the outdoor unit • Poor contact of the suction temperature sensor on the outdoor unit • Damage of wiring of the suction temperature sensor on the outdoor unit • Damage of the main PCB on the outdoor unit

C8	Fault with the temperature sensor in the middle of Outdoor condenser	• Damage of the temperature sensor on the outdoor unit • Poor contact of the temperature sensor on the outdoor unit • Damage of wiring of the temperature sensor on the outdoor unit • Damage of the main PCB on the outdoor unit

3.2 Communication fault

Code display in wired controller	Fault code description	Possible reason
A9	Communication error between the outdoor unit and the indoor unit	• Damage of the main PCB on the indoor unit • Damage of the main PCB on the outdoor unit • Poor wiring
AA	Communication error between the wired controller and main PCB of the indoor unit	• Poor wiring • Damage of the wired controller • Damage of the main PCB on the indoor unit
D3/J3	Communication error between the driver PCB and main PCB of the outdoor unit	• Damage of the driver PCB on the outdoor unit • Damage of the main PCB on the outdoor unit • Poor wiring

3.3 IDU fault

Code display in IDU	Fault code description	Possible reason
A6	Fault with the fan motor of the indoor unit	• Low voltage • Poor wiring • Damage of the main PCB on the indoor unit • Damage of the motor
A0	Fault with the refrigerant sensor	• Damage of the refrigerant sensor • Damage of the main PCB on the indoor unit • Poor wiring
AF	Refrigerant leakage protection	• Refrigerant leakage

3.4 Refrigerant circuit fault

Code display in IDU	Fault code description	Possible reason
E3	High discharge temperature protection	• Lack of the refrigerant • Stop valve unopened • Damage of the main PCB on the outdoor unit • Damage of the EXV • Damage of the EXV coil
E8	Cooling: high temperature protection of outdoor unit Heating: high temperature protection of indoor unit	• Cooling: Poor condenser heat exchange • Heating: Poor evaporator heat exchange
B5/H5	Lack of refrigerant	• Lack of the refrigerant • Stop valve unopened
B4/ H4	Heating:low pressure protection	• Lack of the refrigerant • Stop valve unopened • Damage of the EXV • Damage of the EXV coil

F6	cooling:low pressure protection	• Lack of the refrigerant • Stop valve unopened • Damage of the EXV • Damage of the EXV coil

3.5 ODU components fault

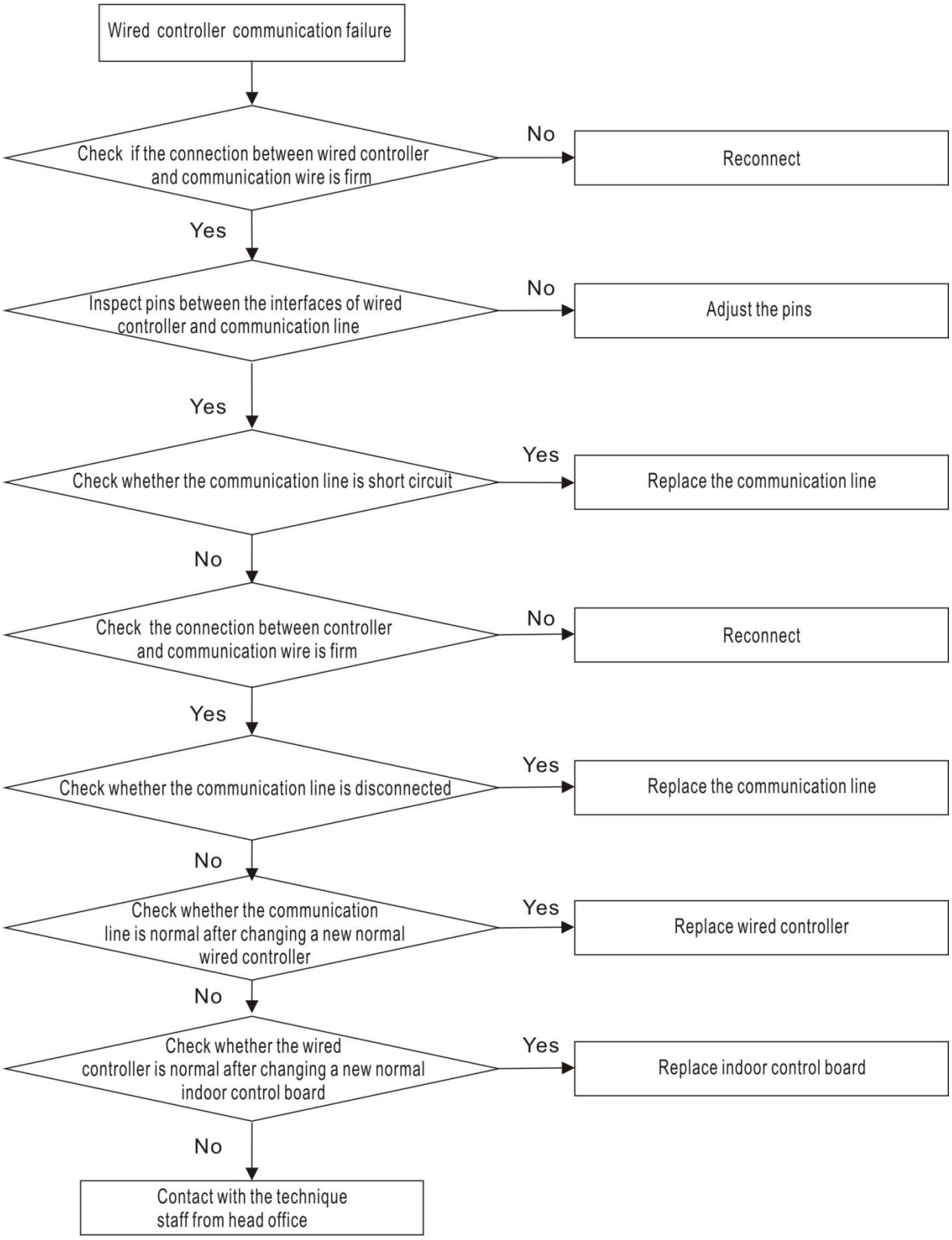
Code display in IDU	Fault code description	Possible reason
B1/H1	High pressure switch protection	• System dirty blocking • Damage of high pressure switch
B4/H4	Low pressure switch protection	• Lack of the refrigerant • Stop valve unopened • Damage of low press switch
E1	Fault of four-way valve	• Damage of four-way valve • Damage to coil of four-way valve
3E	Compressor failed to start	• Compressor power line not connected • Compressor sequence connection error • Damage of compressor
3B/3H 5B/5H	Outdoor DC Fan out-of-step protection & over current protection&	• DC motor failure • High Speed of DC Fan • System dirty blocking • Damage of of the main PCB on the outdoor unit
F1	Fault of pressure Sensor	• Damage of pressure Sensor • Damage of of the main PCB on the outdoor unit • Poor wiring

3.6 ODU electeic control fault

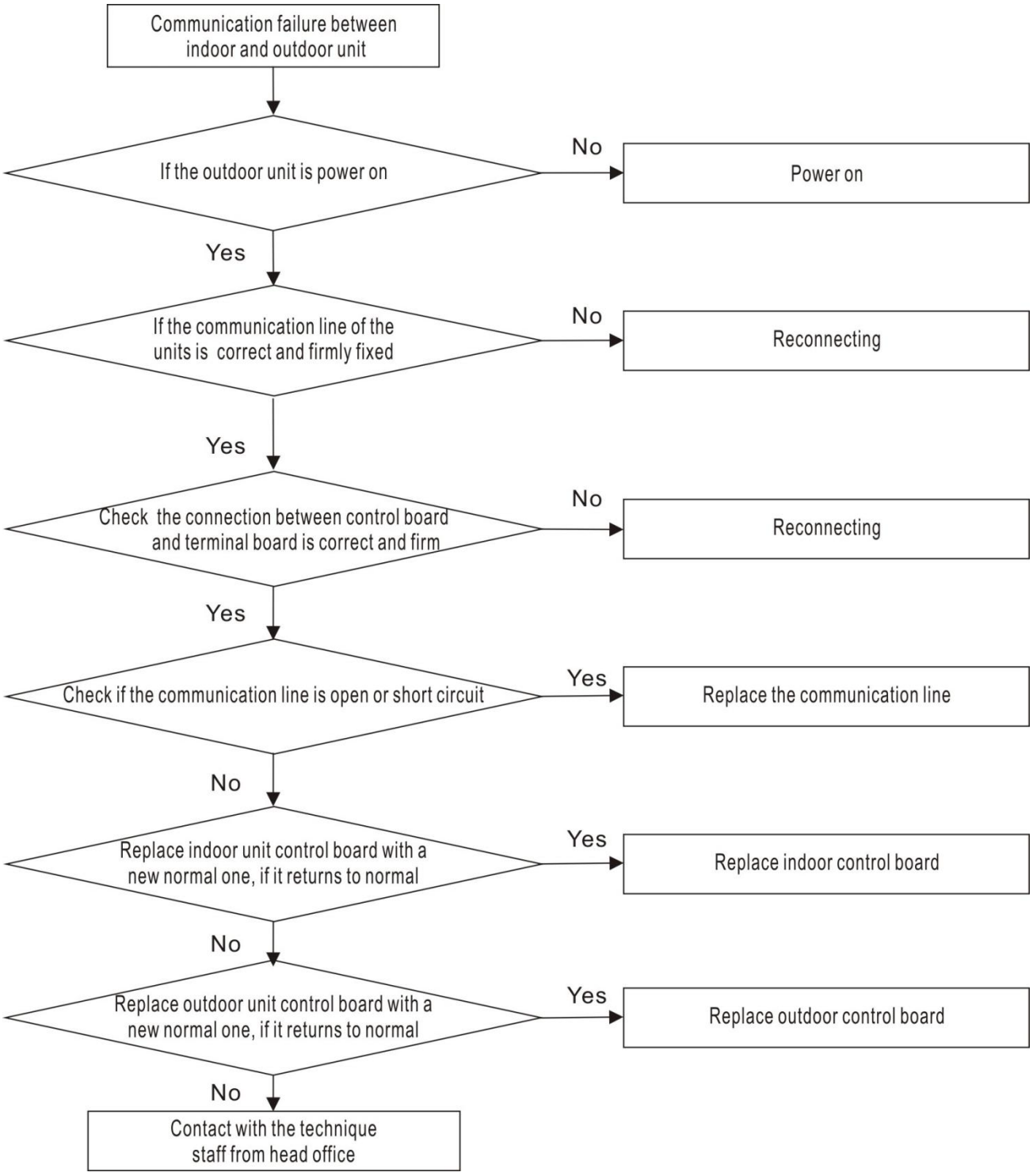
Code display in IDU	Fault code description	Possible reason
31	IPM module failure protection	• Compressor damage • Compressor IPM module damage • System blockage
D7/ J7 32	Compressor drive hardware protection & Fault with the outdoor unit EEPROM	• Chip damage
35	Over-current protection of the compressor drive modular	• Excessive running current of the unit • Voltage drops abruptly during operation
36	Over-voltage protection of the compressor drive modular	• Excessive input voltage • Lower input voltage
37	Abnormal temperature sensor in IPM/PFC module	• Driver board IPM/PFC module device is broken
39	Temperature of compressor drive modular too high protection	• Compressor IPM module sensor damage • Poor contact between compressor IPM module and radiator
3F	Compressor drive PFC protection	• Damage of the PFC circuit components • Reactor damage
3B/3H 5B/5H	IPM protection of outdoor DC Fan drive modular	• The IPM device of DC motor is bad

