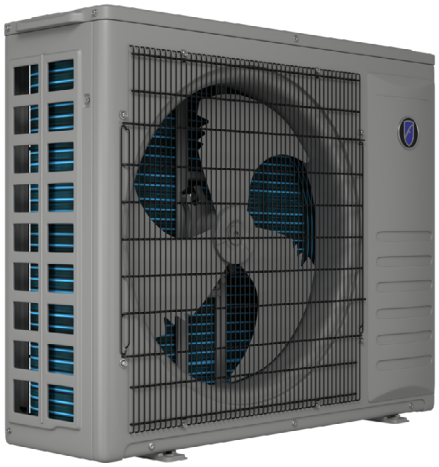
Service Manual

FRIEDRICH

Friedrich Breeze™ Premier Universal Heat Pumps R-454B Refrigerant Matched ODU to AHU Set







Outdoor Unit — **230-Volt:** FPHFR24A3D, FPHFR36A3D, FPHFR48A3D

Indoor Air Handler Unit — **230-Volt:** FPHFA18A3D, FPHFA24A3D, FPHFA36A3D, FPHFA48A3D

THE EXPERTS IN ROOM AIR CONDITIONING

96162005_00

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INTRODUCTION

Important Safety Information

The information in this manual is intended for use by a qualified technician who is familiar with the safety procedures required for installation and repair, and who is equipped with the proper tools and test instruments required to service this product.

Installation or repairs made by unqualified persons can result in subjecting the unqualified person making such repairs as well as the persons being served by the equipment to hazards resulting in injury or electrical shock which can be serious or even fatal.

Maintenance is the responsibility of the owner. Failure to properly maintain or repair equipment may result in personal injury and/or various types of property damage (fire, flood, etc.).

Safety warnings have been placed throughout this manual to alert you to potential hazards that may be encountered. If you install or perform service on equipment, it is your responsibility to read and obey these warnings to guard against any bodily injury or property damage which may result to you or others. Due to continuing research in new energy-saving technology, all information in this manual is subject to change without notice.

This service manual is designed to be used in conjunction with the installation and operation manuals provided with each air conditioning system.
This service manual was written to assist the professional service technician to quickly and accurately diagnose and repair malfunctions.

Installation procedures are not given in this manual. They are given in the Installation/Operation manual which can be acquired on the Friedrich website. Click the Link or scan the QR code to be directed to the Professional page where you can locate our technical literature.

SAFETY IS IMPORTANT

We have provided many important safety messages in this manual and on your appliance. Always read and obey all safety messages.

This is a safety Alert symbol. This symbol alerts you to potential hazards that can kill or hurt you and others.

All safety messages will tell you what the potential hazard is, tell you how to reduce the chance of injury, and tell you what will happen if the instructions are not followed.

All safety messages will follow the safety alert symbol with the word “WARNING” or “CAUTION”. These words mean:

WARNING Indicates a hazard which, if not avoided, can result in severe personal injury or death and damage to product or other property.

CAUTION Indicates a hazard which, if not avoided, can result in personal injury and damage to product or other property.

NOTICE Indicates property damage can occur if instructions are not followed.



This symbol indicates that this appliance uses a flammable refrigerant. If the refrigerant is leaked and is exposed to an external ignition source, there is a risk of fire.



This symbol indicates that the Operation Manual should be read carefully.



This symbol indicates that service personnel should be handling this equipment with reference to the installation manual.



This symbol indicates that information is available such as the Installation and Operation manual, or the Service Manual.

INTRODUCTION

Personal Injury Or Death Hazards

	⚠ WARNING	⚠ AVERTISSEMENT	⚠ ADVERTENCIA
SAFETY FIRST	Do not remove, disable or bypass this unit's safety devices. Doing so may cause fire, Doing so may cause fire, injuries, or death.	Ne pas supprime, désactiver ou contourner cette l´unité des dispositifs de sécurité, faire vous risqueriez de provoquer le feu, les blessures ou la mort.	No eliminar, desactivar o pasar por alto los dispositivos de seguridad de la unidad. Si lo hace podría producirse fuego, lesiones o muerte.

⚠ WARNING
ALWAYS USE INDUSTRY STANDARD PERSONAL PROTECTIVE EQUIPMENT (PPE)

ELECTRICAL HAZARDS:

- Unplug and/or disconnect all electrical power to the unit before performing inspections, maintenance, or service.
- Make sure to follow proper lockout/tag out procedures.
- Always work in the company of a qualified assistant if possible.
- Capacitors, even when disconnected from the electrical power source, retain an electrical charge potential capable of causing electric shock or electrocution.
- Handle, discharge, and test capacitors according to safe, established, standards, and approved procedures.
- Extreme care, proper judgment, and safety procedures must be exercised if it becomes necessary to test or troubleshoot equipment with the power on to the unit.
- Do not spray water on the air conditioning unit while the power is on.
- Electrical component malfunction caused by water could result in electric shock or other electrically unsafe conditions when the power is restored and the unit is turned on, even after the exterior is dry.
- Use air conditioner on a single dedicated circuit within the specified amperage rating.
- Never operate the unit on an extension cord.
- Follow all safety precautions and use proper and adequate protective safety aids such as: gloves, goggles, clothing, properly insulated tools, and testing equipment etc.
- Failure to follow proper safety procedures and/or these warnings can result in serious injury or death.

INTRODUCTION

Personal Injury Or Death Hazards

- REFRIGERATION SYSTEM REPAIR HAZARDS:
- Use approved standard refrigerant recovering procedures and equipment to relieve high pressure before opening system for repair. Reference EPA regulations (40 CFR Part 82, Subpart F) Section 608.
- Do not allow liquid refrigerant to contact skin. Direct contact with liquid refrigerant can result in minor to moderate injury.
- Be extremely careful when using an oxy-acetylene torch. Direct contact with the torch's flame or hot surfaces can cause serious burns.
- Make certain to protect personal and surrounding property with fire proof materials and have a fire extinguisher at hand while using a torch.
- Provide adequate ventilation to vent off toxic fumes, and work with a qualified assistant whenever possible.
- Always use a pressure regulator when using dry nitrogen to test the sealed refrigeration system for leaks, flushing etc.
- MECHANICAL HAZARDS:
- Extreme care, proper judgment and all safety procedures must be followed when testing, troubleshooting, handling, or working around unit with moving and/or rotating parts.
- Be careful when, handling and working around exposed edges and corners of the sleeve, chassis, and other unit components especially the sharp fins of the indoor and outdoor coils.
- Use proper and adequate protective aids such as: gloves, clothing, safety glasses etc.
- Failure to follow proper safety procedures and/or these warnings can result in serious injury or death.
- PROPERTY DAMAGE HAZARDS
- FIRE DAMAGE HAZARDS:
- Read the Installation/Operation Manual for the air conditioning unit prior to operating.
- Use air conditioner on a single dedicated circuit within the specified amperage rating.
- Be extremely careful when using acetylene torch and protect surrounding property.
- Failure to follow these instructions can result in fire and minor to serious property damage.
- WATER DAMAGE HAZARDS:
- Improper installation, maintenance or servicing of the air conditioner unit can result in water damage to personal items or property.
- Ensure that the units drain has sufficient pitch to the outside to allow water to drain from the unit.
- Do not drill holes in the bottom of the drain pan or the underside of the unit.
- Failure to follow these instructions can result in damage to the unit and/or minor to serious property damage.

INTRODUCTION

Personal Injury Or Death Hazards

⚠WARNING: The manufacturer's warranty does not cover any damage or defect to the air conditioner caused by the attachment or use of any components, accessories or devices (other than those authorized by the manufacturer) into, onto or in conjunction with the air conditioner. You should be aware that the use of unauthorized components, accessories or devices may adversely affect the operation of the air conditioner and may also endanger life and property. The manufacturer disclaims any responsibility for such loss or injury resulting from the use of such unauthorized components, accessories or devices.

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

Children should be supervised to ensure that they do not play with the appliance.

⚠WARNING: The maximum altitude for this appliance is 2,000 meters(6,562 feet).

Do not use above 2,000 meters(6,562 feet).

⚠WARNING: Electrical Shock Hazard



Disconnect all power to the unit before starting maintenance. All electrical connections and wiring MUST be installed by a qualified electrician and conform to the National Code and all local codes which have jurisdiction. Failure to do so can result in property damage, severe electrical shock or death.

⚠WARNING: Read Installation Manual



Read this manual thoroughly prior to equipment installation or operation. It is the installer's responsibility to properly apply and install the equipment. Installation must be in conformance with the NFPA 70-2023 national electric code or current edition, International Mechanic code 2021 or current edition, and any other local or national codes.

⚠WARNING: Safety First

Do not remove, disable, or bypass this unit's safety devices. Doing so may cause fire, injuries, or death.

⚠WARNING: This Product uses R-454B Refrigerant



Refrigerant Safety Group A2L

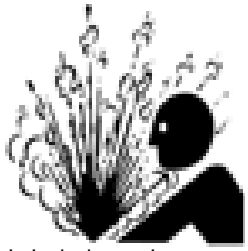
Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.

The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater.

Do not pierce or burn.

Be aware that refrigerants may not contain an odor.

⚠WARNING: Refrigeration System under High pressure



Do not puncture, heat, expose to flame or incinerate. Only certified refrigeration technicians should service this equipment. R32 systems operate at higher pressures than R22 equipment. Appropriate safe service and handling practices must be used.

⚠CAUTION: Do Not Operate Equipment During Active Stages Of Construction

To ensure proper operation, Friedrich requires that all equipment is not operated during active construction phases. This includes active stages of completing framing, drywalling, spackling, sanding, painting, flooring, and moulding in the equipment's designated conditioning space. The use of this equipment during construction could result in premature failure of the components and/or system and is in violation of our standard warranty guidelines. The operation of newly installed equipment during construction will accelerate the commencement and/or termination of the warranty period.

⚠WARNING: Keep all air circulation and ventilation openings free from obstruction.

⚠WARNING: The unit should not be in contact with any equipment that will transmit vibration to the unit. Any excessive vibration or pulsation to the unit could result in damage to the refrigerant tubing.

INTRODUCTION

Model Identification Guide

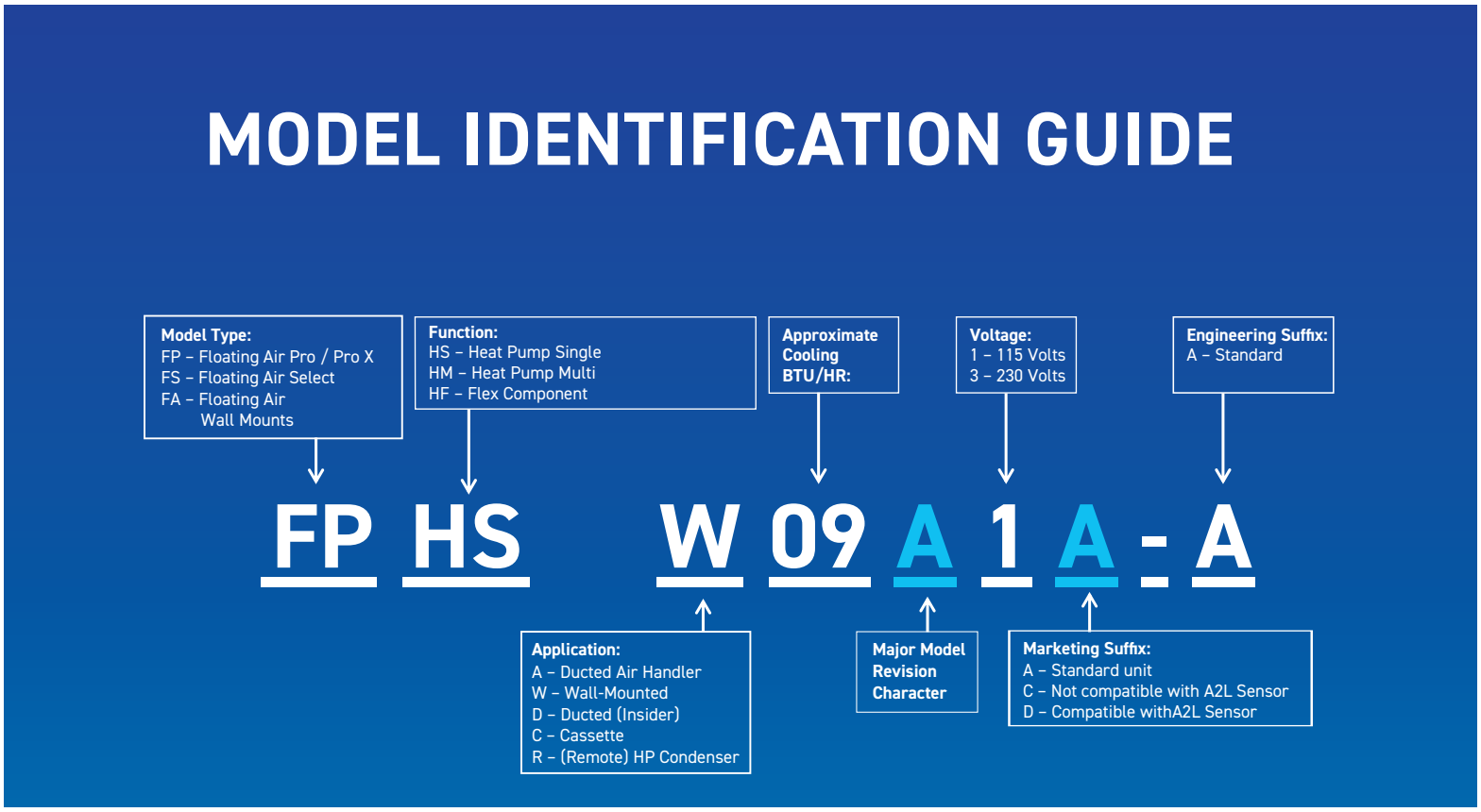


Figure 103 (Model Number Reference Guide)