4. Failure Analysis Process

4.1 【AA】Wired controller communication failure

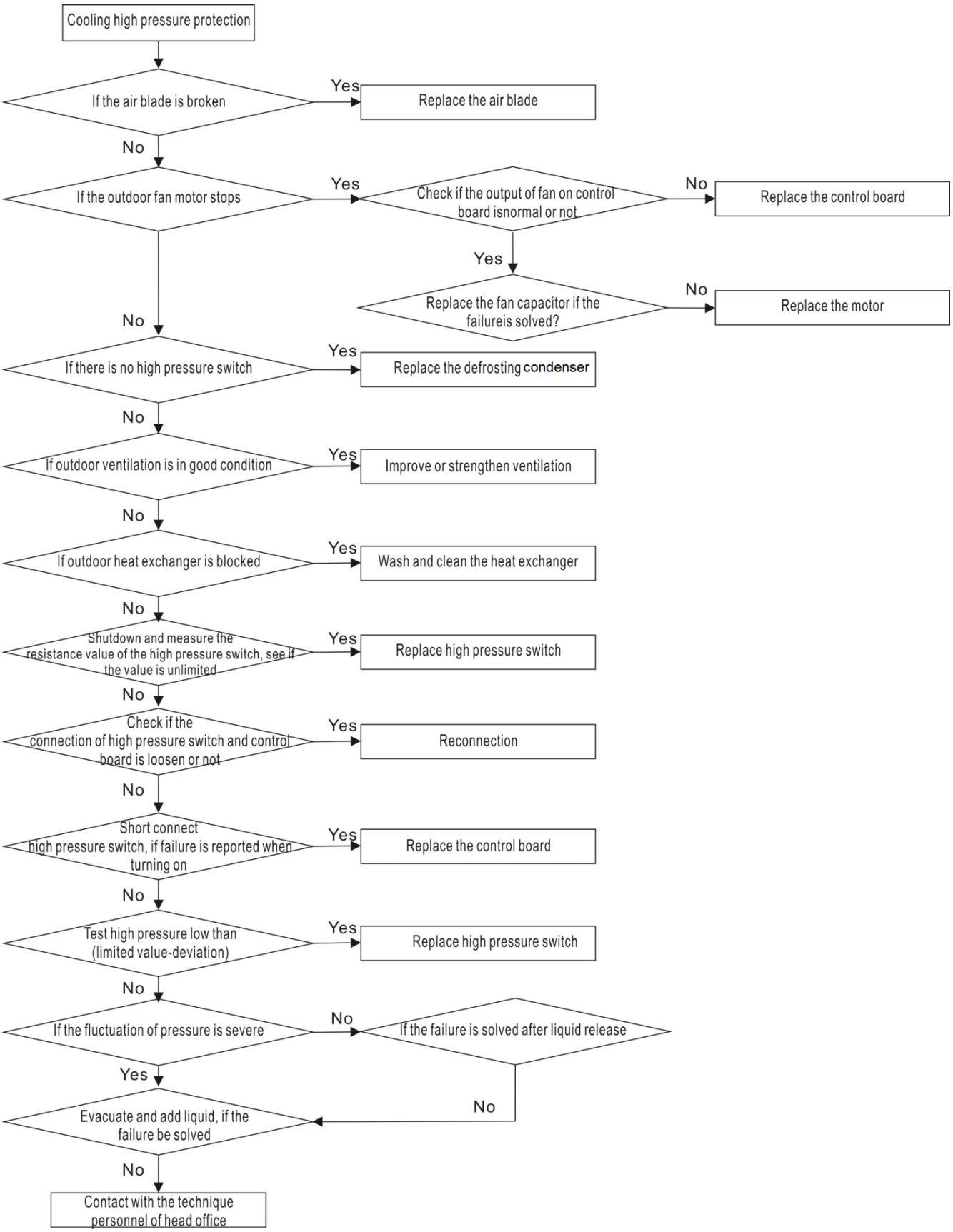


4.2 【A9】Communication failure between indoor and outdoor unit

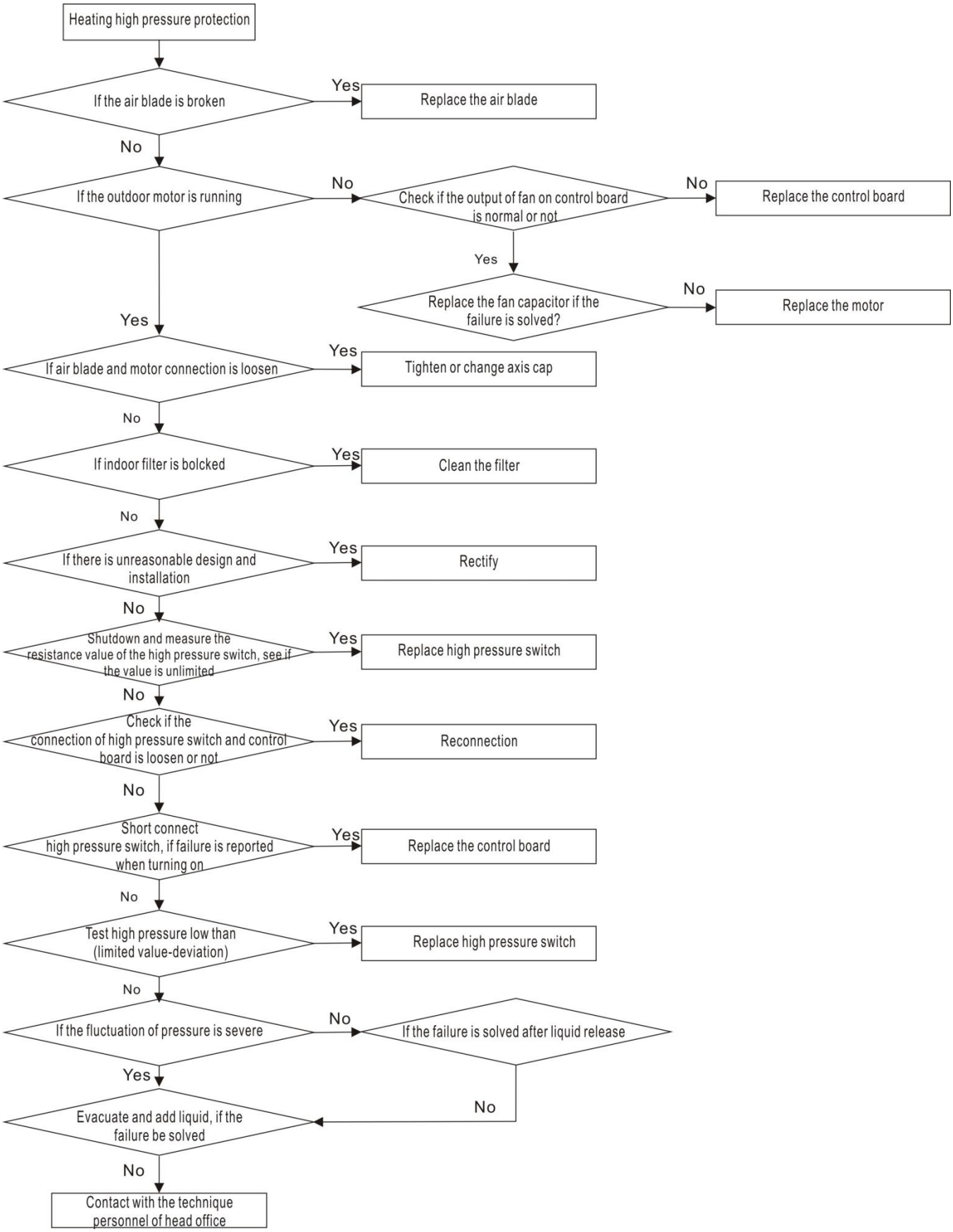


4.3 【H1/E8】High pressure protection

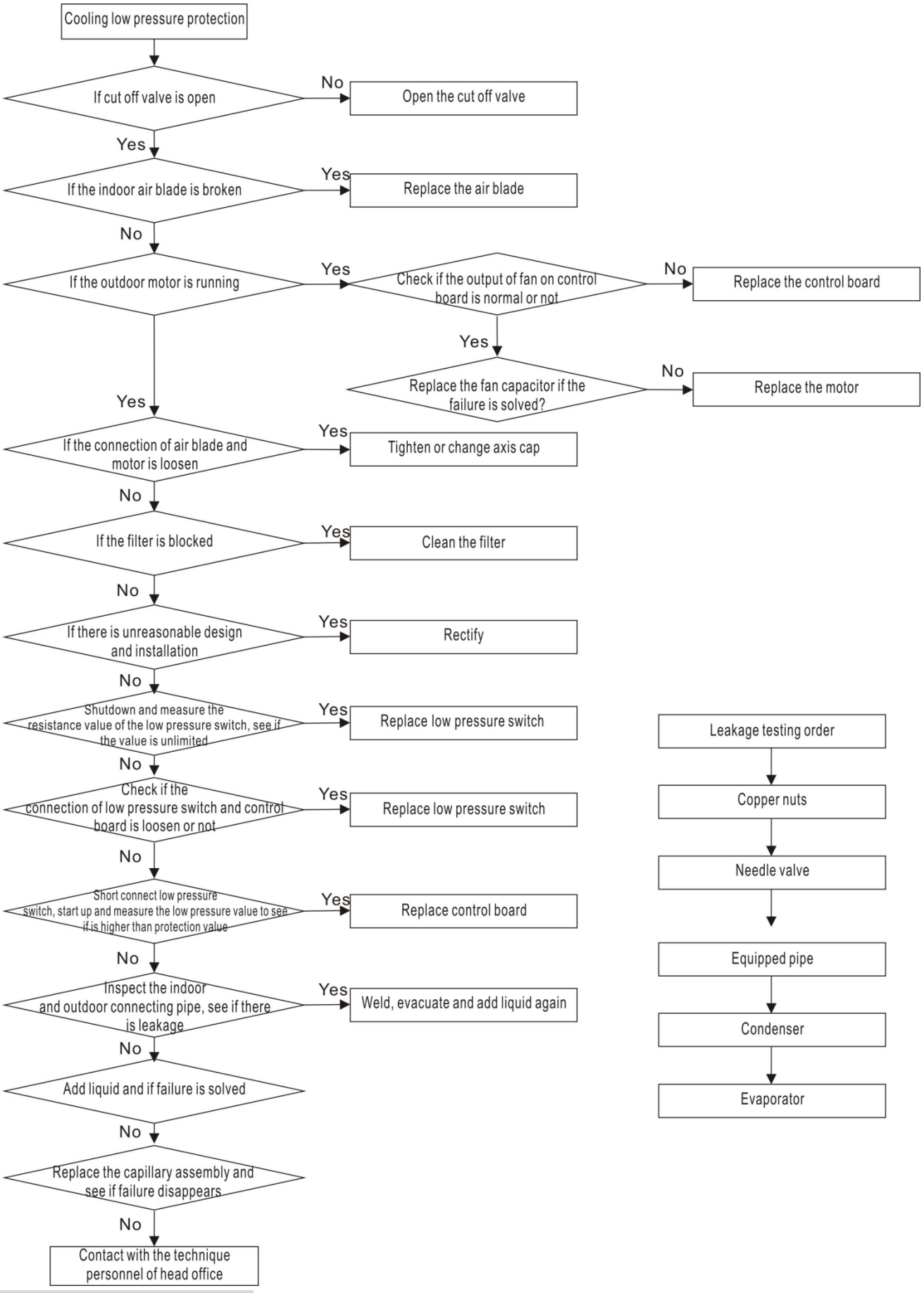
Cooling high pressure protection



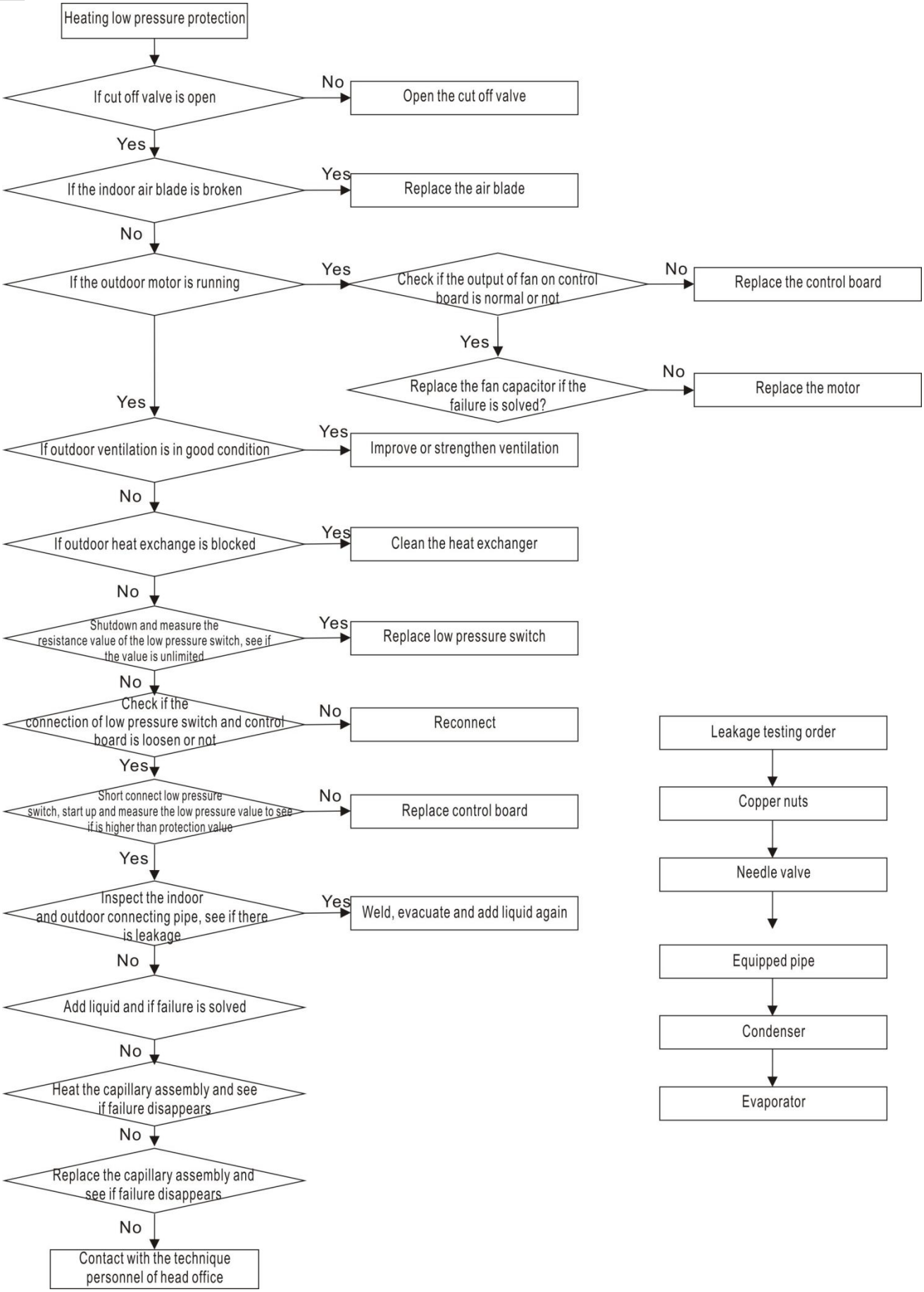
Heating high pressure protection



4.4 【F6】Cooling Low pressure protection

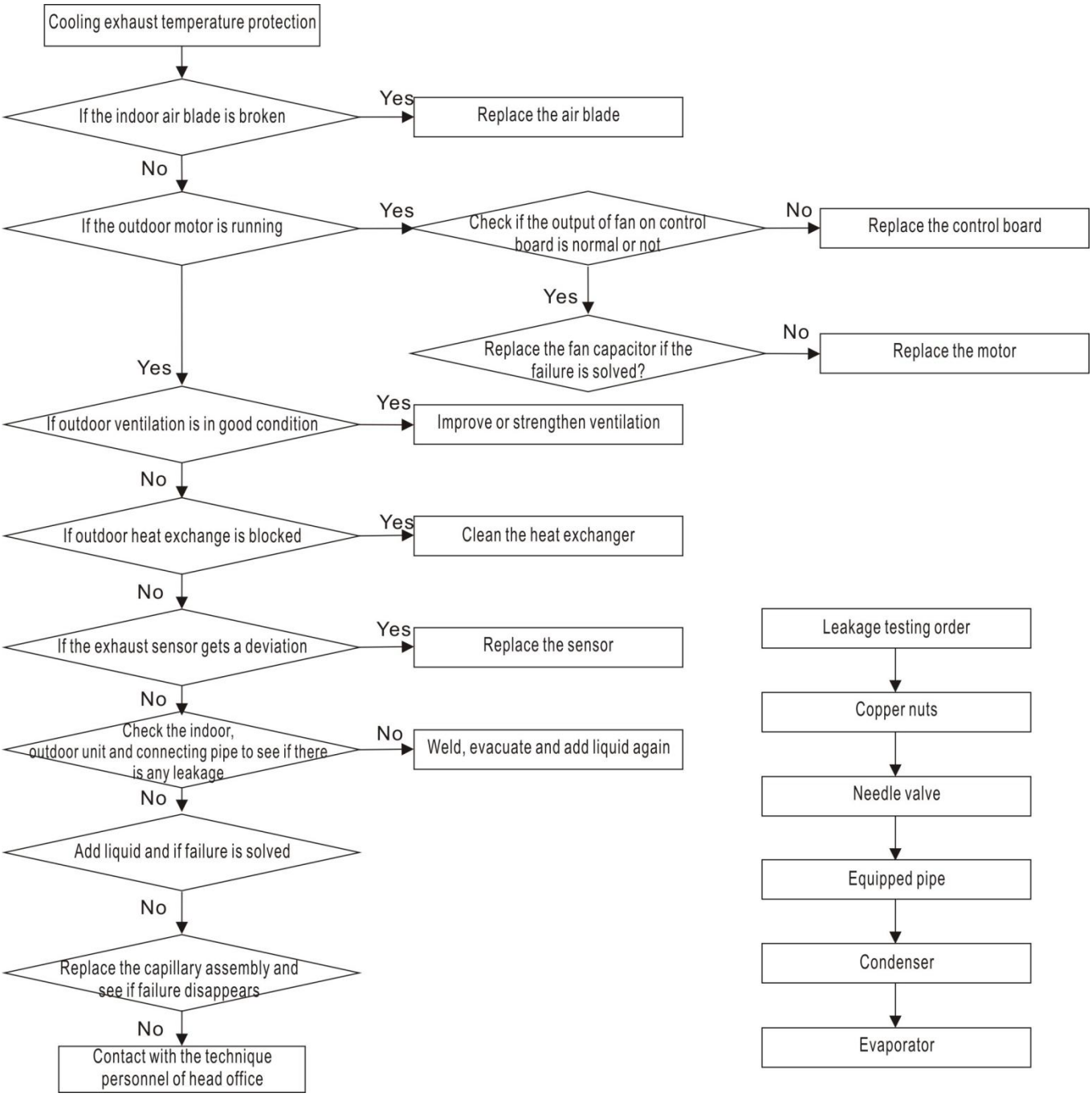


【H4】Heating low pressure protection

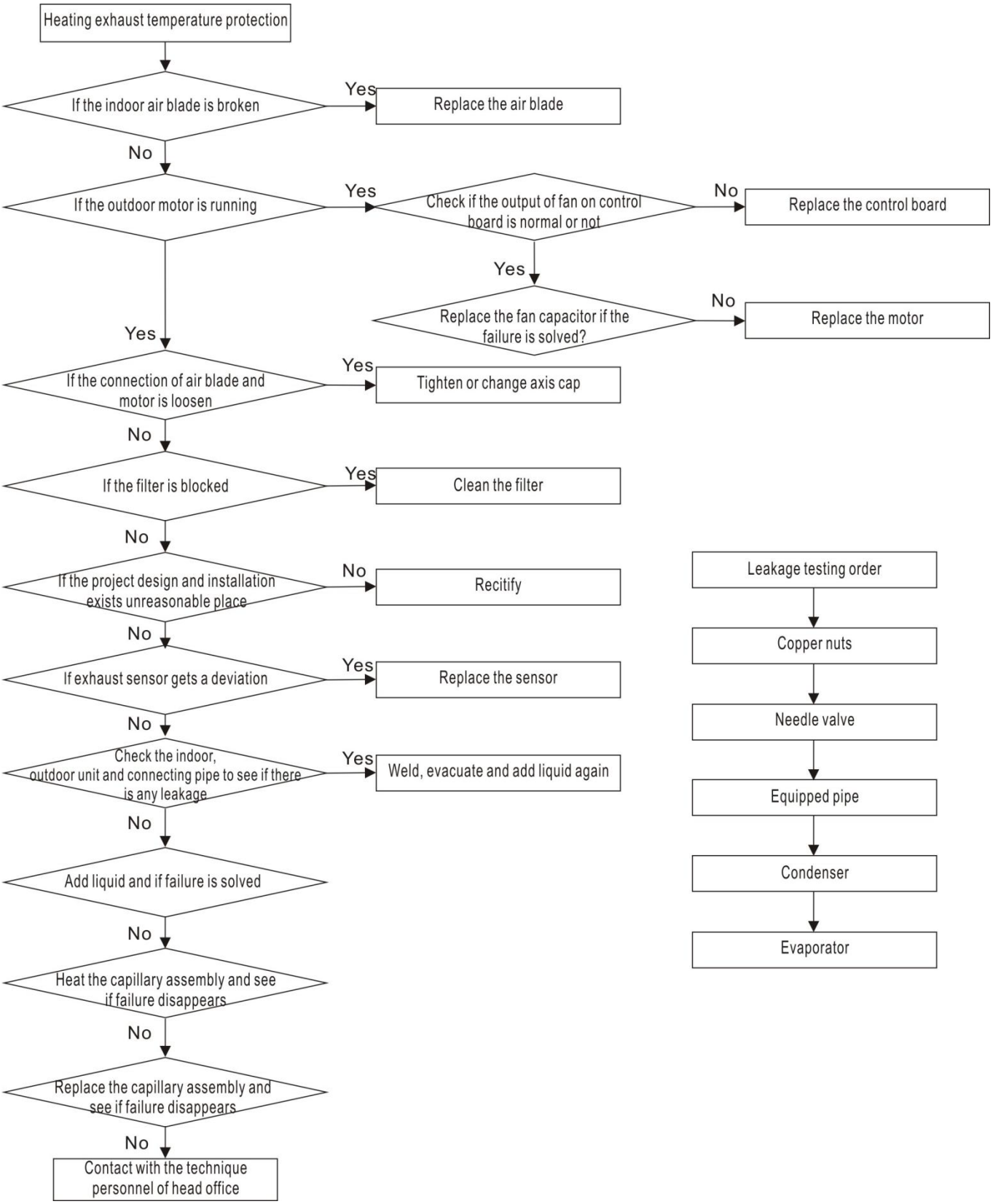


4.5 【E3】High exhaust temperature protection

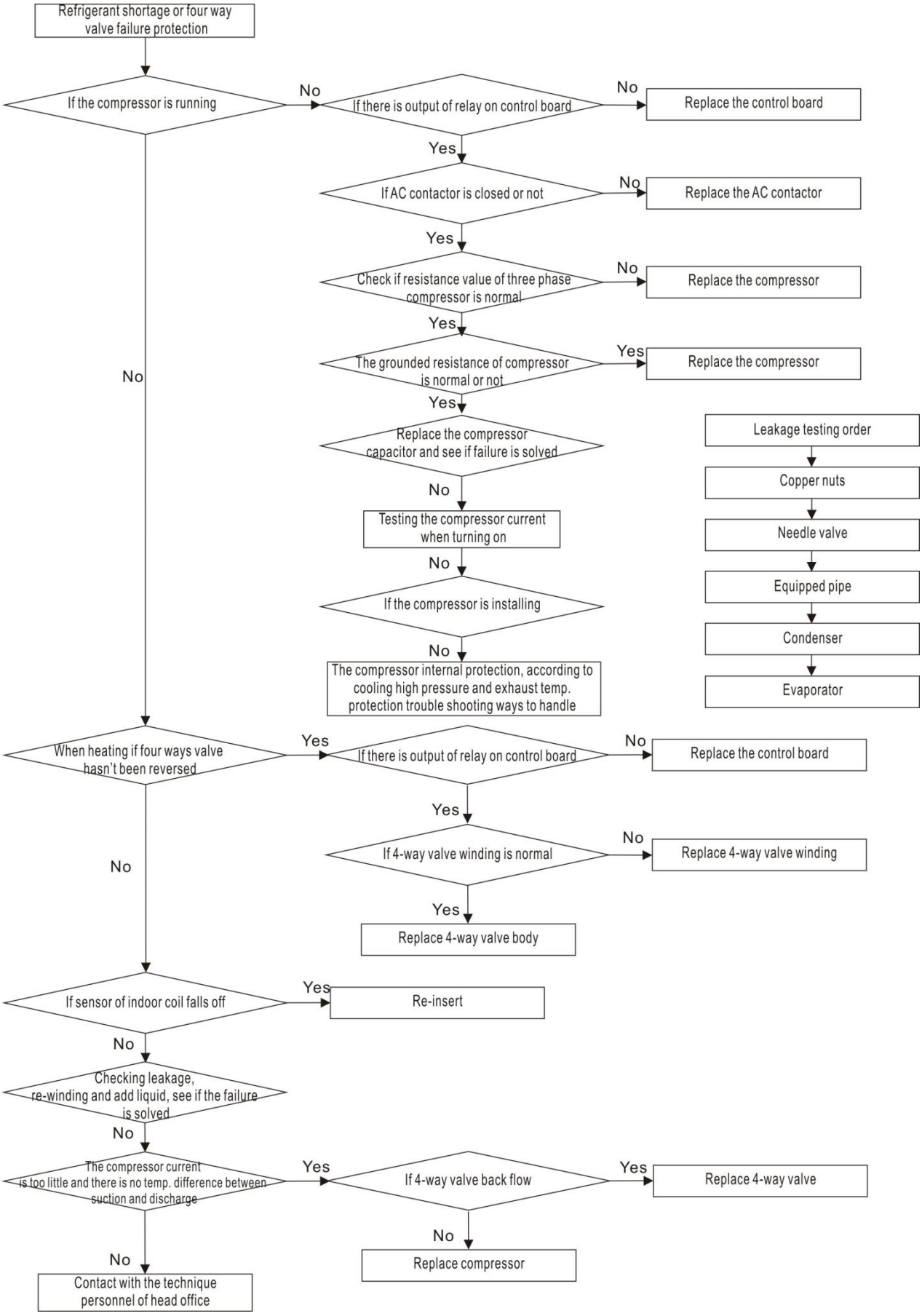
Cooling exhaust temperature protection



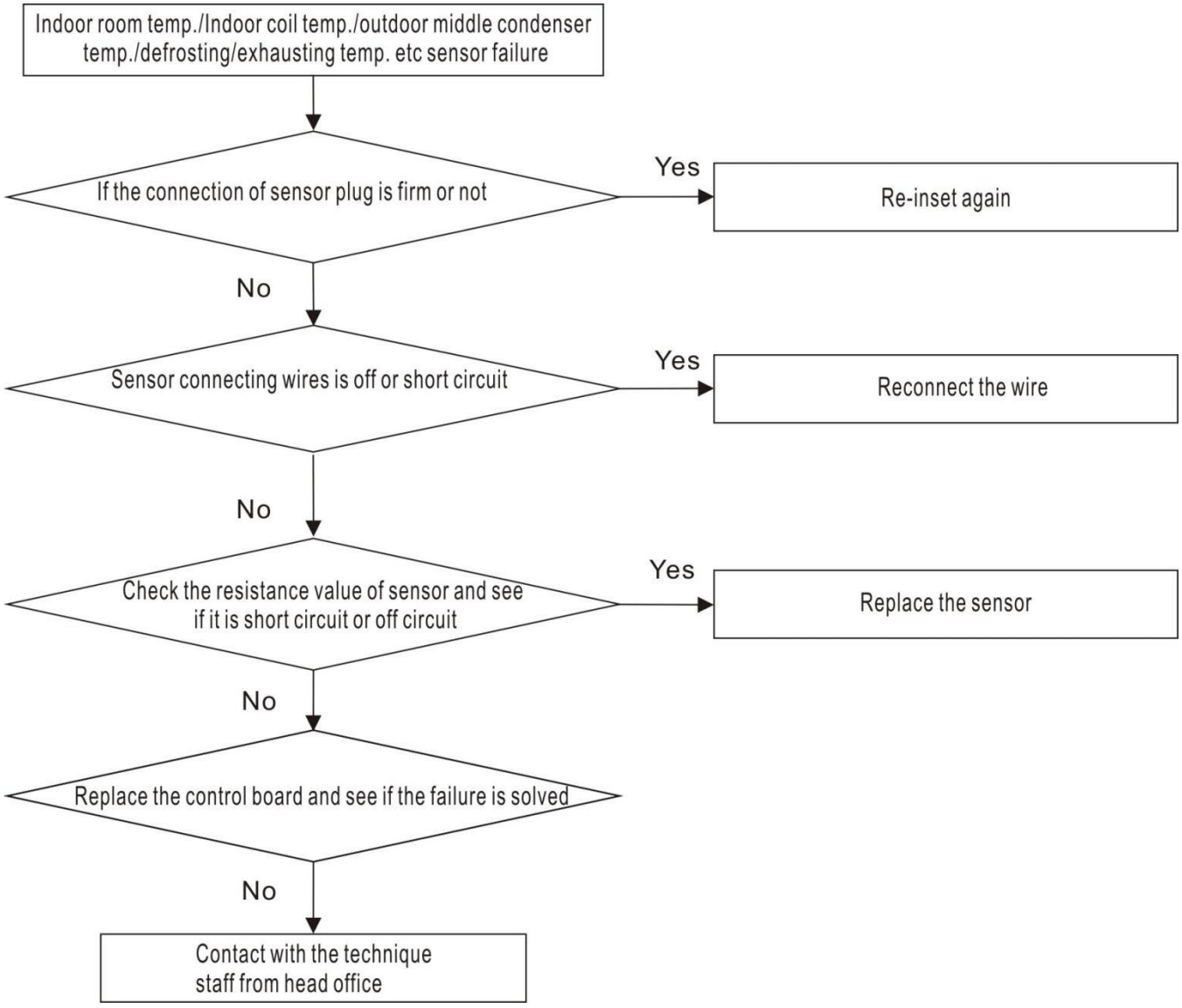
Heating exhaust temperature protection



4.6 【E1】Four way valve failure protection



4.7 Sensor failure protection



5. Maintenance Notice

Attention：

For maintenance or scrap, please contact a authorized contractor.

Maintenance by unqualified person may cause injury or damage to the unit.

Charge air conditioner with R32 refrigerant only, and maintain the air conditioner in a strict accordance with the manufacturer's requirements.

5.1 Qualification of Workers

1. Special training is required to work on equipment with A2L refrigerants. Only rely on qualified contractors to install, service, and repair this system.
2. The maintenance and repair of the air conditioner must be conducted according to the method recommended by the manufacturer.
   If other professionals are needed to help maintain and repair the equipment, it should be conducted under the supervision of individuals who have the qualification to repair AC equipped with flammable refrigerants.

5.2 Inspection of the Site

Safety inspection must be conducted before maintaining equipment with R32 refrigerant to make sure the risk of fire is minimized.

Check whether the space is well ventilated and whether anti-static or fire prevention equipment is required.

While maintaining the refrigeration system, observe the following precautions before operating the system.

5.3 Operating Procedures

1) General work area:

All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out.

Work in confined spaces shall be avoided. The area around the workspace shall be sectioned off. Ensure that the conditions within the area have been made safe by control of flammable material.

2) Checking for presence of refrigerant:

The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially toxic or flammable atmospheres.

Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i.e. non-sparking, adequately sealed or intrinsically safe.

3) Presence of fire extinguisher:

If any hot work is to be conducted on the refrigeration equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO_2 fire extinguisher adjacent to the charging area.

4) No ignition sources:

No person carrying out work in relation to a refrigeration system which involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks.‘No Smoking’ signs shall be displayed.

5) Ventilated Area(open the door and window):

Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work. A degree of ventilation shall continue during the period that the work is carried out.

The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

6) Checks to the refrigeration equipment:

Where electrical components are being changed, they shall be fit for the purpose and to the correct specification. At all times the manufacturer's maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer's technical department for assistance.

The following checks shall be applied to installations using flammable refrigerants:

● The actual REFRIGERANT CHARGE is in accordance with the room size within which the refrigerant containing parts are installed;

● The ventilation machinery and outlets are operating adequately and are not obstructed.

● If an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant.

● Marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected;

● Refrigeration pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.

7) Checks to electrical devices:

Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures.If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment so all parties are advised.

Initial safety checks shall include:

●That capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking.

●That no live electrical components and wiring are exposed while charging, recovering or purging the system.

●That there is continuity of earth bonding.

5.4 Repairs to Sealed Components

● During repairs to sealed components, all electrical supplies shall be disconnected from the equipment being worked upon prior to any removal of sealed covers, etc. If it is absolutely necessary to have an electrical supply to equipment during servicing, then a permanently operating form of leak detection shall be located at the most critical point to warn of a potentially hazardous situation.

●Sealed electrical components shall be replaced.

5.5 Repair to Intrinsically Safe Components

●Do not apply any permanent inductive or capacitance loads to the circuit without ensuring that this will not exceed the permissible voltage and current permitted for the equipment in use.

●Intrinsically safe components must be replaced.

●Replace components only with parts specified by the manufacturer. Other parts may result in the ignition of refrigerant in the atmosphere from a leak.

NOTE: The use of silicon sealant can inhibit the effectiveness of some types of leak detection equipment. Intrinsically safe components do not have to be isolated prior to working on them.

5.6 Cabling

Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

5.7 Detection of Flammable Refrigerants

●Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used.

●The following leak detection methods are deemed acceptable for all refrigerant systems.

●Electronic leak detectors may be used to detect refrigerant leaks but, in the case of FLAMMABLE REFRIGERANTS, the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25 % maximum) is confirmed.

●Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.

NOTE:

Examples of leak detection fluids are

– bubble method,

– fluorescent method agents.

●If a leak is suspected, all naked flames shall be removed/extinguished.

●If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak.

5.8 Removal and Evacuation

1.When breaking into the refrigerant circuit to make repairs – or for any other purpose – conventional procedures shall be used. However, for flammable refrigerants it is important that best practice be followed, since flammability is a consideration. The following procedure shall be adhered to:

●safely remove refrigerant following local and national regulations;

●revacuate;

●purge the circuit with inert gas (optional for A2L);

●evacuate (optional for A2L);

●purge with inert gas (optional for A2L);

●continuously flush or purge with inert gas when using flame to open circuit, and open the circuit.