Serial Number Reference Guide

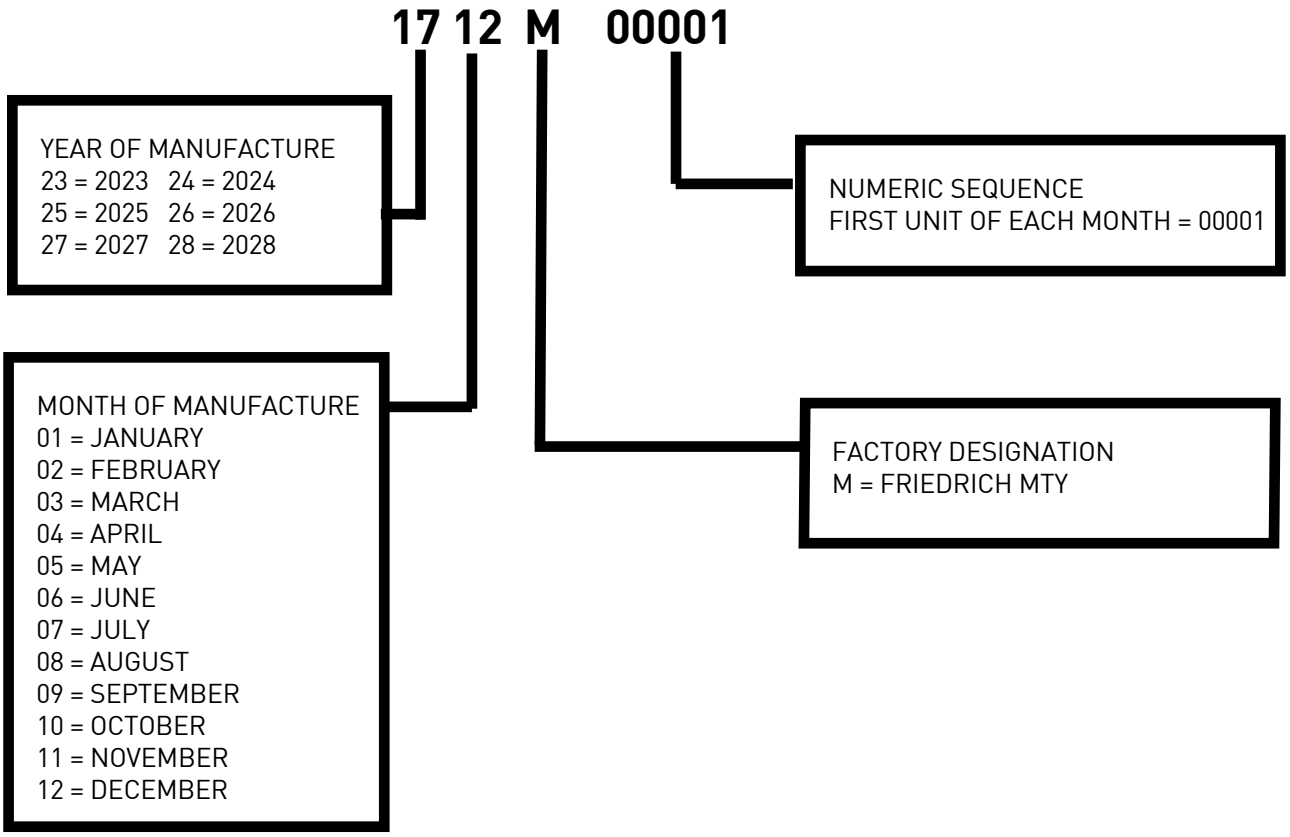


Figure 104 (Serial Number Reference Guide)

SPECIFICATION

18k-24k BTU

Indoor Model Number			FPHFA18A3D	FPHFA24A3D
Outdoor Model Number			FPHFR24A3D	FPHFR24A3D
E-STAR__V6.1			Y	Y
NEEP			Y	Y
Canada Greener Home Program			Y	Y
Power Supply		V/ph/Hz	208~230/1/60	208~230/1/60
Energy Star			Y	Y
Cooling	Rated Capacity at 95˚F	Btu/h	18000	24000
	Cooling Capacity Range(MIN-MAX)	Btu/h	9700-23300	9720-31000
	Cooling Capacity Range(MIN-MAX)	W	2843-6829	2849-9085
	Capacity at 115˚F	Btu/h	16800	24000
	Power Input	W	1538	2050
	Current	A	7.1	9.3
	EER2 at 95˚F	Btu/h/W	11.7	11.7
	SEER2	Btu/h/W	19.0	19
	Operating temperature range Indoor	˚F	61-86	61-86
		˚C	16-30	16-30
	Operating temperature range Outdoor	˚F	5~125	5~125
		˚C	-15~52	-15~52
Heating	Rated Capacity at 47˚F	Btu/h	18000	24000
	Heating Capacity Range(MIN-MAX)	Btu/h	10000-24600	9990-29000
	Heating Capacity Range(MIN-MAX)	W	2930-7210	2929-8500
	Power Input	W	1425	1900
	Current	A	6.5	8.7
	COP2 at 47˚F	W/W	3.7	3.7
	COP @ 5˚F	W/W	1.9	1.9
	HSPF2	Btu/h/W	10.0	10
	Rated Capacity Heating at 17°F(-8.3˚C)	Btu/h	18000	18500
	Maximum Heating Capacity @17˚F(-8.3˚C)	Btu/h	18000	24000
	Maximum Heating Capacity @5˚F(-15˚C)	Btu/h	18000	24000
	Maximum Heating Capacity @-5˚F(-20.5˚C)	Btu/h	14400	19000
	Maximum Heating Capacity @-13˚F(-25˚C)	Btu/h	13400	17800
	Maximum Heating Capacity @-22˚F(-30˚C)	Btu/h	13200	16800
	Operating temperature range Indoor	˚F	61-86	61-86
		˚C	16-30	16-30
	Operating temperature range Outdoor	˚F	-13~75	-13~75
		˚C	-25~24	-25~24

Figure 201

SPECIFICATIONS

18k-24k BTU

Indoor Model Number			**FPHFA18A3D**	**FPHFA24A3D**
Outdoor Model Number			**FPHFR24A3D**	**FPHFR24A3D**
Electrical	Rated Current	Cooling (A)	7.1	9.3
		Heating (A)	6.5	8.7
	MOP (Maximum Overcurrent Protection)	Amps	25 Serial Numbers after 2510F03601)	25 Serial Numbers after 2510F03601)
	MOP (Maximum Overcurrent Protection)		30 (Serial Numbers 2510F03601and Prior)	30 ((Serial Numbers 2510F03601and Prior)
	MCA(Minimum Circuit Ampacity)		22	22
	Thermostat type		wired	wired
	Communication wire size and type		4 x 14 AWG stranded THHN	4 x 14 AWG stranded THHN
	Thermostat Wire		6-10 x 18 AWG*	6-10 x 18 AWG*
Indoor AirFlow	Rated	m3/h	1360	1360
		CFM	800	800
	Min-Max	m3/h	900-1400	900-1400
		CFM	529-823	529-823
	Ultra low speed	m3/h	900	900
		CFM	529	529
ESP	Rated	In.W.C.(Pa)	0.58(145Pa)	0.58(145Pa)
	Range	In.W.C.(Pa)	0-0.8(200Pa)	0-0.8(200Pa)
Indoor Noise (Sound Pressure)		dB(A)	51	51
Outdoor Noise (Sound Pressure)		dB(A)	59	59
Indoor fan motor (DC inverter)	Qty		1	1
	Model		ZW702B500035	ZW702B500035
	output	W[HP]	373[1/2]	373[1/2]
	RLA	A	2.6	2.6
	Speed	r/min	350~1400	350~1400
Indoor Coil	Number of Rows		6	6
	Tube Pitch(a)	mm	21	21
		in	0.827	0.827
	Row Pitch(b)	mm	13.6	13.6
		in	0.535	0.535
	Fin Spacing	mm	1.4	1.4
		Fins Per in	18	18
	Fin Type		Hydrophilic aluminium	Hydrophilic aluminium
	Tube Outside Diameter and Type	mm	Φ7,innergroove aluminium tube	Φ7,innergroove aluminium tube
	Coil Dimension(WxHxD)	mm	2×(405×420×40.8)	2×(405×420×40.8)
		in	2×(16×16-1/2×1-5/8)	2×(16×16-1/2×1-5/8)
	Number of Circuits		6	6
Indoor Metering Device			EEV	EEV
Indoor Unit	Heater Kit (optional)	KW	5/10	5/10
Drainage water pipe diameter		inch	3/4	3/4

Figure 201

SPECIFICATIONS

18k-24k BTU

Indoor Model Number			FPHFA18A3D	FPHFA24A3D
Outdoor Model Number			FPHFR24A3D	FPHFR24A3D
Outdoor Airflow	Air Circulation(high) for Outdoor	CFM	2235	2235
		m3/h	3800	3800
Outdoor Metering Device			EEV	EEV
Outdoor fan motor	Model		ZWB278L46A	ZWB278L46A
	Qty		1	1
	output	W[HP]	107[1/7]	107[1/7]
	RLA	A	0.8	0.8
	Speed	r/min	880	880
Outdoor Coil	Number of Rows		2	2
	Tube Pitch(a)	mm	21	21
		in	0.827	0.827
	Row Pitch(b)	mm	21.65	21.65
		in	0.852	0.852
	Fin Spacing	mm	1.5	1.5
		Fins Per in	17	17
	Fin Type		Hydrophilic aluminium	Hydrophilic aluminium
	Tube Outside Diameter and Type	mm	Φ7.94,innergroove tube	Φ7.94,innergroove tube
	Coil Dimension(WxHxD)	mm	975×714×43.3	975×714×43.3
	Number of Circuits	in	38-3/8×28-1/8×1-3/4	38-3/8×28-1/8×1-3/4
			5	5
Compressor	Model		C-7RZ280H1AAF	C-7RZ280H1AAF
	Brand		CRSS	CRSS
	Type		Twin ROTARY	Twin ROTARY
	Capacity	Btu/h	27705	27705
	Input	W	2575	2575
	Rated current	A	10.8	10.8
	Compressor	A	15	15
	Refrigerant oil	ml	FV68S /900	FV68S /900
Moisture Removal		pints/hr	1.14	4.64
		L/H	0.54	2.2
Refrigerant type/Quantity	Type		R454B	R454B
	Refrigerant charge	oz(kg)	88.1 (2.3)	88.1 (2.3)
	Factory pre-charge	ft (m)	25(7.5)	25(7.5)
	Additional charge for each ft	oz/ft	0.38	0.38

Figure 201

SPECIFICATIONS

18k-24k BTU

Indoor Model Number			**FPHFA18A3D**	**FPHFA24A3D**
Outdoor Model Number			**FPHFR24A3D**	**FPHFR24A3D**
Refrigerant piping	Liquid side/ Gas side	mm(inch)	9.52(3/8")/15.88(5/8")	9.52(3/8")/15.88(5/8")
	Max. pipe length	m	50	50
		ft	165	165
	Max. difference in level	m	30	30
		ft	100	100
Design pressure	H/L	MPa	4.14/2.86	4.14/2.86
		PSIG	600/415	600/415
DIMENSIONS & WEIGHT				
Indoor Unit	Dimension (WxHxD)	inches	17-1/2 ×45×21	17-1/2 ×45×21
		mm	445×1143×534	445×1143×534
	Packing(LxWxH)	inches	20-1/2 ×51-5/8 ×25-3/8	20-1/2 ×51-5/8 ×25-3/8
		mm	520×1310×645	520×1310×645
	Net Weight	lbs	123.9	123.9
		kg	56.2	56.2
Outdoor Unit	Shipping Weight	lbs	149.7	149.7
		kg	67.9	67.9
	Dimension (WxHxD)	inches	35-3/8×29-4/8×13-3/8	35-3/8×29-4/8×13-3/8
		mm	900×750×340	900×750×340
	Packing (LxWxH)	inches	41×32-5/8×18-1/8	41×32-5/8×18-1/8
		mm	1040×830×460	1040×830×460
	Net Weight	lbs	123.4	123.4
		kg	56	56
	Shipping Weight	lbs	132.3	132.3
		kg	60	60
Loading	Indoor Unit Stack height (Stack Limit)		5	5
	Outdoor Unit Stack height (Stack Limit)		4	4

* Lengths over 100 feet long will require an increase in communication cable to 16 AWG. Lengths over 262 feet will require an increase in communication Cable to 14 AWG

Figure 201

SPECIFICATIONS

36k-48k BTU

Indoor Model Number			FPHFA36A3D	FPHFA48A3D
Outdoor Model Number			FPHFR36A3D	FPHFR48A3D
E-STAR__V6.1			Y	Y
NEEP			Y	Y
Canada Greener Home Program			Y	Y
Power Supply		V/ph/Hz	208~230/1/60	208~230/1/60
Energy Star			Y	Y
Cooling	Rated Capacity at 95˚F	Btu/h	36000	48000
	Cooling Capacity Range(MIN-MAX)	Btu/h	12000-45000	16800-61500
	Cooling Capacity Range(MIN-MAX)	W	3517-13189	4924-18024
	Capacity at 115˚F	Btu/h	28800	38400
	Power Input	W	3070	4000
	Current	A	14	18.7
	EER2 at 95˚F	Btu/h/W	11.7	11.7
	SEER2	Btu/h/W	19.0	19.0
	Operating temperature range Indoor	˚F	61-86	61-86
		˚C	16-30	16-30
	Operating temperature range Outdoor	˚F	5~125	5~125
		˚C	-15~52	-15~52
Heating	Rated Capacity at 47˚F	Btu/h	36000	48000
	Heating Capacity Range(MIN-MAX)	Btu/h	11000-45000	15800-65000
	Heating Capacity Range(MIN-MAX)	W	3224-13189	4630-19050
	Power Input	W	2800	3600
	Current	A	13	15.6
	COP2 at 47˚F	W/W	3.77	3.9
	COP @ ˚5F	W/W	2.0	2.1
	HSPF2	Btu/h/W	9.0	10
	Rated Capacity Heating at 17°(-8.3˚C)	Btu/h	26000	37000
	Maximum Heating Capacity @17˚F (-8.˚C)	Btu/h	36000	48000
	Maximum Heating Capacity @5˚F (-15˚C)	Btu/h	36000	48000
	Maximum Heating Capacity @-5˚F (-20.5˚C)	Btu/h	28800	38000
	Maximum Heating Capacity @-13˚F (-25˚C)	Btu/h	27000	36000
	Maximum Heating Capacity @-22˚F (-30˚C)	Btu/h	20000	31000
	Operating temperature range Indoor	˚F	61-86	61-86
		˚C	16-30	16-30
	Operating temperature range Outdoor	˚F	-13~75	-13~75
		˚C	-25~24	-25~24

Figure 202

SPECIFICATIONS

36k-48k BTU

Indoor Model Number			FPHFA36A3D	FPHFA48A3D
Outdoor Model Number			FPHFR36A3D	FPHFR48A3D
Electrical	Rated Current	Cooling (A)	14	18.7
		Heating (A)	13	15.6
	MOP (Maximum Overcurrent Protection)	Amps	35 (After Serial Numbers 2507F00439)	60
	MOP (Maximum Overcurrent Protection)		50 (Serial Numbers 2507F00439 and Prior)	60
	MCA(Minimum Circuit Ampacity)		30	50
	Thermostat type		wired	wired
	communication wire size and type		4 x 14 AWG stranded THHN	4 x 14 AWG stranded THHN
	Thermostat Wire		10 x 18 AWG*	10 x 18 AWG*
Indoor AirFlow	Rated	m3/h	1900	2900
		CFM	1118	1705
	Min-Max	m3/h	1280-2000	2000-2900
		CFM	753-1176	1176-1705
	Ultra low speed	m3/h	1280	2000
		CFM	753	1176
ESP	Rated	In.W.C.(Pa)	0.58(145Pa)	0.58(145Pa)
	Range	In.W.C.(Pa)	0-0.8(200Pa)	0-0.8(200Pa)
Indoor Noise (Sound Pressure)		dB(A)	56	58
Outdoor Noise (Sound Pressure)		dB(A)	63	62
Indoor fan motor (DC inverter)	Qty		1	1
	Model		ZW702E000024	ZW702E000024
	output	W[HP]	621[5/6]	5/6
	RLA	A	4.2	5.4
	Speed	r/min	560~1300	350~1300
Indoor Coil	Number of Rows		10	5*2
	Tube Pitch(a)	mm	21	21
		in	0.827	0.827
	Row Pitch(b)	mm	13.6	13.6
		in	0.535	0.535
	Fin Spacing	mm	1.4	1.4
		Fins Per in	18	17
	Fin Type		Hydrophilic aluminium	Hydrophilic aluminium
	Tube Outside Diameter and Type	mm	Φ7,innergroove aluminium tube	Φ7,innergroove aluminium tube
	Coil Dimension(WxHxD)	mm	2×(425×462×68)	2 (509x546x68)
		in	2×(16-3/4×18-3/16×2-11/16)	2 (20x21-1/2x2-11/16)
	Number of Circuits		10	14
Indoor Metering Device			EEV	EEV
Indoor Unit	Heater Kit (optional)	KW	5/10/15	5/10/15/20
Drainage water pipe diameter		inch	3/4	3/4

Figure 202

SPECIFICATIONS

36k-48k BTU

Indoor Model Number			FPHFA36A3D	FPHFA48A3D
Outdoor Model Number			FPHFR36A3D	FPHFR48A3D
Outdoor Airflow	Air Circulation(high) for Outdoor	CFM	3350	4820
		m3/h	5700	8200
Outdoor Metering Device			EEV	EEV
Outdoor fan motor	Model		ZWB4710L17A	ZW511B500064 ZW511B500067
	Qty		1	2
	output	W/HP	249[1/3]	149*2[1/5*2]
	RLA	A	1.5	1
	Speed	r/min	850	890
Outdoor Coil	Number of Rows		2	2.5
	Tube Pitch(a)	mm	21	21
		in	0.827	0.827
	Row Pitch(b)	mm	21.65	21.65
		in	0.852	0.852
	Fin Spacing	mm	1.4	1.4
		Fins Per in	18	18
	Fin Type		Hydrophilic aluminium	Hydrophilic aluminium
	Tube Outside Diameter and Type	mm	Φ7.94,innergroove tube	Φ7.94,innergroove tube
	Coil Dimension (WxHxD)	mm	1190×840×43.3	(968+934+643)×1428×21.65
		in	46-7/8×33-1/8×1-3/4	38-1/8+36-3/4+25-3/8 ×56-1/4×7/8
	Number of Circuits		6	8
Compressor	Model		C-7RZ420H1CAF	C-8RZ580H1BAF
	Brand		CRSS	CRSS
	Type		Twin ROTARY	Twin ROTARY
	Capacity	Btu/h	41524	57458
	Input	W	3800	5830
	Rated current	A	14.6	21.2
	Compressor	A	19	29
	Refrigerant oil	ml	FV68S /1200	VG75 /1700
Moisture Removal		pints/hr	8.24	13.15
		L/H	3.9	6.23
Refrigerant type/Quantity	Type		R454B	R454B
	Refrigerant charge	oz(kg)	112.9(3.2)	169.3(4.9)
	Factory precharge	ft (m)	25(7.5)	25(7.5)
	Additional charge for each ft	oz/ft	0.38	0.38

Figure 202

SPECIFICATIONS

36k-48k BTU

Indoor Model Number			**FPHFA36A3D**	**FPHFA48A3D**
Outdoor Model Number			**FPHFR36A3D**	**FPHFR48A3D**
Refrigerant piping	Liquid side/ Gas side	mm(inch)	9.52(3/8")/15.88(5/8")	9.52(3/8")/19.05(3/4")
	Max. pipe length	m	50	75
		ft	165	250
	Max. difference in level	m	30	30
		ft	100	100
Design pressure	H/L	MPa	4.14/2.86	4.14/2.86
		PSIG	600/415	600/415
DIMENSIONS & WEIGHT				
Indoor Unit	Dimension (WxHxD)	inches	19-5/8 × 46-1/8 × 21-5/8	22×53-7/8 ×24
		mm	500×1170×550	560×1370×610
	Packing(LxWxH)	inches	22-1/2×49-5/8×25-3/8	25-2/8×55-4/8×28
		mm	570×1260×645	640×1410×710
	Net Weight	lbs	153.2	190
		kg	69.5	86
	Shipping Weight	lbs	173	207
		kg	78.5	94
Outdoor Unit	Dimension (WxHxD)	inches	43-2/8×34-4/8×17-6/8	38-3/8x57-4/8x13
		mm	1100×875×450	975x1460x330
	Packing (LxWxH)	inches	45-7/8×39-4/8×21-2/8	44-1/8x62-5/8x16-6/8
		mm	1165×1005×540	1120x1590x435
	Net Weight	lbs	185.2	244.7
		kg	84	111
	Shipping Weight	lbs	209.4	266.8
		kg	95	121
Loading	Indoor Unit Stack height (Stack Limit)		4	4
	Outdoor Unit Stack height (Stack Limit)		2	2
* Lengths over 100 feet long will require an increase in communication cable to 16 AWG. Lengths over 262 feet will require an increase in communication Cable to 14 AWG				
Figure 202				