2.The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times. Compressed air or oxygen shall not be used for purging refrigerant systems.

3.For appliances containing flammable refrigerants, refrigerants purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum (optional for A2L). This process shall be repeated until no refrigerant is within the system (optional for A2L). When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place.

4.The outlet for the vacuum pump shall not be close to any potential ignition sources, and ventilation shall be available.

5.9 Charging Procedures

1.In addition to conventional charging procedures, the following requirements shall be followed.

●Ensure that contamination of different refrigerants does not occur when using charging equipment.

Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.

●Cylinders shall be kept in an appropriate position according to the instructions.

●Ensure that the REFRIGERATING SYSTEM is earthed prior to charging the system with refrigerant.

●Label the system when charging is complete (if not already).

●Extreme care shall be taken not to overfill the REFRIGERATING SYSTEM.

2.Prior to recharging the system, it shall be pressure-tested with the appropriate purging gas. The system shall be leak-tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site.

5.10 Decommissioning

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended good practice that all refrigerants are recovered safely. Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of recovered refrigerant. It is essential that electrical power is available before the task is commenced.

a) Become familiar with the equipment and its operation.

b) Isolate system electrically.

c) Before attempting the procedure, ensure that:

●mechanical handling equipment is available, if required, for handling refrigerant cylinders;

●all personal protective equipment is available and being used correctly;

●the recovery process is supervised at all times by a competent person;

●recovery equipment and cylinders conform to the appropriate standards.

d) Pump down refrigerant system, if possible.

e) If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.

f) Make sure that cylinder is situated on the scales before recovery takes place.

g) Start the recovery machine and operate in accordance with instructions.

h) Do not overfill cylinders (no more than 80 % volume liquid charge).

i) Do not exceed the maximum working pressure of the cylinder, even temporarily.

j) When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.

k) Recovered refrigerant shall not be charged into another REFRIGERATING SYSTEM unless it has been cleaned and checked.

5.11 Labeling

Equipment shall be labeled stating that it has been decommissioned and emptied of refrigerant. The label shall be dated and signed. For appliances containing FLAMMABLE REFRIGERANTS, ensure that there are labels on the equipment stating the equipment contains FLAMMABLE REFRIGERANT.

5.12 Recovery

1.When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely.

2.When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed.

Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be

used are designated for the recovered refrigerant and labeled for that refrigerant (i.e. special cylinders for the recovery of refrigerant).

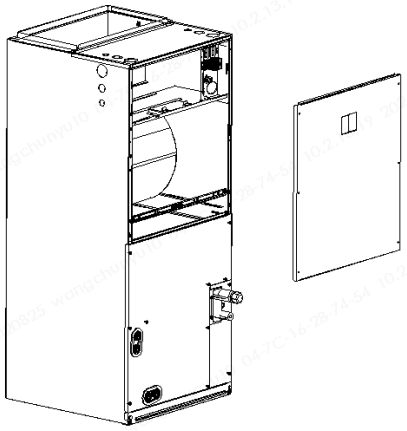
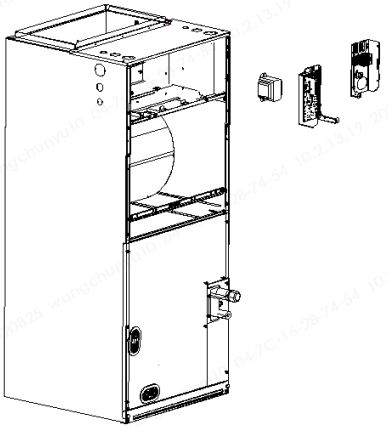
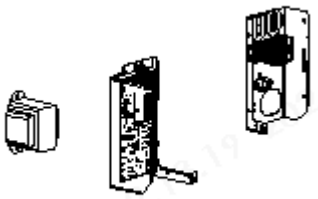
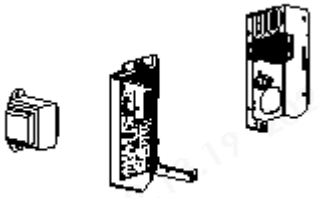
Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.