SPECIFICATIONS

Dimensions

AHU 18K & 24K BTU

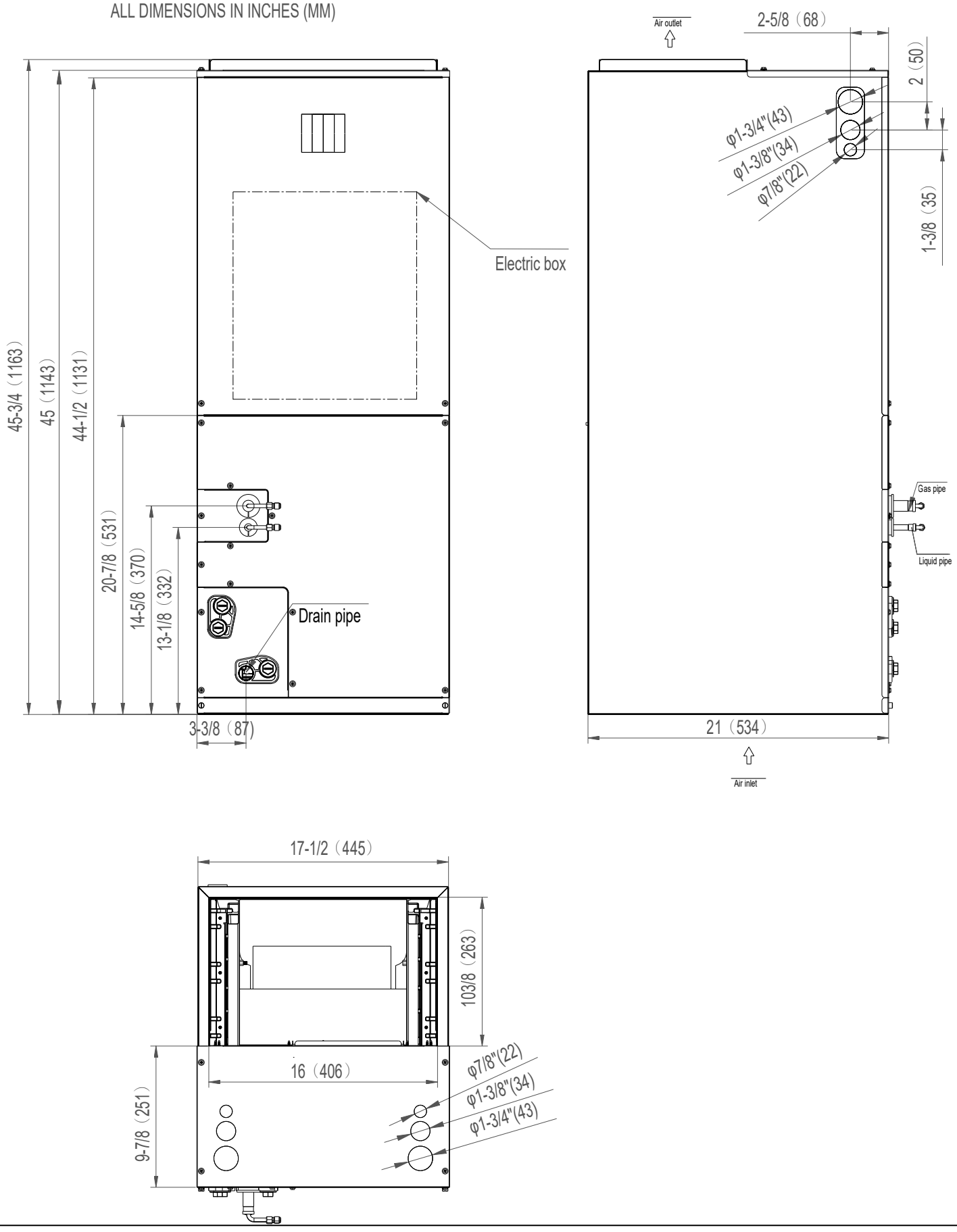


Figure 203

SPECIFICATIONS

Dimensions

AHU 36K BTU

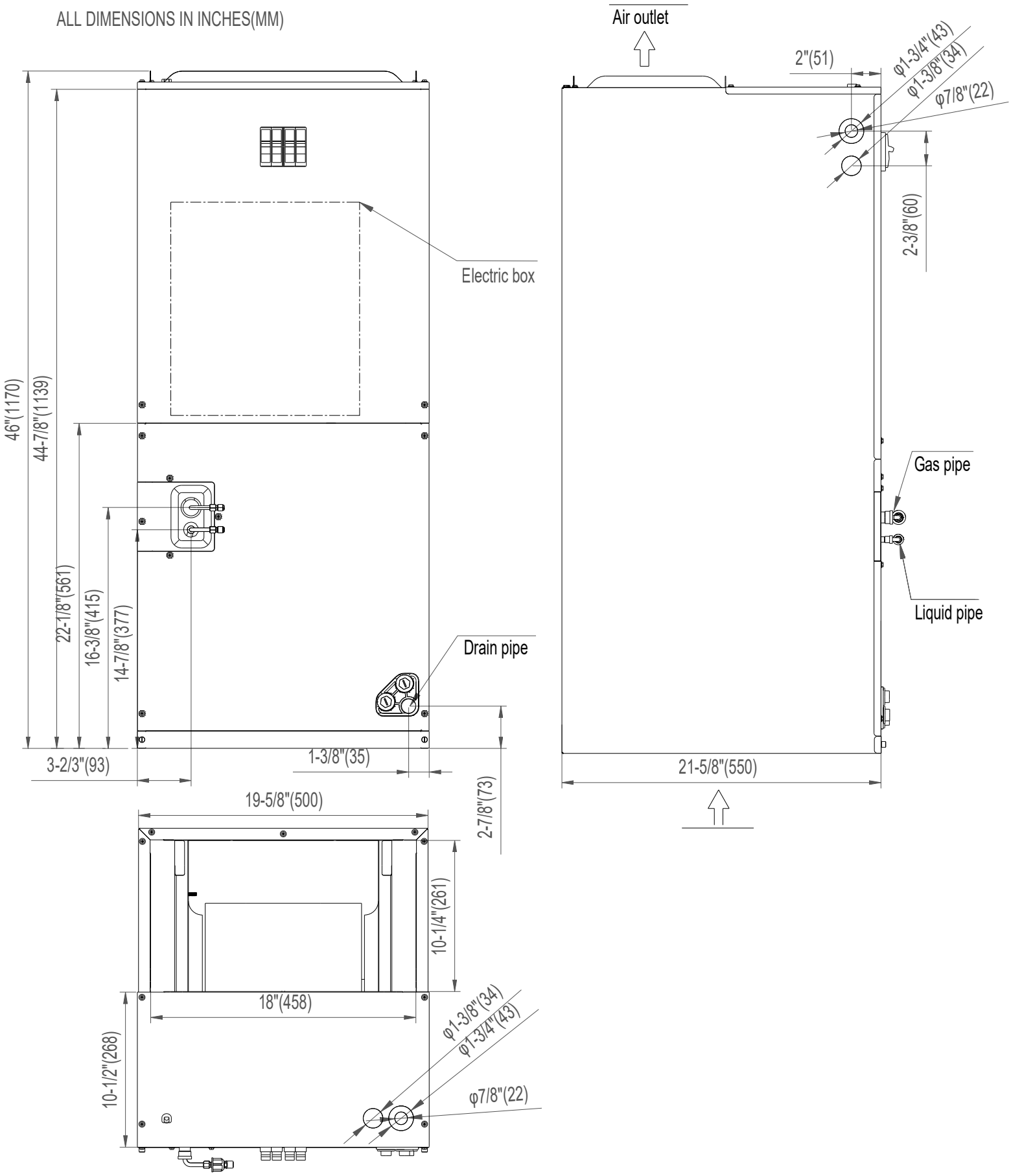


Figure 204

SPECIFICATIONS

Dimensions

AHU 48K BTU

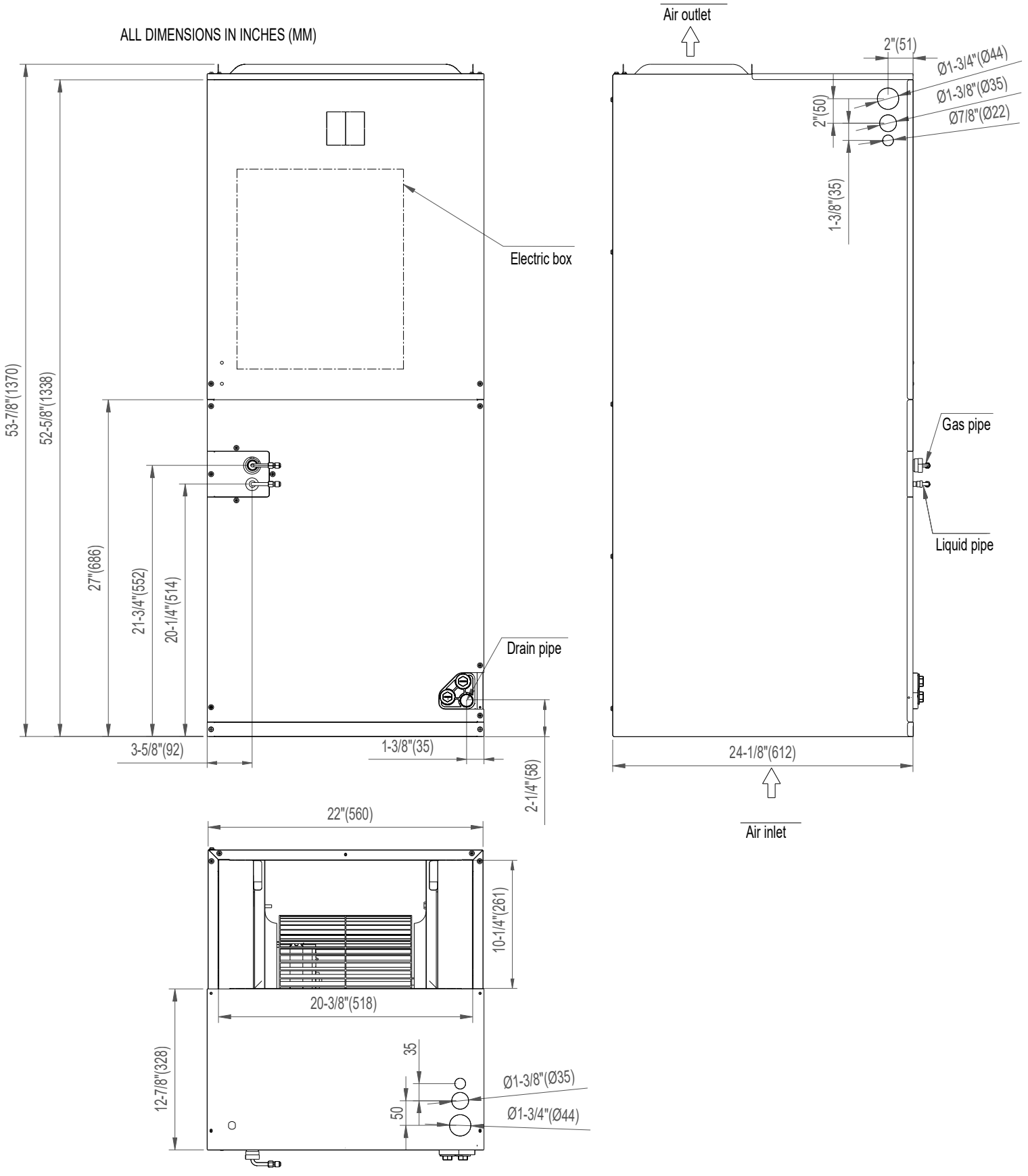


Figure 205

SPECIFICATIONS

Dimensions

ODU 24K BTU

Unit : in.(mm)

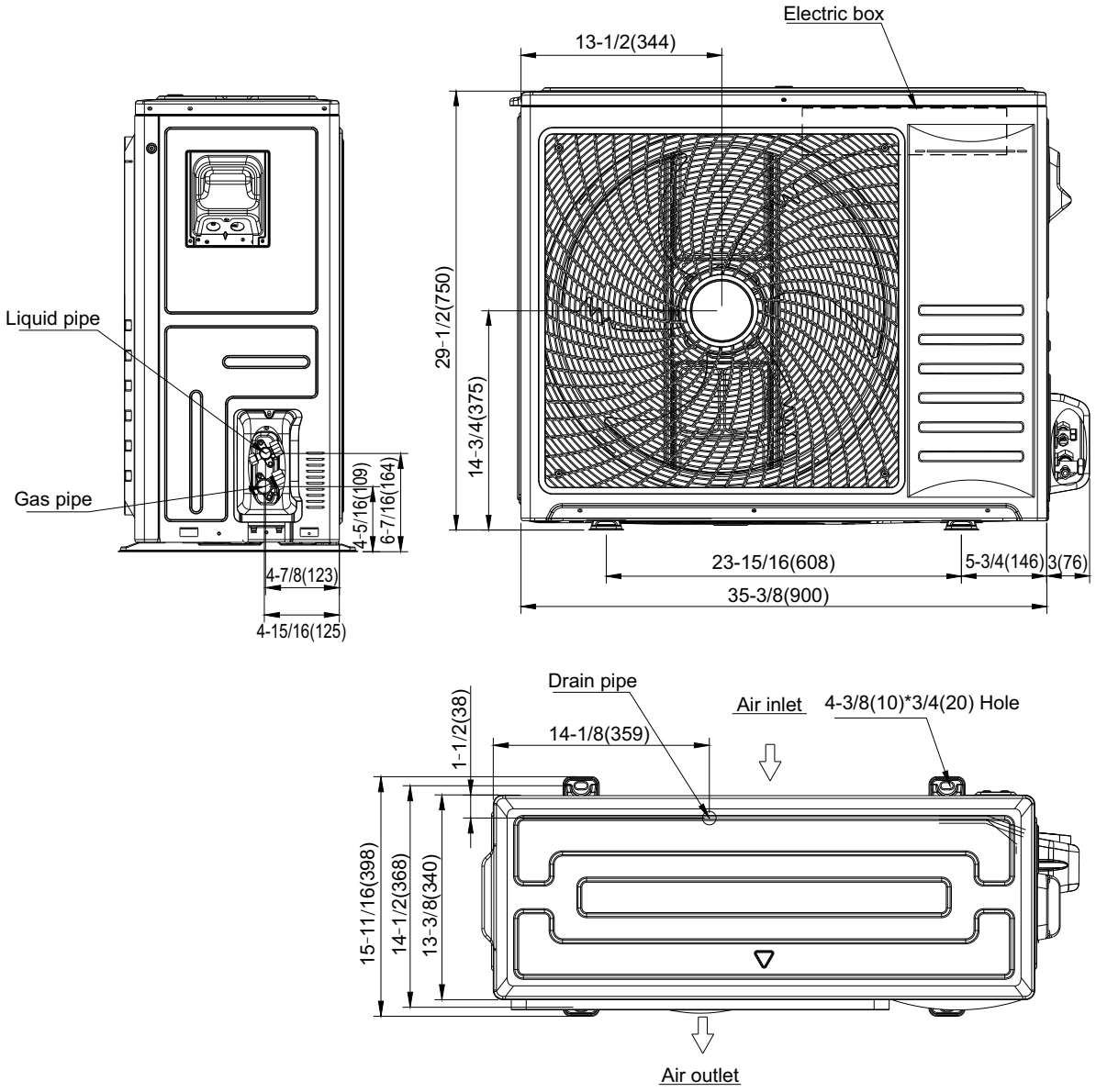


Figure 206

SPECIFICATIONS

Dimensions

ODU 36K BTU

Unit: in.(mm)