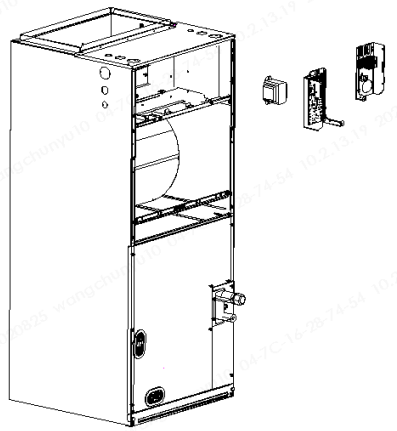
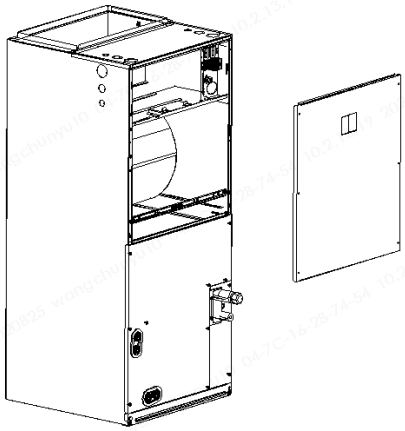
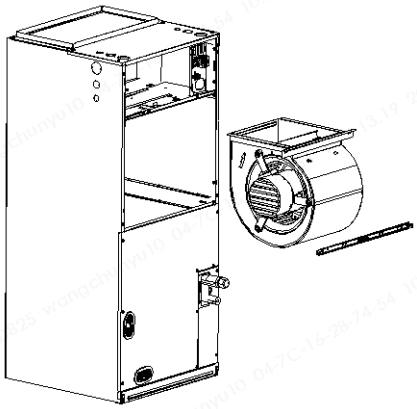
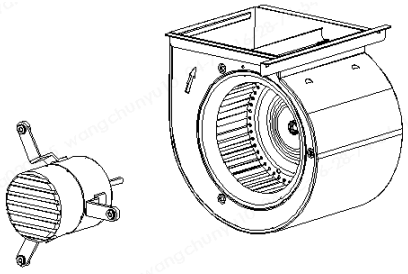
3.The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of the flammable refrigerant. If in doubt, the manufacturer should be consulted. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition.

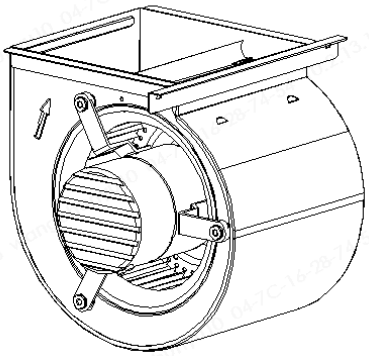
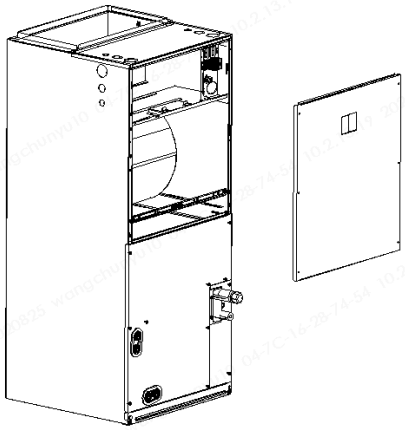
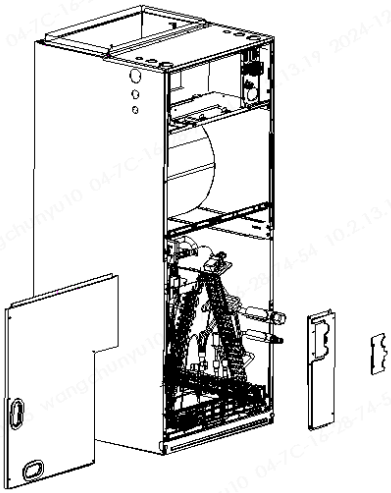
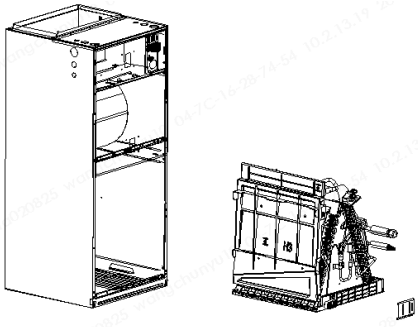
4.The recovered refrigerant shall be processed according to local legislation in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.

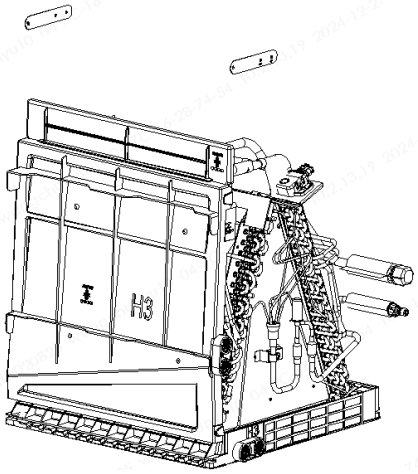
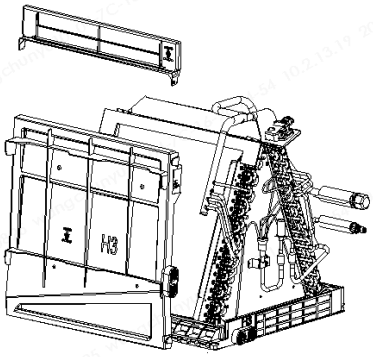
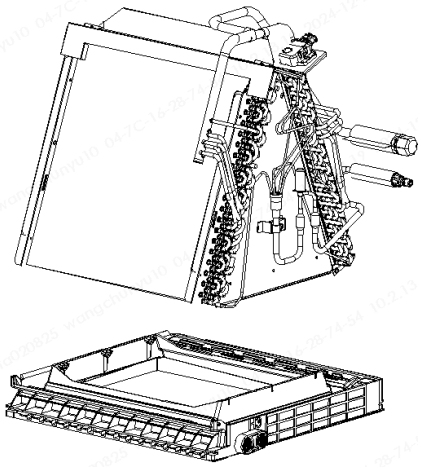
5.If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The compressor body shall not be heated by an open flame or other ignition sources to accelerate this process. When oil is drained from a system, it shall be carried out safely.

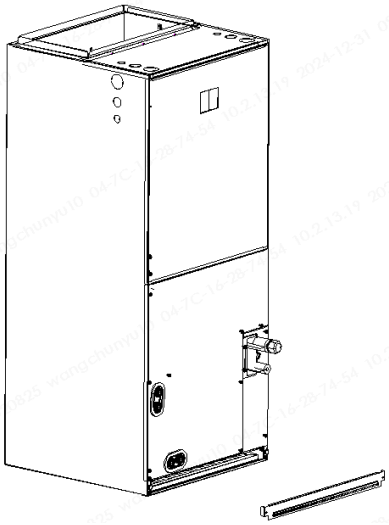
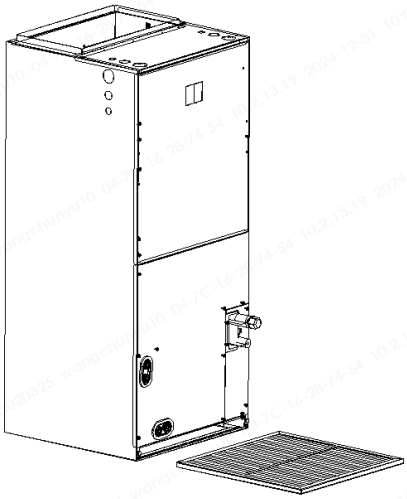
6. Disassembly and Assembly of Main Components

Disassembly and Assembly of the Electric Box		
Step	**Picture**	**Work Instruction**
1. Remove the front panel.		●Loosen screws around the upper panel with a screwdriver. ●Remove the front panel away from the unit.
2. Remove the electric box.		●Disconnect the power cord and control line from the wiring terminals, and then draw them out. ●Loosen screws around the electric box with a screwdriver. ●Remove the electric box from the unit.
3. Remove the electric element.		●Disconnect the electric element from the wiring terminal. ●Loosen screws around the electric element with a screwdriver. ●Remove the electric element from the electric box.
4. Mount the new electric element.		●Place the electric element at the proper position. ●Tighten the screws around the electric element with a screwdriver. ●Wire the electric element to the wiring terminal.

5. Reinstall the electric box.		●Place the electric box at the proper position. ●Tighten screws around the electric box with a screwdriver. ●Connect the power cord and control line properly. ●Reassemble the unit as before.
Disassembly and Assembly of the Fan Motor		
Step	**Picture**	**Work Instruction**
1. Remove the front panel.		●Loosen screws around the upper panel with a screwdriver. ●Remove the front panel away from the unit.
2. Remove the fan.		●Disconnect the wires of the fan from the wiring terminal and draw them out. ●Loosen screws located at the front of the fan with a screwdriver. ●Remove the middle reinforcing plate and the fan from the unit.
3. Remove the motor.		●Loosen screws fixing the motor and fan blades. ●Loosen screw bolts fixing the bracket. ●Remove the motor rightward from the fan.

4. Reinstall the fan.		●Place the motor at the proper position. ●Tighten screws fixing the motor and fan blades. ●Tighten screw bolts fixing the motor bracket. ●After the installation, reassemble the unit as before.
Disassembly and Assembly of the Evaporator and Drain Pan		
Step	**Picture**	**Work Instruction**
1. Remove the front panel.		●Loosen screws around the upper panel with a screwdriver. ●Remove the front panel away from the unit.
2. Remove the lower panel (1) and panel (2)and panel (3).		●Loosen screws round the lower panel with a screwdriver. ●Remove the lower panel from unit.
3. Remove the mounting plate of the drain pan and the primary drain pan.		●Loosen screws at both side of the mounting plate with a screwdriver. ●Remove the mounting plate from the unit. ●Remove the primary drain pan from the unit.

4. Remove the fixing plate to the water tray.		●Loosen screws at both side of the mounting plate with a screwdriver. ●Remove the mounting plate from the unit.
5. Remove the secondary drain pan.		●Remove the secondary drain pan from the unit.
6. Remove the evaporator.		●Remove the evaporator away from the primary drain pan. ●Reassemble the unit as before.
Disassembly and Assembly of the Filter		
Step	**Picture**	**Work Instruction**

1. Remove the mounting plate.		●Loosen screws fixing the mounting plate with a screwdriver. ●Remove the mounting plate away from the unit.
2. Remove the filter screen.		●Remove the filter screen away from the unit. ●After replacing the filter screen, reassemble the unit as before.

Section 9: Temperature sensor R-T analysis table

Table 1

Temperature sensor R-T analysis table （15K ）										
Sensor standard resistance：15KΩ±3%　　B:B(25/50)=3950K±2%Reference temperature：25（℃）										
MCU_A/D exchange　±3LSB（at10bit）										
Series (sampling) resistor：10（KΩ）±1%　(except disk sensor)										
Single chip (A/D reference voltage) supply voltage：5V										
Temp		Resistance（KΩ）			MCU Input voltage（V）			A/D Exchange value		
（℃）	（℉）	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
-25.0	-13	183.4	199.1	216.0	0.219	0.239	0.261	42	49	56
-24.0	-11.2	172.8	187.4	203.0	0.233	0.253	0.276	45	52	60
-23.0	-9.4	162.9	176.5	190.9	0.247	0.268	0.292	47	55	63
-22.0	-7.6	153.7	166.2	179.6	0.261	0.284	0.308	50	58	66
-21.0	-5.8	145.0	156.7	169.1	0.277	0.300	0.326	54	61	70
-20.0	-4	136.9	147.7	159.2	0.293	0.317	0.344	57	65	73
-19.0	-2.2	129.2	139.3	150.0	0.310	0.335	0.363	60	69	77
-18.0	-0.4	122.1	131.4	141.4	0.327	0.354	0.382	64	72	81
-17.0	1.4	115.4	124.1	133.3	0.346	0.373	0.402	68	76	85
-16.0	3.2	109.1	117.2	125.7	0.365	0.393	0.424	72	81	90
-15.0	5	103.1	110.7	118.6	0.385	0.414	0.446	76	85	94
-14.0	6.8	97.59	104.6	112.0	0.406	0.436	0.469	80	89	99
-13.0	8.6	92.37	98.88	105.8	0.428	0.459	0.493	85	94	104
-12.0	10.4	87.45	93.52	99.92	0.451	0.483	0.518	89	99	109
-11.0	12.2	82.83	88.48	94.43	0.474	0.508	0.543	94	104	114
-10.0	14	78.48	83.74	89.27	0.499	0.533	0.570	99	109	120
-9.0	15.8	74.39	79.29	84.43	0.525	0.560	0.598	104	115	125
-8.0	17.6	70.54	75.10	79.88	0.551	0.588	0.626	110	120	131
-7.0	19.4	66.90	71.15	75.61	0.579	0.616	0.656	116	126	137
-6.0	21.2	63.48	67.44	71.59	0.607	0.646	0.686	121	132	144
-5.0	23	60.25	63.95	67.80	0.637	0.676	0.718	127	138	150
-4.0	24.8	57.21	60.65	64.24	0.668	0.708	0.750	134	145	157
-3.0	26.6	54.34	57.55	60.89	0.699	0.740	0.784	140	152	163
-2.0	28.4	51.63	54.62	57.73	0.732	0.774	0.818	147	158	171
-1.0	30.2	49.07	51.86	54.76	0.766	0.808	0.853	154	166	178
0.0	32	46.65	49.25	51.95	0.800	0.844	0.890	161	173	185
1.0	33.8	44.37	46.79	49.31	0.836	0.880	0.927	168	180	193
2.0	35.6	42.21	44.47	46.81	0.873	0.918	0.965	176	188	201
3.0	37.4	40.17	42.28	44.46	0.911	0.956	1.005	183	196	209
4.0	39.2	38.24	40.20	42.24	0.949	0.996	1.045	191	204	217
5.0	41	36.41	38.25	40.14	0.989	1.036	1.086	200	212	225
6.0	42.8	34.68	36.39	38.16	1.030	1.078	1.128	208	221	234
7.0	44.6	33.05	34.64	36.29	1.072	1.120	1.170	216	229	243
8.0	46.4	31.50	32.99	34.52	1.114	1.163	1.214	225	238	252
9.0	48.2	30.03	31.42	32.84	1.158	1.207	1.258	234	247	261
10.0	50	28.64	29.94	31.26	1.203	1.252	1.304	243	256	270