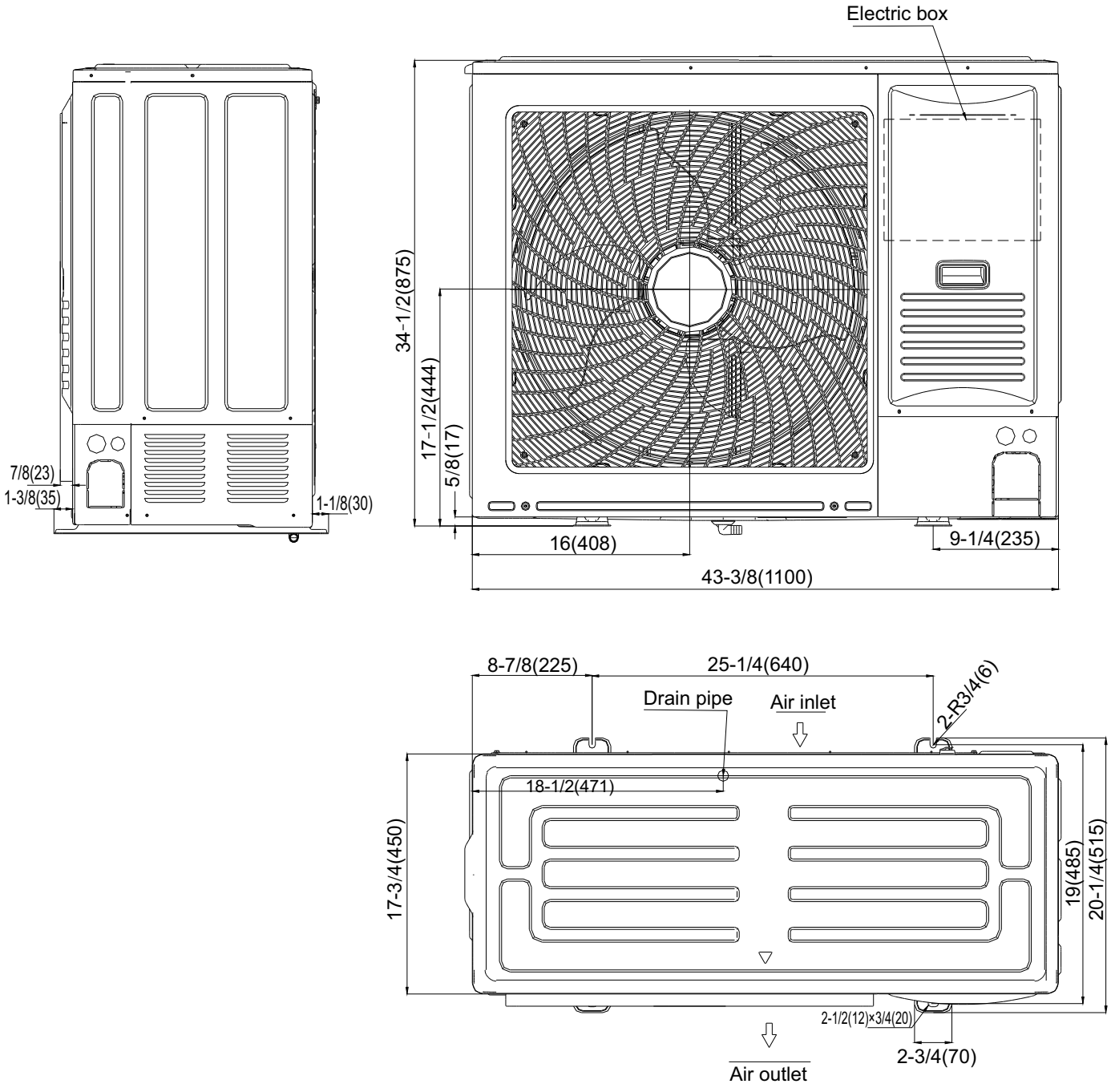


Figure 207

SPECIFICATIONS

Dimensions

ODU 48K BTU

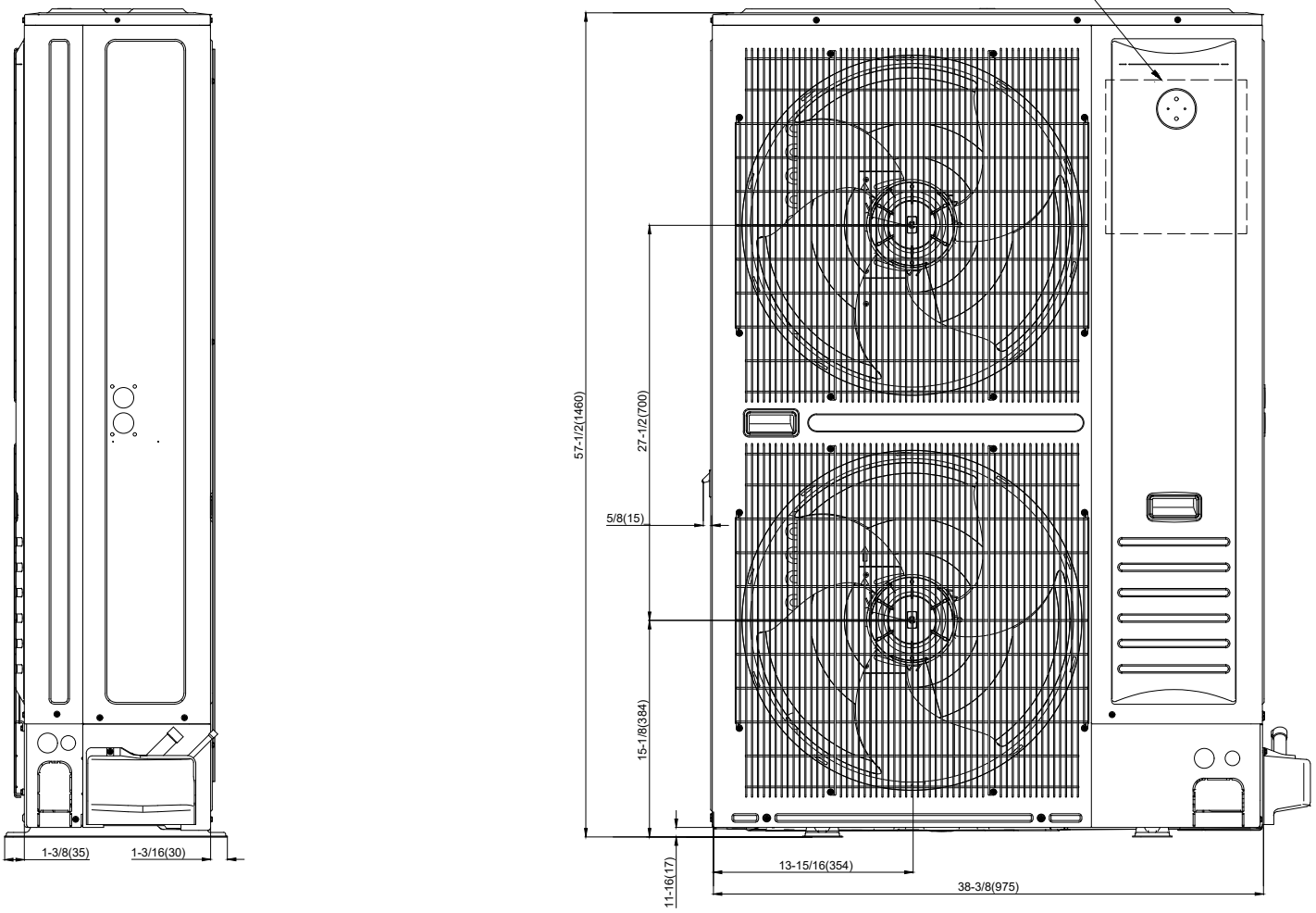


Figure 208

SPECIFICATIONS

Sound Power Data - AHU NC (Noise Criterion)

Model	18K
Test condition	3.28ft.(1.0m) ahead of the unit; 3.28ft.(1.0m) high from the ground.

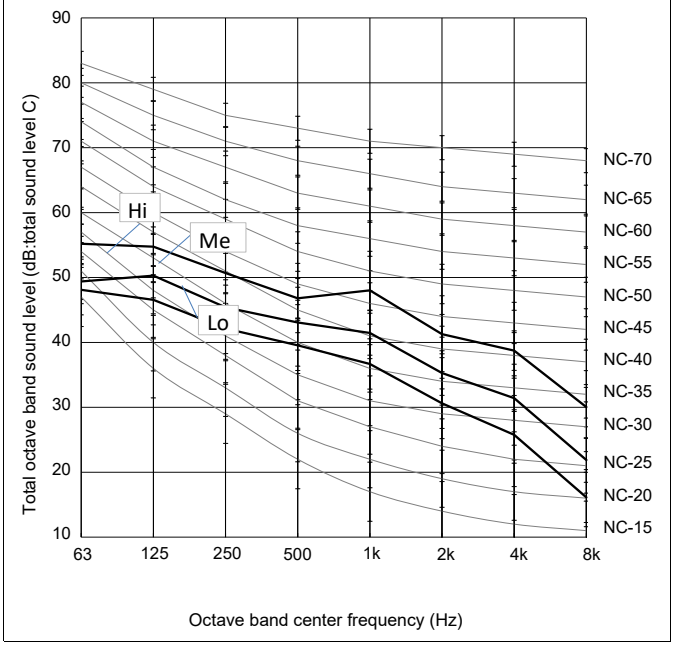


Figure 209

Model	24K
Test condition	3.28ft.(1.0m) ahead of the unit; 3.28ft.(1.0m) high from the ground.

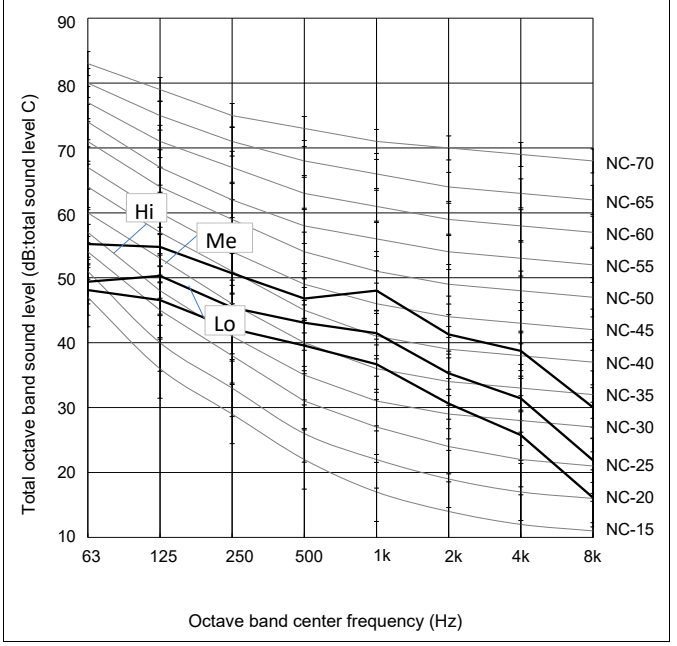


Figure 210

Model	36K
Test condition	4.92ft.(1.5m) under the unit; 3.28ft.(1.0m) high from the ground.

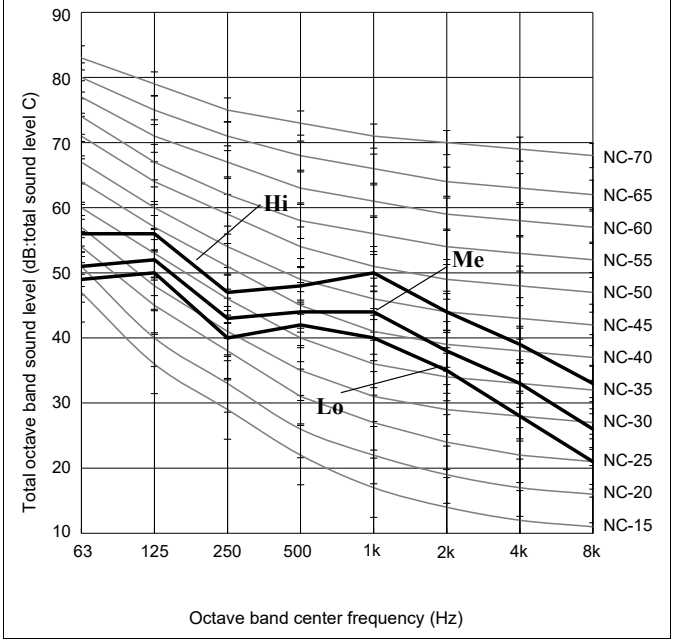


Figure 211

Model	48K
Test condition	4.92ft.(1.5m) under the unit; 3.28ft.(1.0m) high from the ground.

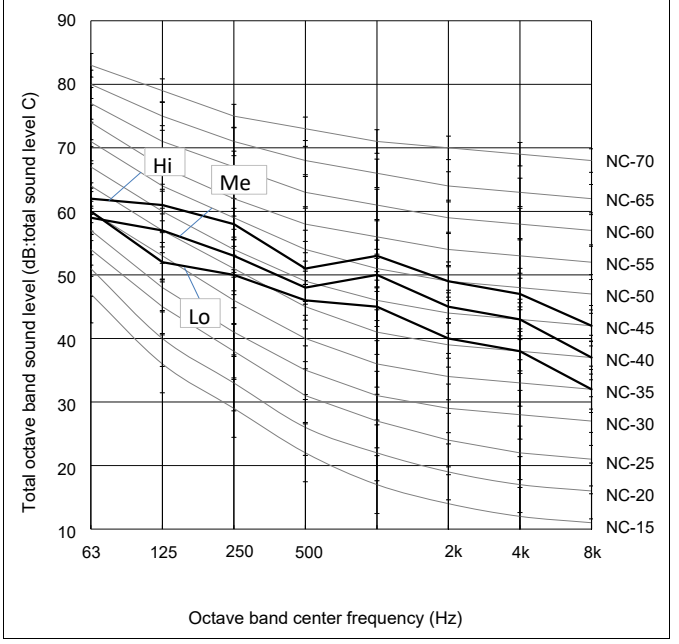
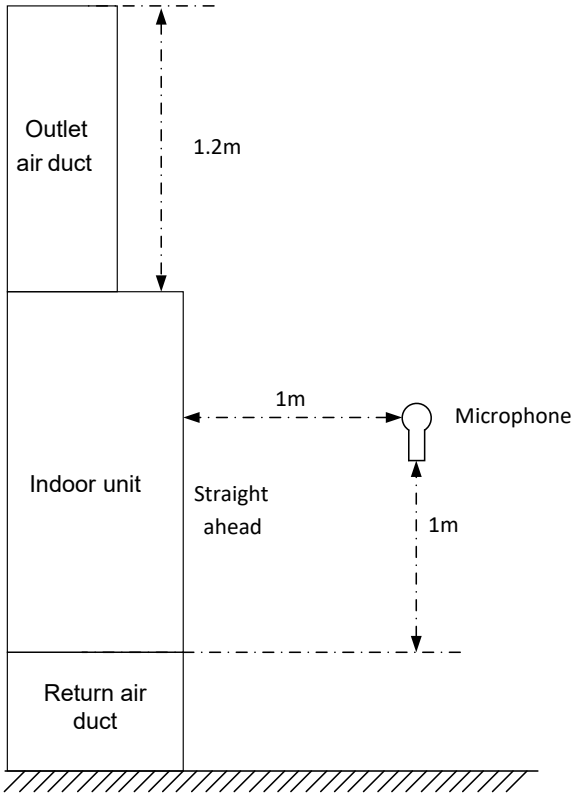


Figure 212

SPECIFICATIONS

Sound Power Data - AHU NC (Noise Criterion)

Test condition Air handler:



Notes：

1.The sound power level is dependent on the operating conditions of the unit. Sound measurements shall be carried out at the standard rating conditions.
Test method reference standard AHRI Standard 260.

2. Power source 230V, 60Hz.
3. The operation values were obtained in an semianechoic chamber (conversion values).
4. Sound levels will varies with operating and environmental conditions.

Figure 213

SPECIFICATIONS

Sound Power Data - ODU NC (Noise Criterion)

Model	18K
Test condition	3.28ft.(1.0m) ahead of the unit; 4.92ft.(1.5m) high from the bottom of the unit.

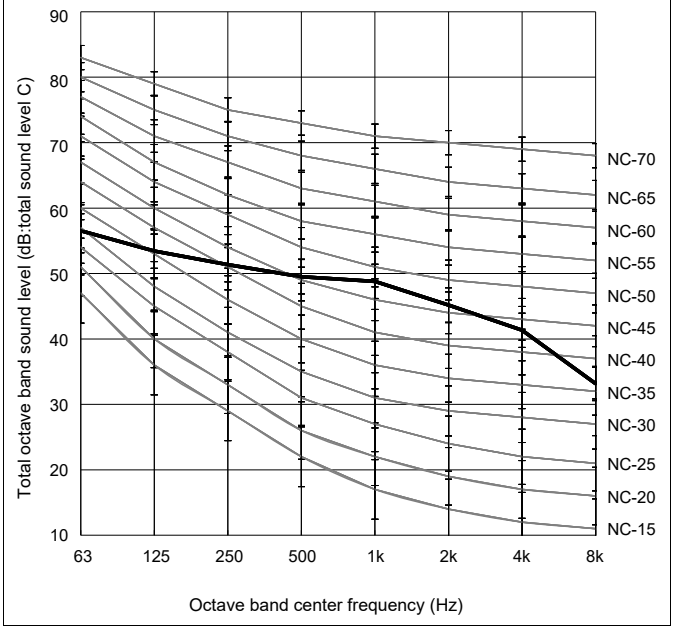


Figure 214

Model	24K
Test condition	3.28ft.(1.0m) ahead of the unit; 3.28ft.(1.0m) high from the bottom of the unit.