11.0	51.8	27.32	28.53	29.77	1.248	1.298	1.350	253	266	279
12.0	53.6	26.07	27.20	28.35	1.294	1.344	1.396	262	275	289
13.0	55.4	24.89	25.94	27.01	1.341	1.391	1.443	272	285	299
14.0	57.2	23.76	24.74	25.74	1.389	1.439	1.491	281	295	308
15.0	59	22.69	23.61	24.54	1.437	1.488	1.540	291	305	318
16.0	60.8	21.68	22.53	23.40	1.486	1.537	1.589	301	315	328
17.0	62.8	20.72	21.51	22.32	1.536	1.587	1.639	312	325	339
18.0	64.4	19.80	20.55	21.30	1.587	1.637	1.689	322	335	349
19.0	66.2	18.94	19.63	20.33	1.637	1.687	1.739	332	346	359
20.0	68	18.11	18.75	19.40	1.689	1.739	1.790	343	356	370
21.0	69.8	17.33	17.93	18.53	1.741	1.790	1.841	354	367	380
22.0	71.6	16.58	17.14	17.70	1.793	1.842	1.893	364	377	391
23.0	73.4	15.87	16.39	16.91	1.846	1.895	1.945	375	388	401
24.0	75.2	15.19	15.68	16.16	1.899	1.947	1.997	386	399	412
25.0	77	14.55	15.00	15.45	1.953	2.000	2.049	397	410	423
26.0	78.8	13.91	14.36	14.80	2.004	2.053	2.103	407	420	434
27.0	80.6	13.31	13.74	14.18	2.056	2.106	2.157	418	431	445
28.0	82.4	12.73	13.16	13.59	2.107	2.159	2.212	429	442	456
29.0	84.2	12.18	12.60	13.03	2.159	2.212	2.267	439	453	467
30.0	86	11.66	12.08	12.49	2.211	2.264	2.321	450	464	478
31.0	87.8	11.17	11.57	11.98	2.262	2.318	2.374	460	475	489
32.0	89.6	10.69	11.09	11.49	2.314	2.371	2.429	471	486	500
33.0	91.4	10.24	10.63	11.03	2.365	2.424	2.483	481	496	511
34.0	93.2	9.816	10.20	10.59	2.416	2.475	2.536	492	507	522
35.0	95	9.408	9.782	10.16	2.468	2.528	2.589	502	518	533
36.0	96.8	9.019	9.385	9.758	2.518	2.579	2.641	513	528	544
37.0	98.6	8.648	9.007	9.372	2.568	2.631	2.694	523	539	555
38.0	100.4	8.294	8.645	9.003	2.619	2.682	2.745	533	549	565
39.0	102.2	7.957	8.300	8.651	2.668	2.732	2.797	543	560	576
40.0	104	7.635	7.971	8.315	2.718	2.782	2.847	554	570	586
41.0	105.8	7.328	7.657	7.993	2.766	2.832	2.898	564	580	596
42.0	107.6	7.034	7.356	7.686	2.815	2.881	2.947	573	590	607
43.0	109.4	6.755	7.069	7.391	2.863	2.929	2.996	583	600	617
44.0	111.2	6.487	6.795	7.110	2.910	2.977	3.045	593	610	627
45.0	113	6.232	6.532	6.841	2.957	3.024	3.092	603	619	636
46.0	114.8	5.988	6.282	6.584	3.003	3.071	3.139	612	629	646
47.0	116.6	5.755	6.042	6.337	3.049	3.117	3.185	621	638	655
48.0	118.4	5.532	5.812	6.101	3.094	3.162	3.231	631	648	665
49.0	120.2	5.319	5.593	5.875	3.138	3.207	3.275	640	657	674
50.0	122	5.115	5.382	5.659	3.181	3.251	3.319	649	666	683
51.0	123.8	4.919	5.180	5.450	3.225	3.294	3.362	657	675	692
52.0	125.6	4.732	4.987	5.251	3.267	3.336	3.405	666	683	700
53.0	127.4	4.553	4.802	5.060	3.309	3.378	3.446	675	692	709
54.0	129.2	4.382	4.625	4.877	3.350	3.419	3.487	683	700	717
55.0	131	4.219	4.457	4.703	3.390	3.459	3.527	691	708	725

56.0	132.8	4.061	4.293	4.534	3.429	3.498	3.566	699	716	733
57.0	134.6	3.911	4.137	4.373	3.468	3.537	3.604	707	724	741
58.0	136.4	3.767	3.988	4.218	3.506	3.574	3.642	715	732	749
59.0	138.2	3.630	3.845	4.070	3.543	3.611	3.678	723	740	756
60.0	140	3.498	3.708	3.927	3.580	3.648	3.714	730	747	764
61.0	141.8	3.371	3.577	3.791	3.616	3.683	3.749	737	754	771
62.0	143.6	3.250	3.450	3.660	3.650	3.717	3.783	745	761	778
63.0	145.4	3.134	3.329	3.534	3.685	3.751	3.816	752	768	785
64.0	147.2	3.022	3.213	3.413	3.718	3.784	3.848	758	775	791
65.0	149	2.915	3.102	3.297	3.751	3.816	3.880	765	782	798
66.0	150.8	2.813	2.995	3.185	3.783	3.848	3.911	772	788	804
67.0	152.6	2.714	2.892	3.078	3.814	3.878	3.941	778	794	810
68.0	154.4	2.620	2.793	2.975	3.845	3.908	3.970	784	800	816
69.0	156.2	2.529	2.698	2.876	3.874	3.938	3.999	790	806	822
70.0	158	2.442	2.607	2.781	3.903	3.966	4.026	796	812	828
71.0	159.8	2.358	2.519	2.689	3.932	3.994	4.054	802	818	833
72.0	161.6	2.278	2.435	2.601	3.960	4.021	4.080	808	823	839
73.0	163.4	2.200	2.354	2.516	3.987	4.047	4.106	813	829	844
74.0	165.2	2.126	2.276	2.435	4.013	4.073	4.131	819	834	849
75.0	167	2.055	2.201	2.356	4.039	4.098	4.155	824	839	854
76.0	168.8	1.986	2.129	2.280	4.064	4.122	4.178	829	844	859
77.0	170.6	1.920	2.060	2.208	4.088	4.146	4.201	834	849	863
78.0	172.4	1.857	1.993	2.138	4.112	4.169	4.223	839	854	868
79.0	174.2	1.796	1.929	2.070	4.135	4.191	4.245	844	858	872
80.0	176	1.737	1.867	2.005	4.158	4.213	4.266	849	863	877
81.0	177.8	1.681	1.808	1.942	4.180	4.234	4.287	853	867	881
82.0	179.6	1.626	1.750	1.882	4.201	4.255	4.307	857	871	885
83.0	181.4	1.574	1.695	1.824	4.222	4.275	4.326	862	876	889
84.0	183.2	1.524	1.642	1.767	4.243	4.295	4.344	866	880	893
85.0	185	1.475	1.590	1.713	4.262	4.314	4.363	870	884	897
86.0	186.8	1.428	1.541	1.661	4.282	4.332	4.381	874	887	900
87.0	188.6	1.383	1.493	1.611	4.300	4.350	4.398	878	891	904
88.0	190.4	1.340	1.447	1.562	4.319	4.368	4.414	881	895	907
89.0	192.2	1.298	1.403	1.515	4.336	4.385	4.431	885	898	910
90.0	194	1.258	1.360	1.470	4.354	4.401	4.446	889	901	914
91.0	195.8	1.219	1.319	1.426	4.370	4.417	4.462	892	905	917
92.0	197.6	1.181	1.279	1.384	4.387	4.433	4.477	895	908	920
93.0	199.4	1.145	1.241	1.343	4.403	4.448	4.491	899	911	923
94.0	201.2	1.110	1.204	1.304	4.418	4.463	4.505	902	914	926
95.0	203	1.077	1.168	1.266	4.433	4.477	4.518	905	917	928
96.0	204.8	1.044	1.134	1.229	4.448	4.491	4.532	908	920	931
97.0	206.6	1.013	1.100	1.194	4.462	4.505	4.544	911	923	934
98.0	208.4	0.9826	1.068	1.160	4.476	4.518	4.557	914	925	936
99.0	210.2	0.9535	1.037	1.127	4.489	4.530	4.569	916	928	939
100.0	212	0.9252	1.007	1.095	4.502	4.543	4.580	919	930	941

101.0	213.8	0.8981	0.9778	1.064	4.515	4.555	4.592	922	933	943
102.0	215.6	0.8717	0.9497	1.034	4.527	4.566	4.603	924	935	946
103.0	217.4	0.8463	0.9225	1.005	4.539	4.578	4.613	927	938	948
104.0	219.2	0.8218	0.8963	0.9767	4.551	4.589	4.624	929	940	950
105.0	221	0.7981	0.8710	0.9497	4.562	4.599	4.634	931	942	952

Table 2:

Temperature sensor R-T analysis table (20K)										
Sensor standard resistance：20KΩ±3%　B:B(25/50)=3950K±2%　reference temperature：25（℃）										
MCU_A/D exchange　±3LSB（at10bit）										
Series（sampling）resistor：10（KΩ）±1%										
Single chip (A/D reference voltage) supply voltage：5V										
Temp		Resistance（KΩ）			MCU Input voltage（V）			A/D Exchange value		
（℃）	（°F）	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
-30	-22	318.3	347.0	377.6	0.128	0.140	0.154	23	29	34
-29	-20.2	299.6	326.2	354.6	0.136	0.149	0.163	25	30	36
-28	-18.4	282.2	306.9	333.4	0.144	0.158	0.173	27	32	38
-27	-16.6	265.9	289.0	313.5	0.153	0.167	0.183	28	34	40
-26	-14.8	250.8	272.2	295.1	0.162	0.177	0.194	30	36	43
-25	-13	236.6	256.5	277.9	0.172	0.188	0.205	32	38	45
-24	-11.2	223.3	241.9	261.8	0.182	0.198	0.216	34	41	47
-23	-9.4	210.9	228.2	246.7	0.193	0.210	0.229	37	43	50
-22	-7.6	199.2	215.3	232.6	0.204	0.222	0.241	39	45	52
-21	-5.8	188.3	203.3	219.4	0.216	0.234	0.255	41	48	55
-20	-4	178.0	192.0	207.0	0.228	0.248	0.268	44	51	58
-19	-2.2	168.3	181.4	195.4	0.241	0.261	0.283	46	54	61
-18	-0.4	159.2	171.4	184.4	0.255	0.276	0.298	49	56	64
-17	1.4	150.7	162.0	174.2	0.269	0.291	0.314	52	60	67
-16	3.2	142.6	153.2	164.6	0.284	0.306	0.331	55	63	71
-15	5	135.0	144.9	155.5	0.299	0.323	0.348	58	66	74
-14	6.8	127.9	137.1	147.0	0.315	0.340	0.366	62	70	78
-13	8.6	121.2	129.8	138.9	0.333	0.358	0.385	65	73	82
-12	10.4	114.9	122.9	131.4	0.350	0.376	0.404	69	77	86
-11	12.2	108.9	116.4	124.3	0.369	0.396	0.424	73	81	90
-10	14	103.3	110.3	117.7	0.388	0.416	0.445	76	85	94
-9	15.8	98.00	104.5	111.4	0.408	0.437	0.467	81	89	99
-8	17.6	93.01	99.10	105.6	0.429	0.458	0.490	85	94	103
-7	19.4	88.29	93.98	100.0	0.450	0.481	0.513	89	98	108
-6	21.2	83.84	89.15	94.78	0.473	0.504	0.538	94	103	113
-5	23	79.63	84.60	89.85	0.496	0.529	0.563	99	108	118
-4	24.8	75.67	80.30	85.12	0.521	0.554	0.589	104	113	124
-3	26.6	71.91	76.24	80.75	0.546	0.580	0.616	109	119	129
-2	28.4	68.37	72.41	76.62	0.572	0.607	0.644	114	124	135
-1	30.2	65.02	68.79	72.72	0.599	0.635	0.672	120	130	141
0	32	61.85	65.37	69.04	0.627	0.663	0.702	125	136	147
1	33.8	58.85	62.14	65.56	0.656	0.693	0.732	131	142	153