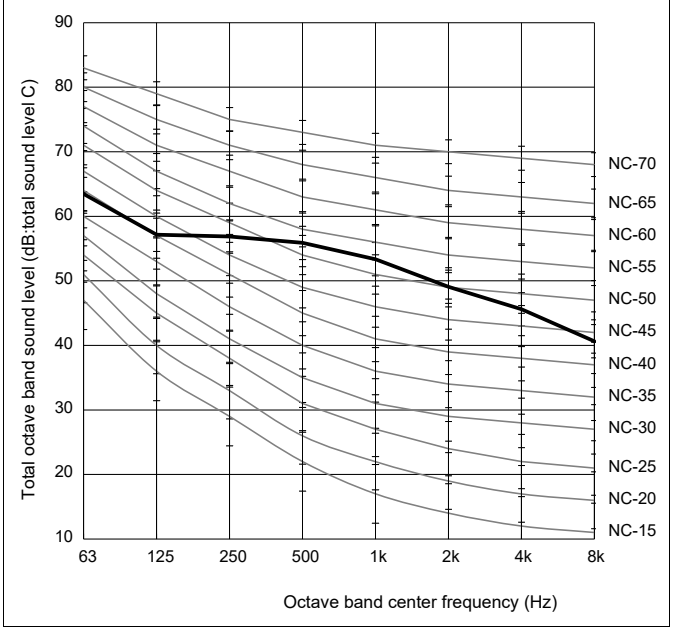


Figure 215

Model	36K
Test condition	3.28ft.(1.0m) ahead of the unit; 4.92ft.(1.5m) high from the bottom of the unit.

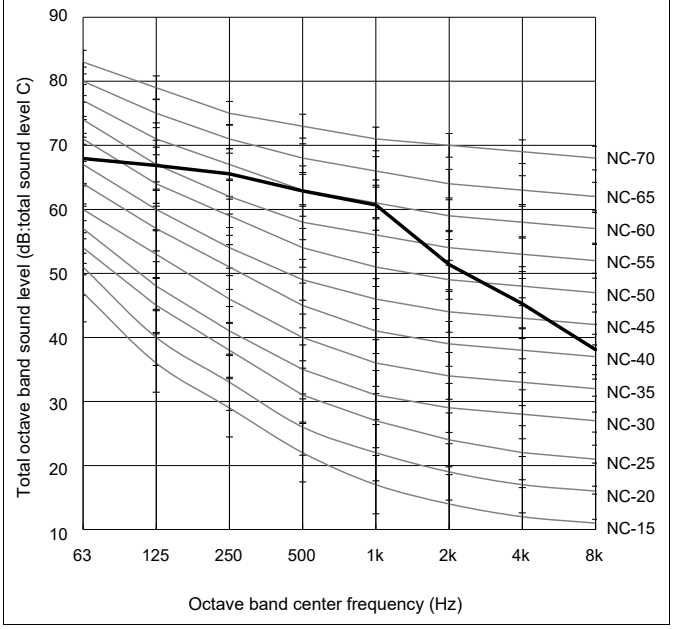


Figure 216

Model	48K
Test condition	3.28ft.(1.0m) ahead of the unit; 3.28ft.(1.0m) high from the ground.

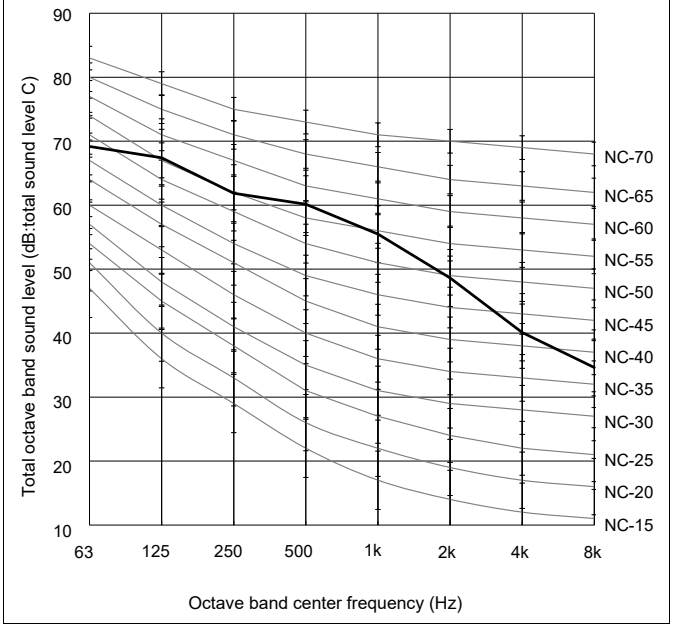
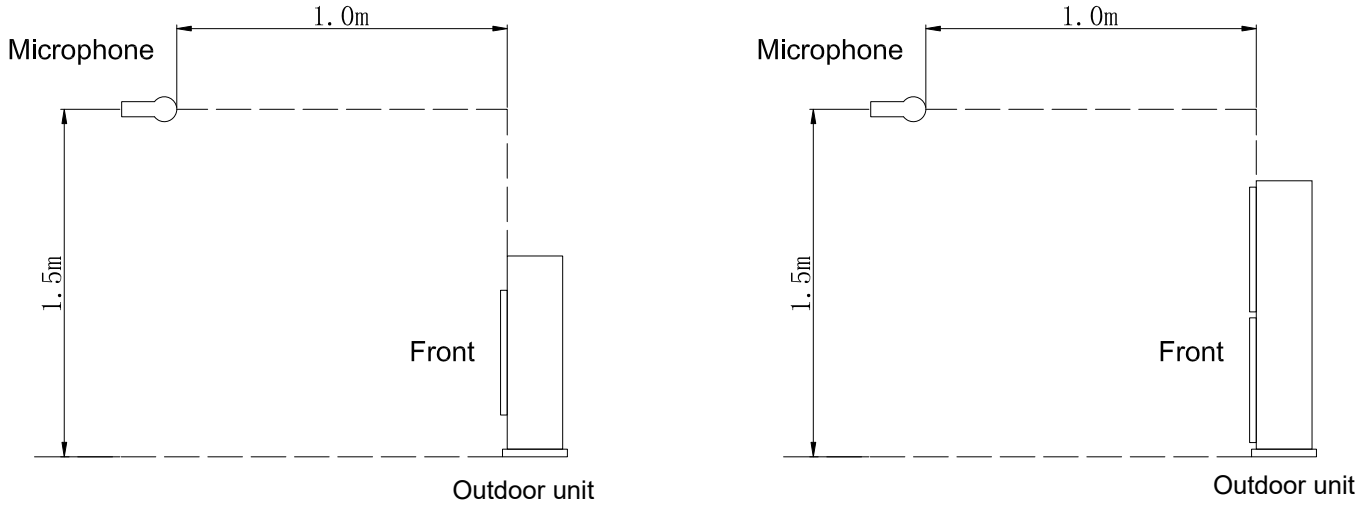


Figure 217

SPECIFICATIONS

Sound Power Data - ODU NC (Noise Criterion)

Test condition Outdoor:



Notes:

1.The sound power level is dependent on the operating conditions of the unit. Sound measurements shall be carried out at the standard rating conditions。
Test method reference standard EN 12102-1.

2. Power source 230V, 50Hz.

3. The operation values were obtained in an semi-anechoic chamber (conversion values).

4. Sound levels will varies with operating and environmental conditions.

Figure 218

Capacity Charts

5. Capacity Tables

5.1 Capacity Characteristic Charts

The following charts show the characteristics of outdoor unit capacity, which corresponds with the operating ambient temperature of outdoor unit.

The data are based on the following conditions:

① Pipe length / height difference : 25 ft. (7.6m) / 0 ft.(0m)
② Compressor at rated inverter frequency
③ Indoor fan speed at high fan speed
④ Capacity loss due to white frost and defrost operation is not included.

Remarks:
TC: Total Cooling Capacity (Gross) (kBtu/h) SHC: Sensible Heat Capacity (Gross)
PI: Power Input (including the compressor, evap. fan motor & cond. fan motor) (kW) DB: Dry Bulb Temperature
WB: Wet Bulb Temperature

SPECIFICATIONS

Capacity Charts

Air Handler

Cooling Capacity Tables																			
Model No. / Nominal Capacity (Btu/h)	Outdoor Air Temp. (°F DB)	Indoor Air Temp. °F DB / °F WB																	
		68 / 57			73 / 61			77 / 64			80 / 67			86 / 72			90 / 75		
		TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI
18K	5	14.92	13.80	0.62	15.85	14.67	0.83	16.76	15.15	0.90	17.45	14.47	0.92	18.64	14.61	0.92	19.55	14.88	0.92
	10	14.92	13.80	0.63	15.85	14.67	0.85	16.76	15.15	0.92	17.45	14.47	0.94	18.64	14.61	0.94	19.55	14.88	0.94
	15	14.92	13.80	0.65	15.85	14.67	0.88	16.76	15.15	0.95	17.45	14.47	0.96	18.64	14.61	0.97	19.55	14.88	0.96
	20	14.92	13.80	0.66	15.85	14.67	0.90	16.76	15.15	0.98	17.45	14.47	0.99	18.64	14.61	0.99	19.55	14.88	0.99
	25	14.92	13.80	0.68	15.85	14.67	0.92	16.76	15.15	1.00	17.45	14.47	1.02	18.64	14.61	1.02	19.55	14.88	1.02
	30	14.92	13.80	0.70	15.85	14.67	0.95	16.76	15.15	1.02	17.45	14.47	1.04	18.64	14.61	1.05	19.55	14.88	1.04
	35	14.92	13.80	0.72	15.85	14.67	0.97	16.76	15.15	1.05	17.45	14.47	1.07	18.64	14.61	1.07	19.55	14.88	1.07
	40	14.92	13.80	0.73	15.85	14.67	0.99	16.76	15.15	1.08	17.45	14.47	1.09	18.64	14.61	1.09	19.55	14.88	1.09
	45	14.92	13.80	0.75	15.85	14.67	1.02	16.76	15.15	1.10	17.45	14.47	1.12	18.64	14.61	1.12	19.55	14.88	1.12
	50	14.92	13.80	0.77	15.85	14.67	1.04	16.76	15.15	1.12	17.45	14.47	1.15	18.64	14.61	1.15	19.55	14.88	1.15
	55	15.37	15.48	0.78	16.44	16.47	1.06	17.51	17.06	1.15	18.00	16.20	1.17	19.65	16.70	1.17	20.72	17.10	1.17
	60	15.37	15.48	0.80	16.44	16.47	1.08	17.51	17.06	1.18	18.00	16.20	1.19	19.65	16.70	1.20	20.72	17.10	1.19
	65	15.37	15.48	0.82	16.44	16.47	1.11	17.51	17.06	1.20	18.00	16.20	1.22	19.65	16.70	1.22	20.72	17.10	1.22
	70	15.37	15.48	0.84	16.44	16.47	1.13	17.51	17.06	1.23	18.00	16.20	1.25	19.65	16.70	1.25	20.72	17.10	1.25
	75	15.37	15.48	0.89	16.44	16.47	1.17	17.51	17.06	1.26	18.00	16.20	1.28	19.65	16.70	1.29	20.72	17.10	1.30
	80	15.37	15.48	0.95	16.44	16.47	1.21	17.51	17.06	1.29	18.00	16.20	1.31	19.65	16.70	1.34	20.72	17.10	1.35
	85	15.37	15.48	1.08	16.44	16.47	1.31	17.51	17.06	1.39	18.00	16.20	1.41	19.65	16.70	1.44	20.72	17.10	1.46
	90	15.37	15.48	1.20	16.44	16.47	1.41	17.51	17.06	1.48	18.00	16.20	1.51	19.65	16.70	1.54	20.72	17.10	1.56
	95	15.37	15.48	1.33	16.44	16.47	1.51	17.51	17.06	1.56	18.00	16.20	1.54	19.65	16.70	1.61	20.72	17.10	1.65
	100	15.37	14.15	1.40	16.44	15.14	1.54	17.51	15.75	1.58	18.00	15.23	1.56	19.65	15.53	1.61	20.72	15.94	1.65
	105	15.37	14.15	1.46	16.44	15.14	1.57	17.51	15.75	1.58	18.00	15.23	1.59	19.65	15.53	1.61	20.72	15.94	1.65
	110	15.37	14.15	1.49	16.44	15.13	1.60	17.51	15.75	1.61	18.00	15.23	1.63	19.65	15.53	1.65	20.72	15.94	1.68
	115	13.87	13.73	1.28	14.94	14.71	1.29	16.01	15.33	1.26	16.79	14.84	1.24	18.15	15.16	1.25	19.22	15.58	1.28
	118	13.10	13.08	1.13	14.13	14.04	1.12	15.16	14.64	1.06	15.90	14.18	1.04	17.21	14.50	1.04	18.24	14.92	1.06
	125	12.84	12.86	1.08	13.86	13.81	1.05	14.87	14.41	1.00	15.60	13.96	0.97	16.90	14.28	0.97	17.91	14.69	0.99

Heating Capacity Tables														
Airflow（CFM）	Outdoor Air Temp. (°F DB)		Indoor Air Temp. °F DB / °F WB											
	°F DB	°F WB	61		64		68		70		72		75	
			TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
18K	-13	-15	13.48	1.92	13.27	1.98	12.97	2.05	12.60	2.11	12.39	2.15	12.23	2.18
	-4	-6	14.45	2.06	14.21	2.12	13.90	2.19	13.50	2.26	13.28	2.30	12.89	2.33
	0	-2	15.41	2.19	15.16	2.26	14.82	2.33	14.40	2.41	14.16	2.45	13.75	2.48
	5	3	19.26	2.28	18.95	2.35	18.53	2.42	18.00	2.51	17.71	2.55	17.47	2.58
	10	8	19.26	2.17	18.95	2.23	18.53	2.31	18.00	2.38	17.71	2.42	17.47	2.46
	17	15	19.26	2.06	18.95	2.12	18.53	2.19	18.00	2.27	17.71	2.30	17.47	2.33
	20	18	19.26	1.95	18.95	2.01	18.53	2.08	18.00	2.14	17.71	2.18	17.47	2.21
	25	23	19.26	1.84	18.95	1.90	18.53	1.96	18.00	2.02	17.71	2.06	17.47	2.09
	30	28	19.26	1.73	18.95	1.79	18.53	1.84	18.00	1.90	17.71	1.94	17.47	1.96
	35	32	19.26	1.62	18.95	1.67	18.53	1.73	18.00	1.78	17.71	1.81	17.47	1.84
	40	36	19.26	1.52	18.95	1.56	18.53	1.61	18.00	1.67	17.71	1.69	17.47	1.72
	45	41	19.26	1.41	18.95	1.45	18.53	1.50	18.00	1.54	17.71	1.57	17.47	1.59
	47	43	19.26	1.30	18.95	1.34	18.53	1.38	18.00	1.43	17.71	1.45	17.47	1.47
	50	44	19.26	1.28	18.95	1.32	18.53	1.36	18.00	1.41	17.71	1.43	17.47	1.45
	55	48	19.26	1.26	18.95	1.30	18.53	1.34	18.00	1.38	17.71	1.40	17.47	1.42
	60	52	19.26	1.23	18.95	1.26	18.53	1.30	18.00	1.35	17.71	1.37	17.47	1.39
	63	54	19.26	1.22	18.95	1.25	18.53	1.30	18.00	1.34	17.71	1.36	17.47	1.38
	68	58	19.26	1.20	18.95	1.23	18.53	1.28	18.00	1.32	17.71	1.34	17.47	1.36
	75	64	19.26	1.18	18.95	1.22	18.53	1.26	18.00	1.30	17.71	1.32	17.47	1.34

SPECIFICATIONS

Capacity Charts

Cooling Capacity Tables																			
Model No. / Nominal Capacity (Btu/h)	Outdoor Air Temp. (°F DB)	Indoor Air Temp. °F DB / °F WB																	
		68 / 57			73 / 61			77 / 64			80 / 67			86 / 72			90 / 75		
		TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI
24K	5	18.32	14.20	1.29	19.38	15.02	1.34	20.51	15.90	1.40	21.71	16.82	1.43	23.22	18.00	1.47	24.85	19.26	1.53
	10	18.50	14.34	1.31	19.58	15.17	1.37	20.72	16.06	1.43	21.92	16.99	1.45	23.46	18.18	1.50	25.10	19.45	1.56
	15	18.69	14.48	1.34	19.78	15.33	1.40	20.93	16.22	1.45	22.15	17.16	1.48	23.70	18.36	1.53	25.35	19.65	1.59
	20	18.88	14.63	1.37	19.98	15.48	1.42	21.14	16.38	1.48	22.37	17.34	1.51	23.94	18.55	1.56	25.61	19.85	1.62
	25	19.07	14.78	1.40	20.18	15.64	1.45	21.35	16.55	1.51	22.60	17.51	1.54	24.18	18.74	1.59	25.87	20.05	1.65
	30	19.26	14.93	1.42	20.38	15.80	1.48	21.57	16.72	1.54	22.82	17.69	1.58	24.42	18.93	1.62	26.13	20.25	1.69
	35	19.46	15.08	1.45	20.59	15.96	1.51	21.79	16.88	1.58	23.05	17.87	1.61	24.67	19.12	1.66	26.39	20.46	1.72
	40	19.65	15.23	1.48	20.80	16.12	1.54	22.01	17.05	1.61	23.29	18.05	1.64	24.92	19.31	1.69	26.66	20.66	1.76
	45	19.85	15.38	1.51	21.01	16.28	1.58	22.23	17.23	1.64	23.52	18.23	1.67	25.17	19.51	1.73	26.93	20.87	1.79
	50	20.05	15.54	1.54	21.22	16.44	1.61	22.45	17.40	1.67	23.76	18.41	1.71	25.42	19.70	1.76	27.20	21.08	1.83
	55	20.25	15.70	1.58	21.43	16.61	1.64	22.68	17.58	1.71	24.00	18.60	1.74	25.68	19.90	1.80	27.48	21.30	1.87
	60	20.25	15.70	1.61	21.43	16.61	1.67	22.68	17.58	1.74	24.00	18.60	1.78	25.68	19.90	1.83	27.48	21.30	1.91
	65	20.25	15.70	1.64	21.43	16.61	1.71	22.68	17.58	1.78	24.00	18.60	1.82	25.68	19.90	1.87	27.48	21.30	1.95
	70	20.25	15.70	1.67	21.43	16.61	1.74	22.68	17.58	1.82	24.00	18.60	1.85	25.68	19.90	1.91	27.48	21.30	1.98
	75	20.25	15.70	1.71	21.43	16.61	1.78	22.68	17.58	1.85	24.00	18.60	1.89	25.68	19.90	1.95	27.48	21.30	2.03
	80	20.25	15.70	1.74	21.43	16.61	1.82	22.68	17.58	1.89	24.00	18.60	1.93	25.68	19.90	1.99	27.48	21.30	2.07
	85	20.25	15.70	1.78	21.43	16.61	1.85	22.68	17.58	1.93	24.00	18.60	1.97	25.68	19.90	2.03	27.48	21.30	2.11
	90	20.25	15.70	1.81	21.43	16.61	1.89	22.68	17.58	1.97	24.00	18.60	2.01	25.68	19.90	2.07	27.48	21.30	2.15
	95	20.25	15.70	1.85	21.43	16.61	1.93	22.68	17.58	2.01	24.00	18.60	2.05	25.68	19.90	2.11	27.48	21.30	2.20
	100	20.25	15.70	1.87	21.43	16.61	1.94	22.68	17.58	2.03	24.00	18.60	2.15	25.68	19.90	2.13	27.48	21.30	2.21
	105	20.25	15.70	1.88	21.43	16.61	1.96	22.68	17.58	2.04	24.00	18.60	2.26	25.68	19.90	2.15	27.48	21.30	2.23
	110	20.25	15.70	1.90	21.43	16.61	1.98	22.68	17.58	2.06	24.00	18.60	2.37	25.68	19.90	2.16	27.48	21.30	2.25
	115	20.25	16.00	1.91	21.43	16.93	1.99	22.68	17.92	2.07	24.00	18.60	2.49	25.68	19.90	2.16	25.83	21.30	2.27
	120	19.04	15.04	1.93	20.15	15.91	2.01	21.32	16.84	2.09	20.64	17.48	2.62	24.14	18.71	2.18	24.28	20.02	2.29
	125	17.90	14.14	1.94	18.94	14.96	2.02	20.04	15.83	2.11	17.75	16.43	2.75	22.69	17.59	2.20	22.82	18.82	2.30

Heating Capacity Tables														
Airflow （CFM）	Outdoor Air Temp. (°F DB)		Indoor Air Temp. °F DB / °F WB											
	°F DB	°F WB	61		64		68		70		72		75	
			TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
24K	-13	-15	17.83	2.23	17.48	2.30	17.14	2.37	16.80	2.70	16.46	2.49	16.13	2.54
	-4	-6	20.38	2.48	19.98	2.55	19.58	2.63	19.20	3.00	18.82	2.77	18.44	2.82
	0	-2	22.92	2.75	22.47	2.84	22.03	2.92	21.60	3.33	21.17	3.07	20.74	3.14
	5	3	25.47	3.06	24.97	3.15	24.48	3.25	24.00	3.70	23.52	3.42	23.05	3.48
	10	8	25.47	2.87	24.97	2.96	24.48	3.05	24.00	3.52	23.52	3.21	23.05	3.27
	17	15	25.47	2.69	24.97	2.78	24.48	2.86	24.00	3.26	23.52	3.01	23.05	3.07
	20	18	25.47	2.53	24.97	2.61	24.48	2.69	24.00	3.02	23.52	2.83	23.05	2.88
	25	23	25.47	2.38	24.97	2.45	24.48	2.53	24.00	2.79	23.52	2.66	23.05	2.71
	30	28	25.47	2.23	24.97	2.30	24.48	2.37	24.00	2.58	23.52	2.49	23.05	2.54
	35	32	25.47	2.09	24.97	2.16	24.48	2.23	24.00	2.39	23.52	2.34	23.05	2.39
	40	36	25.47	1.97	24.97	2.03	24.48	2.09	24.00	2.22	23.52	2.20	23.05	2.24
	45	41	25.47	1.85	24.97	1.90	24.48	1.96	24.00	2.05	23.52	2.06	23.05	2.11
	47	43	25.47	1.73	24.97	1.79	24.48	1.84	24.00	1.90	23.52	1.94	23.05	1.98
	50	44	25.47	1.71	24.97	1.76	24.48	1.82	24.00	1.87	23.52	1.91	23.05	1.95
	55	48	25.47	1.68	24.97	1.73	24.48	1.79	24.00	1.84	23.52	1.88	23.05	1.92
	60	52	25.47	1.66	24.97	1.71	24.48	1.76	24.00	1.82	23.52	1.85	23.05	1.89
	63	54	25.47	1.63	24.97	1.68	24.48	1.73	24.00	1.79	23.52	1.82	23.05	1.86
	68	58	25.47	1.61	24.97	1.66	24.48	1.71	24.00	1.76	23.52	1.80	23.05	1.83
	75	64	25.47	1.58	24.97	1.63	24.48	1.68	24.00	1.74	23.52	1.77	23.05	1.81

Remarks:
TC: Total Cooling Capacity (Gross) (kBtu/h)
SHC: Sensible Heat Capacity (Gross)
PI: Power Input (including the compressor, evap. fan motor & cond. fan motor) (kW)
DB: Dry Bulb Temperature
WB: Wet Bulb Temperature

SPECIFICATIONS

Capacity Charts

Cooling Capacity Tables																			
Model No. / Nominal Capacity (Btu/h)	Outdoor Air Temp. (°F DB)	Indoor Air Temp. °F DB / °F WB																	
		68 / 57			73 / 61			77 / 64			80 / 67			86 / 72			90 / 75		
		TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI
36K	5	29.85	24.54	1.23	31.70	26.08	1.66	33.51	26.94	1.80	34.91	25.73	1.83	37.29	25.98	1.83	39.10	26.45	1.83
	10	29.85	24.54	1.26	31.70	26.08	1.70	33.51	26.94	1.84	34.91	25.73	1.87	37.29	25.98	1.87	39.10	26.45	1.87
	15	29.85	24.54	1.29	31.70	26.08	1.75	33.51	26.94	1.90	34.91	25.73	1.92	37.29	25.98	1.93	39.10	26.45	1.92
	20	29.85	24.54	1.32	31.70	26.08	1.80	33.51	26.94	1.95	34.91	25.73	1.98	37.29	25.98	1.98	39.10	26.45	1.98
	25	29.85	24.54	1.37	31.70	26.08	1.84	33.51	26.94	2.00	34.91	25.73	2.03	37.29	25.98	2.03	39.10	26.45	2.03
	30	29.85	24.54	1.40	31.70	26.08	1.89	33.51	26.94	2.04	34.91	25.73	2.07	37.29	25.98	2.09	39.10	26.45	2.07
	35	29.85	24.54	1.43	31.70	26.08	1.93	33.51	26.94	2.10	34.91	25.73	2.13	37.29	25.98	2.13	39.10	26.45	2.13
	40	29.85	24.54	1.46	31.70	26.08	1.98	33.51	26.94	2.15	34.91	25.73	2.18	37.29	25.98	2.18	39.10	26.45	2.18
	45	29.85	24.54	1.50	31.70	26.08	2.03	33.51	26.94	2.20	34.91	25.73	2.23	37.29	25.98	2.24	39.10	26.45	2.23
	50	29.85	24.54	1.54	31.70	26.08	2.07	33.51	26.94	2.24	34.91	25.73	2.29	37.29	25.98	2.29	39.10	26.45	2.29
	55	30.73	27.52	1.57	32.88	29.29	2.12	35.02	30.34	2.30	36.00	28.80	2.33	39.30	29.69	2.33	41.45	30.39	2.33
	60	30.73	27.52	1.60	32.88	29.29	2.16	35.02	30.34	2.35	36.00	28.80	2.38	39.30	29.69	2.39	41.45	30.39	2.38
	65	30.73	27.52	1.64	32.88	29.29	2.21	35.02	30.34	2.39	36.00	28.80	2.44	39.30	29.69	2.44	41.45	30.39	2.44
	70	30.73	27.52	1.67	32.88	29.29	2.26	35.02	30.34	2.46	36.00	28.80	2.49	39.30	29.69	2.49	41.45	30.39	2.49
	75	30.73	27.52	1.78	32.88	29.29	2.33	35.02	30.34	2.52	36.00	28.80	2.56	39.30	29.69	2.58	41.45	30.39	2.59
	80	30.73	27.52	1.89	32.88	29.29	2.41	35.02	30.34	2.58	36.00	28.80	2.62	39.30	29.69	2.67	41.45	30.39	2.70
	85	30.73	27.52	2.15	32.88	29.29	2.61	35.02	30.34	2.78	36.00	28.80	2.82	39.30	29.69	2.87	41.45	30.39	2.92
	90	30.73	27.52	2.39	32.88	29.29	2.82	35.02	30.34	2.96	36.00	28.80	3.01	39.30	29.69	3.07	41.45	30.39	3.12
	95	30.73	27.52	2.66	32.88	29.29	3.01	35.02	30.34	3.12	36.00	28.80	3.07	39.30	29.69	3.22	41.45	30.39	3.28
	100	30.73	25.15	2.79	32.88	26.91	3.07	35.02	27.99	3.15	36.00	27.07	3.12	39.30	27.61	3.22	41.45	28.34	3.28
	105	30.73	25.15	2.92	32.88	26.91	3.13	35.02	27.99	3.16	36.00	27.07	3.18	39.30	27.61	3.22	41.45	28.34	3.28
	110	30.73	25.15	2.98	32.88	26.90	3.20	35.02	28.00	3.22	36.00	27.08	3.24	39.30	27.61	3.29	41.45	28.34	3.35
	115	27.74	24.41	2.55	29.88	26.14	2.58	32.03	27.25	2.52	33.57	26.39	2.47	36.30	26.95	2.49	38.45	27.69	2.55
	118	26.21	23.26	2.26	28.26	24.95	2.23	30.32	26.03	2.12	31.80	25.21	2.07	34.43	25.79	2.07	36.48	26.52	2.12
	125	25.68	22.87	2.16	27.72	24.55	2.10	29.75	25.61	2.00	31.20	24.82	1.93	33.80	25.38	1.93	35.82	26.12	1.98