2	35.6	56.01	59.08	62.28	0.686	0.724	0.764	137	148	159
3	37.4	53.33	56.20	59.18	0.717	0.755	0.796	144	155	166
4	39.2	50.79	53.46	56.25	0.748	0.788	0.829	150	161	173
5	41	48.38	50.88	53.43	0.782	0.821	0.864	157	168	180
6	42.8	46.10	48.43	50.81	0.815	0.856	0.899	164	175	187
7	44.6	43.94	46.12	48.34	0.850	0.891	0.934	171	182	194
8	46.4	41.90	43.92	45.99	0.886	0.927	0.971	178	190	202
9	48.2	39.95	41.85	43.78	0.922	0.964	1.009	186	198	210
10	50	38.11	39.88	41.68	0.960	1.002	1.047	194	205	218
11	51.8	36.37	38.02	39.69	0.998	1.041	1.087	201	213	226
12	53.6	34.71	36.25	37.81	1.038	1.081	1.127	209	221	234
13	55.4	33.14	34.57	36.03	1.078	1.122	1.168	218	230	242
14	57.2	31.65	32.98	34.34	1.119	1.163	1.210	226	238	251
15	59	30.23	31.47	32.74	1.161	1.206	1.252	235	247	259
16	60.8	28.88	30.04	31.22	1.204	1.249	1.295	244	256	268
17	62.8	27.61	28.69	29.78	1.248	1.292	1.339	252	265	277
18	64.4	26.39	27.40	28.41	1.292	1.337	1.384	262	274	286
19	66.2	25.24	26.17	27.12	1.337	1.382	1.429	271	283	296
20	68	24.14	25.01	25.89	1.383	1.428	1.475	280	293	305
21	69.8	23.09	23.90	24.72	1.430	1.475	1.521	290	302	315
22	71.6	22.10	22.85	23.61	1.477	1.522	1.568	300	312	324
23	73.4	21.16	21.85	22.55	1.525	1.570	1.616	309	321	334
24	75.2	20.26	20.90	21.55	1.574	1.618	1.664	319	331	344
25	77	19.40	20.00	20.60	1.623	1.667	1.712	329	341	354
26	78.8	18.55	19.14	19.73	1.670	1.716	1.763	339	351	364
27	80.6	17.74	18.32	18.91	1.718	1.765	1.814	349	362	375
28	82.4	16.97	17.55	18.12	1.766	1.815	1.866	359	372	385
29	84.2	16.24	16.80	17.37	1.815	1.865	1.917	369	382	396
30	86	15.54	16.10	16.66	1.864	1.916	1.970	379	392	406
31	87.8	14.88	15.43	15.98	1.913	1.966	2.022	389	403	417
32	89.6	14.25	14.79	15.33	1.962	2.017	2.074	399	413	428
33	91.4	13.65	14.18	14.71	2.011	2.068	2.127	409	424	439
34	93.2	13.08	13.59	14.12	2.061	2.119	2.179	419	434	449
35	95	12.53	13.04	13.55	2.111	2.170	2.231	429	444	460
36	96.8	12.01	12.51	13.01	2.160	2.221	2.284	439	455	471
37	98.6	11.52	12.00	12.50	2.210	2.272	2.336	450	465	481
38	100.4	11.05	11.52	12.01	2.260	2.323	2.388	460	476	492
39	102.2	10.60	11.06	11.54	2.309	2.374	2.440	470	486	503
40	104	10.17	10.62	11.09	2.358	2.425	2.492	480	497	513
41	105.8	9.757	10.20	10.66	2.408	2.475	2.543	490	507	524
42	107.6	9.367	9.803	10.25	2.457	2.525	2.594	500	517	534
43	109.4	8.994	9.420	9.856	2.506	2.575	2.645	510	527	545
44	111.2	8.638	9.054	9.480	2.554	2.624	2.695	520	537	555
45	113	8.298	8.705	9.121	2.602	2.673	2.745	530	547	565
46	114.8	7.973	8.371	8.778	2.650	2.722	2.794	540	557	575
47	116.6	7.663	8.051	8.449	2.698	2.770	2.843	549	567	585
48	118.4	7.367	7.745	8.134	2.745	2.818	2.891	559	577	595
49	120.2	7.083	7.453	7.832	2.792	2.865	2.939	569	587	605

50	122	6.812	7.176	7.543	2.838	2.911	2.986	578	596	615
51	123.8	6.553	6.905	7.267	2.883	2.958	3.032	588	606	624
52	125.6	6.305	6.649	7.002	2.929	3.003	3.078	597	615	633
53	127.4	6.068	6.403	6.747	2.974	3.048	3.123	606	624	643
54	129.2	5.841	6.168	6.504	3.018	3.093	3.168	615	633	652
55	131	5.623	5.942	6.270	3.061	3.136	3.212	624	642	661
56	132.8	5.415	5.726	6.046	3.104	3.179	3.255	633	651	670
57	134.6	5.216	5.519	5.831	3.147	3.222	3.297	641	660	678
58	136.4	5.025	5.321	5.625	3.188	3.263	3.339	650	668	687
59	138.2	4.842	5.131	5.428	3.229	3.304	3.380	658	677	695
60	140	4.667	4.948	5.238	3.270	3.345	3.420	667	685	703
61	141.8	4.499	4.773	5.055	3.310	3.385	3.459	675	693	711
62	143.6	4.338	4.605	4.880	3.349	3.423	3.498	683	701	719
63	145.4	4.183	4.444	4.712	3.388	3.462	3.536	691	709	727
64	147.2	4.035	4.289	4.551	3.425	3.499	3.573	699	717	735
65	149	3.893	4.140	4.396	3.463	3.536	3.609	706	724	742
66	150.8	3.756	3.998	4.247	3.499	3.572	3.645	714	732	749
67	152.6	3.625	3.861	4.103	3.535	3.607	3.679	721	739	757
68	154.4	3.500	3.729	3.966	3.570	3.642	3.713	728	746	763
69	156.2	3.379	3.603	3.833	3.604	3.676	3.747	735	753	770
70	158	3.263	3.481	3.706	3.638	3.709	3.779	742	760	777
71	159.8	3.152	3.364	3.583	3.671	3.741	3.811	749	766	783
72	161.6	3.045	3.252	3.466	3.703	3.773	3.842	755	773	790
73	163.4	2.942	3.144	3.352	3.735	3.804	3.872	762	779	796
74	165.2	2.843	3.040	3.243	3.766	3.834	3.902	768	785	802
75	167	2.748	2.940	3.138	3.797	3.864	3.931	775	791	808
76	168.8	2.657	2.844	3.037	3.826	3.893	3.959	781	797	814
77	170.6	2.569	2.751	2.940	3.855	3.921	3.986	787	803	819
78	172.4	2.485	2.662	2.846	3.884	3.949	4.013	792	809	825
79	174.2	2.403	2.577	2.756	3.911	3.976	4.039	798	814	830
80	176	2.325	2.494	2.669	3.938	4.002	4.064	804	820	835
81	177.8	2.250	2.415	2.585	3.965	4.027	4.089	809	825	840
82	179.6	2.178	2.338	2.504	3.991	4.053	4.113	814	830	845
83	181.4	2.108	2.264	2.426	4.016	4.077	4.137	819	835	850
84	183.2	2.041	2.193	2.351	4.040	4.101	4.159	824	840	855
85	185	1.976	2.125	2.279	4.064	4.124	4.182	829	845	859
86	186.8	1.914	2.059	2.209	4.088	4.146	4.203	834	849	864
87	188.6	1.854	1.995	2.142	4.111	4.168	4.225	839	854	868
88	190.4	1.796	1.934	2.077	4.133	4.190	4.245	843	858	872
89	192.2	1.740	1.875	2.014	4.155	4.211	4.265	848	862	877
90	194	1.687	1.818	1.954	4.176	4.231	4.284	852	866	880
91	195.8	1.635	1.763	1.895	4.197	4.251	4.303	856	871	884
92	197.6	1.585	1.710	1.839	4.217	4.270	4.322	861	874	888
93	199.4	1.537	1.659	1.785	4.236	4.289	4.340	865	878	892
94	201.2	1.490	1.609	1.732	4.256	4.307	4.357	869	882	895
95	203	1.446	1.561	1.681	4.274	4.325	4.374	872	886	899
96	204.8	1.402	1.515	1.632	4.292	4.342	4.391	876	889	902
97	206.6	1.360	1.471	1.585	4.310	4.359	4.407	880	893	905

98	208.4	1.320	1.428	1.539	4.327	4.375	4.422	883	896	909
99	210.2	1.281	1.386	1.495	4.344	4.391	4.437	887	899	912
100	212	1.243	1.346	1.452	4.360	4.407	4.452	890	903	915
101	213.8	1.207	1.307	1.411	4.376	4.422	4.466	893	906	918
102	215.6	1.172	1.270	1.371	4.392	4.437	4.480	896	909	921
103	217.4	1.137	1.233	1.332	4.407	4.451	4.494	900	912	923
104	219.2	1.104	1.198	1.295	4.422	4.465	4.507	903	914	926
105	221	1.070	1.164	1.258	4.436	4.479	4.521	906	917	929

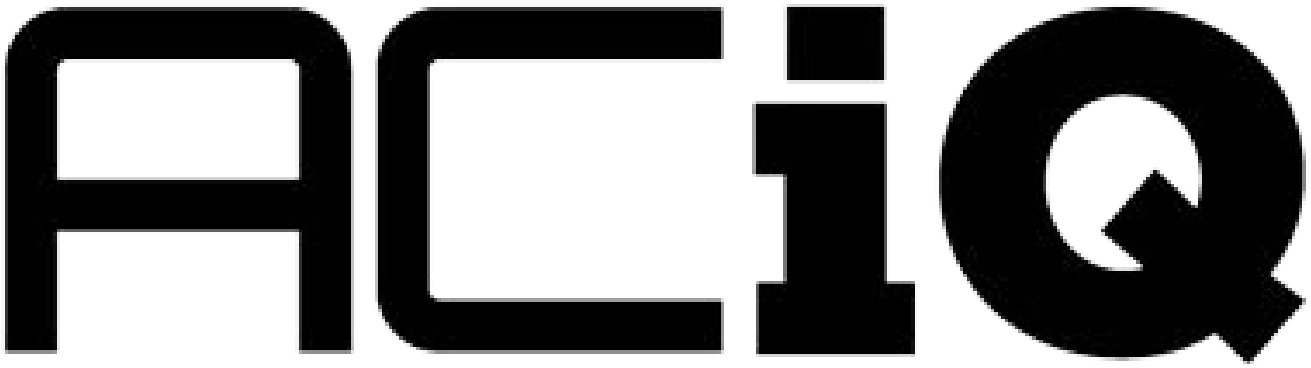
Table 3:

Temperature sensor R-T analysis table (50K)										
Sensor standard resistance：50KΩ±2% B:B(25/50)=3950K±2% reference temperature：25（℃）										
MCU_A/D exchange ±2LSB（at8bit）										
Series（sampling）resistor：5.1（KΩ）±1%										
Single chip (A/D reference voltage) supply voltage：5V										
Temp		Resistance（KΩ）			MCU Input voltage（V）			A/D Exchange value		
（℃）	（℉）	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
-20	-4	465.7	486.2	507.3	0.049	0.052	0.055	1	3	5
-19	-2.2	439.7	458.7	478.3	0.052	0.055	0.058	1	3	5
-18	-0.4	415.2	432.9	451.2	0.055	0.058	0.061	1	3	5
-17	1.4	392.2	408.8	425.8	0.059	0.062	0.065	1	3	5
-16	3.2	370.7	386.1	402	0.062	0.065	0.069	1	3	6
-15	5	350.5	364.8	379.6	0.066	0.069	0.072	1	4	6
-14	6.8	331.5	344.9	358.6	0.069	0.073	0.077	2	4	6
-13	8.6	313.7	326.2	339	0.073	0.077	0.081	2	4	6
-12	10.4	296.9	308.6	320.5	0.078	0.081	0.085	2	4	6
-11	12.2	281.2	292	303.2	0.082	0.086	0.090	2	4	7
-10	14	266.4	276.5	286.9	0.086	0.091	0.095	2	5	7
-9	15.8	252.4	261.8	271.5	0.091	0.096	0.100	3	5	7
-8	17.6	239.3	248.1	257.1	0.096	0.101	0.105	3	5	7
-7	19.4	226.9	235.1	243.6	0.102	0.106	0.111	3	5	8
-6	21.2	215.2	222.9	230.8	0.107	0.112	0.117	3	6	8
-5	23	204.3	211.5	218.8	0.113	0.118	0.123	4	6	8
-4	24.8	193.9	200.6	207.5	0.119	0.124	0.129	4	6	9
-3	26.6	184.1	190.4	196.8	0.125	0.130	0.136	4	7	9
-2	28.4	174.9	180.8	186.8	0.132	0.137	0.143	5	7	9
-1	30.2	166.2	171.7	177.3	0.138	0.144	0.150	5	7	10
0	32	158	163.1	168.4	0.146	0.152	0.158	5	8	10
1	33.8	150.2	155	159.9	0.153	0.159	0.166	6	8	10
2	35.6	142.9	147.4	152	0.161	0.167	0.174	6	9	11
3	37.4	136	140.2	144.5	0.169	0.175	0.182	7	9	11
4	39.2	129.4	133.3	137.4	0.177	0.184	0.191	7	9	12
5	41	123.2	126.9	130.6	0.186	0.193	0.201	8	10	12
6	42.8	117.3	120.8	124.3	0.195	0.203	0.210	8	10	13
7	44.6	111.8	115	118.3	0.205	0.212	0.220	8	11	13
8	46.4	106.5	109.6	112.6	0.215	0.222	0.231	9	11	14

9	48.2	101.5	104.4	107.2	0.225	0.233	0.241	10	12	14
10	50	96.82	99.47	102.2	0.235	0.244	0.253	10	12	15
11	51.8	92.34	94.83	97.35	0.247	0.255	0.264	11	13	16
12	53.6	88.1	90.43	92.79	0.258	0.267	0.276	11	14	16
13	55.4	84.08	86.26	88.47	0.270	0.279	0.289	12	14	17
14	57.2	80.26	82.31	84.37	0.282	0.292	0.302	12	15	17
15	59	76.64	78.55	80.49	0.295	0.305	0.315	13	16	18
16	60.8	73.2	74.99	76.8	0.308	0.318	0.329	14	16	19
17	62.8	69.93	71.62	73.31	0.322	0.332	0.343	14	17	20
18	64.4	66.83	68.41	69.99	0.336	0.347	0.358	15	18	20
19	66.2	63.88	65.36	66.85	0.351	0.362	0.373	16	19	21
20	68	61.08	62.47	63.86	0.366	0.377	0.389	17	19	22
21	69.8	58.42	59.72	61.02	0.382	0.393	0.405	18	20	23
22	71.6	55.88	57.1	58.32	0.398	0.410	0.422	18	21	24
23	73.4	53.47	54.61	55.76	0.415	0.427	0.439	19	22	24
24	75.2	51.18	52.25	53.32	0.433	0.445	0.457	20	23	25
25	77	49	50	51	0.450	0.463	0.476	21	24	26
26	78.8	46.88	47.86	48.84	0.468	0.481	0.495	22	25	27
27	80.6	44.87	45.82	46.78	0.487	0.501	0.515	23	26	28
28	82.4	42.95	43.88	44.82	0.506	0.521	0.535	24	27	29
29	84.2	41.12	42.03	42.95	0.526	0.541	0.557	25	28	30
30	86	39.38	40.27	41.17	0.546	0.562	0.578	26	29	32
31	87.8	37.73	38.59	39.47	0.567	0.584	0.601	27	30	33
32	89.6	36.15	37	37.85	0.588	0.606	0.624	28	31	34
33	91.4	34.64	35.47	36.3	0.611	0.629	0.647	29	32	35
34	93.2	33.21	34.02	34.83	0.633	0.652	0.671	30	33	36
35	95	31.84	32.63	33.42	0.656	0.676	0.696	32	35	38
36	96.8	30.54	31.31	32.08	0.680	0.700	0.722	33	36	39
37	98.6	29.29	30.04	30.8	0.704	0.726	0.748	34	37	40
38	100.4	28.11	28.84	29.58	0.729	0.751	0.774	35	38	42
39	102.2	26.97	27.69	28.41	0.755	0.778	0.802	37	40	43
40	104	25.89	26.59	27.29	0.781	0.805	0.830	38	41	44
41	105.8	24.86	25.54	26.22	0.807	0.832	0.858	39	43	46
42	107.6	23.87	24.53	25.2	0.835	0.861	0.887	41	44	47
43	109.4	22.93	23.57	24.23	0.862	0.889	0.917	42	46	49
44	111.2	22.03	22.66	23.29	0.891	0.919	0.948	44	47	51
45	113	21.17	21.78	22.4	0.920	0.949	0.978	45	49	52
46	114.8	20.34	20.94	21.54	0.949	0.979	1.010	47	50	54
47	116.6	19.56	20.14	20.73	0.979	1.010	1.042	48	52	55
48	118.4	18.8	19.37	19.94	1.010	1.042	1.075	50	53	57
49	120.2	18.08	18.63	19.2	1.041	1.075	1.109	51	55	59
50	122	17.39	17.93	18.48	1.073	1.107	1.143	53	57	61
51	123.8	16.73	17.26	17.79	1.105	1.140	1.177	55	58	62
52	125.6	16.1	16.61	17.13	1.138	1.175	1.212	56	60	64
53	127.4	15.5	15.99	16.5	1.172	1.209	1.247	58	62	66
54	129.2	14.92	15.4	15.9	1.205	1.244	1.283	60	64	68
55	131	14.36	14.83	15.32	1.239	1.279	1.320	61	66	70
56	132.8	13.83	14.29	14.76	1.274	1.315	1.357	63	67	71

57	134.6	13.32	13.77	14.23	1.309	1.351	1.394	65	69	73
58	136.4	12.83	13.27	13.71	1.346	1.388	1.432	67	71	75
59	138.2	12.36	12.79	13.22	1.382	1.425	1.471	69	73	77
60	140	11.91	12.33	12.75	1.418	1.463	1.510	71	75	79
61	141.8	11.48	11.89	12.3	1.455	1.501	1.549	73	77	81
62	143.6	11.07	11.46	11.87	1.492	1.540	1.588	74	79	83
63	145.4	10.67	11.06	11.45	1.530	1.578	1.628	76	81	85
64	147.2	10.29	10.67	11.05	1.568	1.617	1.668	78	83	87
65	149	9.927	10.29	10.66	1.607	1.657	1.708	80	85	89
66	150.8	9.577	9.931	10.29	1.646	1.696	1.749	82	87	92
67	152.6	9.24	9.585	9.94	1.684	1.736	1.790	84	89	94
68	154.4	8.916	9.253	9.599	1.723	1.777	1.831	86	91	96
69	156.2	8.605	8.934	9.271	1.763	1.817	1.872	88	93	98
70	158	8.307	8.627	8.955	1.803	1.858	1.914	90	95	100
71	159.8	8.02	8.331	8.652	1.843	1.899	1.955	92	97	102
72	161.6	7.744	8.048	8.36	1.883	1.939	1.997	94	99	104
73	163.4	7.479	7.775	8.079	1.923	1.981	2.039	96	101	106
74	165.2	7.224	7.512	7.809	1.963	2.022	2.081	99	104	109
75	167	6.979	7.26	7.549	2.004	2.063	2.123	101	106	111
76	168.8	6.743	7.017	7.299	2.044	2.104	2.165	103	108	113
77	170.6	6.516	6.783	7.059	2.085	2.146	2.208	105	110	115
78	172.4	6.298	6.558	6.827	2.126	2.187	2.250	107	112	117
79	174.2	6.088	6.342	6.603	2.167	2.229	2.292	109	114	119
80	176	5.886	6.133	6.388	2.207	2.270	2.334	111	116	121
81	177.8	5.691	5.932	6.181	2.248	2.311	2.375	113	118	124
82	179.6	5.504	5.739	5.982	2.289	2.353	2.417	115	120	126
83	181.4	5.323	5.552	5.789	2.329	2.394	2.459	117	123	128
84	183.2	5.149	5.373	5.604	2.370	2.435	2.500	119	125	130
85	185	4.982	5.2	5.425	2.410	2.476	2.542	121	127	132
86	186.8	4.82	5.033	5.253	2.450	2.517	2.583	123	129	134
87	188.6	4.665	4.872	5.087	2.491	2.557	2.624	126	131	136
88	190.4	4.515	4.717	4.927	2.531	2.598	2.664	128	133	138
89	192.2	4.371	4.568	4.772	2.571	2.638	2.705	130	135	140
90	194	4.232	4.424	4.623	2.610	2.677	2.745	132	137	143
91	195.8	4.097	4.285	4.479	2.650	2.717	2.785	134	139	145
92	197.6	3.968	4.151	4.341	2.688	2.756	2.824	136	141	147
93	199.4	3.843	4.021	4.207	2.727	2.796	2.864	138	143	149
94	201.2	3.722	3.897	4.077	2.766	2.834	2.903	140	145	151
95	203	3.606	3.776	3.952	2.805	2.873	2.941	142	147	153
96	204.8	3.494	3.66	3.832	2.843	2.911	2.979	144	149	155
97	206.6	3.386	3.548	3.716	2.880	2.949	3.017	145	151	156
98	208.4	3.281	3.439	3.603	2.918	2.986	3.054	147	153	158
99	210.2	3.181	3.335	3.495	2.955	3.023	3.091	149	155	160
100	212	3.083	3.233	3.39	2.991	3.060	3.128	151	157	162
101	213.8	2.989	3.136	3.288	3.028	3.096	3.164	153	159	164
102	215.6	2.898	3.041	3.19	3.064	3.132	3.200	155	160	166
103	217.4	2.811	2.95	3.096	3.099	3.168	3.235	157	162	168
104	219.2	2.726	2.862	3.004	3.135	3.203	3.270	159	164	169

105	221	2.644	2.777	2.916	3.169	3.237	3.304	160	166	171
106	222.8	2.565	2.695	2.83	3.204	3.271	3.338	162	167	173
107	224.6	2.488	2.615	2.748	3.238	3.305	3.372	164	169	175
108	226.4	2.415	2.538	2.667	3.272	3.339	3.404	166	171	176
109	228.2	2.343	2.464	2.59	3.305	3.371	3.437	167	173	178
110	230	2.274	2.392	2.515	3.338	3.404	3.469	169	174	180
111	231.8	2.207	2.323	2.443	3.370	3.435	3.500	171	176	181
112	233.6	2.143	2.255	2.373	3.401	3.467	3.531	172	178	183
113	235.4	2.08	2.19	2.305	3.433	3.498	3.562	174	179	184
114	237.2	2.02	2.127	2.239	3.464	3.528	3.592	175	181	186
115	239	1.961	2.066	2.176	3.494	3.558	3.621	177	182	187
116	240.8	1.905	2.007	2.114	3.524	3.588	3.650	178	184	189
117	242.6	1.85	1.95	2.055	3.554	3.617	3.679	180	185	190
118	244.4	1.797	1.895	1.997	3.583	3.645	3.707	181	187	192
119	246.2	1.746	1.841	1.941	3.612	3.674	3.734	183	188	193
120	248	1.696	1.789	1.887	3.640	3.702	3.762	184	190	195
121	249.8	1.648	1.739	1.834	3.668	3.729	3.788	186	191	196
122	251.6	1.602	1.69	1.784	3.695	3.756	3.814	187	192	197
123	253.4	1.556	1.643	1.734	3.722	3.782	3.840	189	194	199
124	255.2	1.513	1.598	1.687	3.748	3.807	3.865	190	195	200
125	257	1.471	1.554	1.641	3.774	3.832	3.889	191	196	201
126	258.8	1.43	1.511	1.596	3.799	3.857	3.914	193	197	202
127	260.6	1.39	1.469	1.552	3.824	3.882	3.937	194	199	204
128	262.4	1.351	1.429	1.51	3.849	3.906	3.961	195	200	205
129	264.2	1.314	1.39	1.469	3.873	3.929	3.984	196	201	206
130	266	1.278	1.352	1.43	3.896	3.952	4.006	197	202	207
131	267.8	1.243	1.315	1.391	3.920	3.975	4.028	199	204	208
132	269.6	1.209	1.28	1.354	3.943	3.997	4.050	200	205	209
133	271.4	1.176	1.245	1.318	3.965	4.019	4.071	201	206	210
134	273.2	1.144	1.212	1.283	3.987	4.040	4.091	202	207	211
135	275	1.113	1.179	1.249	4.008	4.061	4.112	203	208	213
136	276.8	1.083	1.148	1.216	4.030	4.081	4.131	204	209	214
137	278.6	1.054	1.117	1.184	4.050	4.102	4.151	205	210	215
138	280.4	1.026	1.088	1.153	4.070	4.121	4.169	206	211	215
139	282.2	0.9986	1.059	1.123	4.090	4.140	4.188	207	212	216
140	284	0.9721	1.031	1.093	4.110	4.159	4.206	208	213	217
141	285.8	0.9463	1.004	1.065	4.129	4.178	4.224	209	214	218
142	287.6	0.9213	0.9778	1.037	4.148	4.196	4.241	210	215	219
143	289.4	0.897	0.9523	1.011	4.166	4.213	4.258	211	216	220
144	291.2	0.8734	0.9275	0.9845	4.184	4.231	4.275	212	217	221
145	293	0.8505	0.9034	0.9593	4.202	4.248	4.291	213	217	222
146	294.8	0.8283	0.8801	0.9347	4.219	4.264	4.307	214	218	223
147	296.6	0.8068	0.8574	0.9108	4.236	4.280	4.323	215	219	223
148	298.4	0.7858	0.8354	0.8877	4.252	4.296	4.338	216	220	224
149	300.2	0.7655	0.814	0.8652	4.269	4.312	4.353	217	221	225
150	302	0.7458	0.7932	0.8433	4.284	4.327	4.368	217	222	226



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