Heating Capacity Tables														
Airflow （CFM）	Outdoor Air Temp. (°F DB)		Indoor Air Temp. °F DB / °F WB											
	°F DB	°F WB	61		64		68		70		72		75	
			TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
36K	-13	-15	26.96	3.78	26.53	3.89	25.94	4.02	25.20	4.15	24.79	4.22	24.46	4.28
	-4	-6	28.89	4.04	28.43	4.17	27.80	4.30	27.00	4.44	26.56	4.52	25.78	4.58
	0	-2	30.82	4.31	30.32	4.44	29.65	4.58	28.80	4.73	28.33	4.81	27.49	4.88
	5	3	38.52	4.48	37.90	4.61	37.06	4.76	36.00	4.92	35.41	5.00	34.94	5.07
	10	8	38.52	4.26	37.90	4.39	37.06	4.54	36.00	4.68	35.41	4.76	34.94	4.83
	17	15	38.52	4.05	37.90	4.17	37.06	4.31	36.00	4.45	35.41	4.52	34.94	4.58
	20	18	38.52	3.83	37.90	3.95	37.06	4.08	36.00	4.21	35.41	4.28	34.94	4.34
	25	23	38.52	3.62	37.90	3.73	37.06	3.85	36.00	3.98	35.41	4.04	34.94	4.10
	30	28	38.52	3.41	37.90	3.51	37.06	3.62	36.00	3.74	35.41	3.81	34.94	3.86
	35	32	38.52	3.19	37.90	3.29	37.06	3.40	36.00	3.50	35.41	3.57	34.94	3.61
	40	36	38.52	2.98	37.90	3.07	37.06	3.17	36.00	3.27	35.41	3.33	34.94	3.37
	45	41	38.52	2.76	37.90	2.85	37.06	2.94	36.00	3.03	35.41	3.09	34.94	3.13
	47	43	38.52	2.55	37.90	2.63	37.06	2.71	36.00	2.80	35.41	2.85	34.94	2.89
	50	44	38.52	2.51	37.90	2.59	37.06	2.68	36.00	2.76	35.41	2.81	34.94	2.85
	55	48	38.52	2.47	37.90	2.54	37.06	2.63	36.00	2.71	35.41	2.76	34.94	2.80
	60	52	38.52	2.41	37.90	2.48	37.06	2.56	36.00	2.65	35.41	2.69	34.94	2.73
	63	54	38.52	2.39	37.90	2.46	37.06	2.54	36.00	2.63	35.41	2.67	34.94	2.71
	68	58	38.52	2.36	37.90	2.43	37.06	2.51	36.00	2.59	35.41	2.63	34.94	2.67
	75	64	38.52	2.32	37.90	2.39	37.06	2.47	36.00	2.55	35.41	2.59	34.94	2.63

Remarks:
TC: Total Cooling Capacity (Gross) (kBtu/h)
SHC: Sensible Heat Capacity (Gross)
PI: Power Input (including the compressor, evap. fan motor & cond. fan motor) (kW)
DB: Dry Bulb Temperature
WB: Wet Bulb Temperature

SPECIFICATIONS

Capacity Charts

Cooling Capacity Tables																				
Model No. / Nominal Capacity (Btu/h)	Outdoor Air Temp. (°F DB)	Indoor Air Temp. °F DB / °F WB																		
		68 / 57			73 / 61			77 / 64			80 / 67			86 / 72			90 / 75		
		TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI
48K	5	39.80	32.97	1.60	42.27	35.05	2.16	44.68	36.20	2.34	46.55	34.57	2.38	49.72	34.91	2.38	52.13	35.54	2.38
	10	39.80	32.97	1.64	42.27	35.05	2.22	44.68	36.20	2.40	46.55	34.57	2.44	49.72	34.91	2.44	52.13	35.54	2.44
	15	39.80	32.97	1.68	42.27	35.05	2.28	44.68	36.20	2.48	46.55	34.57	2.50	49.72	34.91	2.52	52.13	35.54	2.50
	20	39.80	32.97	1.72	42.27	35.05	2.34	44.68	36.20	2.54	46.55	34.57	2.58	49.72	34.91	2.58	52.13	35.54	2.58
	25	39.80	32.97	1.78	42.27	35.05	2.40	44.68	36.20	2.60	46.55	34.57	2.64	49.72	34.91	2.64	52.13	35.54	2.64
	30	39.80	32.97	1.82	42.27	35.05	2.46	44.68	36.20	2.66	46.55	34.57	2.70	49.72	34.91	2.72	52.13	35.54	2.70
	35	39.80	32.97	1.86	42.27	35.05	2.52	44.68	36.20	2.74	46.55	34.57	2.78	49.72	34.91	2.78	52.13	35.54	2.78
	40	39.80	32.97	1.90	42.27	35.05	2.58	44.68	36.20	2.80	46.55	34.57	2.84	49.72	34.91	2.84	52.13	35.54	2.84
	45	39.80	32.97	1.96	42.27	35.05	2.64	44.68	36.20	2.86	46.55	34.57	2.90	49.72	34.91	2.92	52.13	35.54	2.90
	50	39.80	32.97	2.00	42.27	35.05	2.70	44.68	36.20	2.92	46.55	34.57	2.98	49.72	34.91	2.98	52.13	35.54	2.98
	55	40.98	36.98	2.04	43.84	39.35	2.76	46.70	40.76	3.00	48.00	38.70	3.04	52.40	39.90	3.04	55.26	40.84	3.04
	60	40.98	36.98	2.08	43.84	39.35	2.82	46.70	40.76	3.06	48.00	38.70	3.10	52.40	39.90	3.12	55.26	40.84	3.10
	65	40.98	36.98	2.14	43.84	39.35	2.88	46.70	40.76	3.12	48.00	38.70	3.18	52.40	39.90	3.18	55.26	40.84	3.18
	70	40.98	36.98	2.18	43.84	39.35	2.94	46.70	40.76	3.20	48.00	38.70	3.24	52.40	39.90	3.24	55.26	40.84	3.24
	75	40.98	36.98	2.32	43.84	39.35	3.04	46.70	40.76	3.28	48.00	38.70	3.34	52.40	39.90	3.36	55.26	40.84	3.38
	80	40.98	36.98	2.46	43.84	39.35	3.14	46.70	40.76	3.36	48.00	38.70	3.42	52.40	39.90	3.48	55.26	40.84	3.52
	85	40.98	36.98	2.80	43.84	39.35	3.40	46.70	40.76	3.62	48.00	38.70	3.68	52.40	39.90	3.74	55.26	40.84	3.80
	90	40.98	36.98	3.12	43.84	39.35	3.68	46.70	40.76	3.86	48.00	38.70	3.92	52.40	39.90	4.00	55.26	40.84	4.06
	95	40.98	36.98	3.46	43.84	39.35	3.92	46.70	40.76	4.06	48.00	38.70	4.00	52.40	39.90	4.20	55.26	40.84	4.28
	100	40.98	33.80	3.64	43.84	36.16	4.00	46.70	37.62	4.10	48.00	36.38	4.06	52.40	37.10	4.20	55.26	38.08	4.28
	105	40.98	33.80	3.80	43.84	36.16	4.08	46.70	37.62	4.12	48.00	36.38	4.14	52.40	37.10	4.20	55.26	38.08	4.28
	110	40.98	33.80	3.89	43.84	36.15	4.17	46.70	37.62	4.20	48.00	36.38	4.23	52.40	37.10	4.28	55.26	38.08	4.37
	115	36.98	32.80	3.32	39.84	35.13	3.36	42.70	36.62	3.28	44.76	35.46	3.22	48.40	36.21	3.24	51.26	37.21	3.32
	118	34.94	31.25	2.94	37.68	33.53	2.90	40.42	34.98	2.76	42.40	33.88	2.70	45.90	34.65	2.70	48.64	35.63	2.76
	125	34.24	30.73	2.82	36.96	32.99	2.74	39.66	34.42	2.60	41.60	33.36	2.52	45.06	34.11	2.52	47.76	35.09	2.58

Heating Capacity Tables														
Airflow （CFM）	Outdoor Air Temp. (°F DB)		Indoor Air Temp. °F DB / °F WB											
	°F DB	°F WB	61		64		68		70		72		75	
			TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
48K	-13	-15	35.95	4.85	35.37	5.01	34.59	5.17	33.60	5.34	33.05	5.43	32.61	5.50
	-4	-6	38.52	5.20	37.90	5.36	37.06	5.53	36.00	5.71	35.41	5.81	34.37	5.89
	0	-2	41.09	5.54	40.43	5.71	39.53	5.89	38.40	6.08	37.77	6.19	36.66	6.27
	5	3	51.36	5.75	50.53	5.93	49.41	6.13	48.00	6.33	47.21	6.43	46.59	6.52
	10	8	51.36	5.48	50.53	5.65	49.41	5.83	48.00	6.02	47.21	6.12	46.59	6.21
	17	15	51.36	5.20	50.53	5.36	49.41	5.54	48.00	5.72	47.21	5.82	46.59	5.89
	20	18	51.36	4.93	50.53	5.08	49.41	5.25	48.00	5.41	47.21	5.51	46.59	5.58
	25	23	51.36	4.65	50.53	4.79	49.41	4.95	48.00	5.11	47.21	5.20	46.59	5.27
	30	28	51.36	4.38	50.53	4.51	49.41	4.66	48.00	4.80	47.21	4.89	46.59	4.96
	35	32	51.36	4.10	50.53	4.23	49.41	4.37	48.00	4.51	47.21	4.58	46.59	4.65
	40	36	51.36	3.83	50.53	3.94	49.41	4.07	48.00	4.21	47.21	4.28	46.59	4.34
	45	41	51.36	3.55	50.53	3.66	49.41	3.78	48.00	3.90	47.21	3.97	46.59	4.02
	47	43	51.36	3.28	50.53	3.38	49.41	3.49	48.00	3.60	47.21	3.66	46.59	3.71
	50	44	51.36	3.23	50.53	3.33	49.41	3.44	48.00	3.55	47.21	3.61	46.59	3.66
	55	48	51.36	3.18	50.53	3.27	49.41	3.38	48.00	3.49	47.21	3.55	46.59	3.60
	60	52	51.36	3.10	50.53	3.19	49.41	3.30	48.00	3.40	47.21	3.46	46.59	3.51
	63	54	51.36	3.07	50.53	3.17	49.41	3.27	48.00	3.38	47.21	3.44	46.59	3.48
	68	58	51.36	3.03	50.53	3.12	49.41	3.22	48.00	3.33	47.21	3.38	46.59	3.43
	75	64	51.36	2.98	50.53	3.07	49.41	3.17	48.00	3.28	47.21	3.33	46.59	3.38

Remarks:
TC: Total Cooling Capacity (Gross) (kBtu/h)
SHC: Sensible Heat Capacity (Gross)
PI: Power Input (including the compressor, evap. fan motor & cond. fan motor) (kW)
DB: Dry Bulb Temperature
WB: Wet Bulb Temperature

Capacity Charts

5.2 Piping Length Correction Factor

The correction factor is based on the equivalent piping length in feet (EL) and the height between outdoor and indoor units in feet (H).

H:

Height difference between indoor unit and outdoor unit (ft).

• H>0: Position of outdoor unit is higher than that of the indoor unit (f).

• H<0: Position of outdoor unit is lower than that of the indoor unit (f).

L:

Actual one-way piping length between indoor unit and outdoor unit (ft). EL:

Equivalent one-way piping length between indoor unit and outdoor unit ft).

Equivalent length of 90° Elbow

Cooling

EL ft(m) / Model	25 (7.6)	38 (10)	50 (15)	66 (20)	82 (25)	100 (30)	115 (35)	131 (40)	148 (45)	164 (50)	180 (55)	200 (60)	213 (65)	230 (70)	246 (75)
N/A	1.00	0.98	0.93	0.89	0.84	0.79	0.75	0.70	--	--	--	--	--	--	--
N/A	1.00	0.96	0.94	0.91	0.89	0.85	0.83	0.80	0.76	--	--	--	--	--	--
24K	1.00	0.98	0.96	0.94	0.92	0.89	0.86	0.83	0.79	0.75	--	--	--	--	--
36K	1.00	0.98	0.95	0.91	0.88	0.84	0.81	0.77	0.73	0.70	--	--	--	--	--
48K	1.00	0.98	0.96	0.94	0.92	0.90	0.87	0.84	0.81	0.78	0.75	0.72	0.69	0.66	0.63

Heating

EL[ft(m] / Model	25 (7.6)	38 (10)	50 (15)	66 (20)	82 (25)	100 (30)	115 (35)	131 (40)	148 (45)	164 (50)	180 (55)	200 (60)	213 (65)	230 (70)	246 (75)
N/A	1.00	0.99	0.97	0.94	0.92	0.90	0.87	0.85	--	--	--	--	--	--	--
N/A	1.00	0.96	0.94	0.91	0.89	0.85	0.83	0.80	0.76	--	--	--	--	--	--
24K	1.00	0.98	0.96	0.94	0.92	0.89	0.86	0.83	0.79	0.73	--	--	--	--	--
36K	1.00	0.99	0.87	0.94	0.92	0.89	0.87	0.85	0.82	0.80	--	--	--	--	--
48K	1.00	0.99	0.97	0.95	0.93	0.91	0.88	0.86	0.83	0.80	0.77	0.74	0.70	0.66	0.62

To ensure correct unit selection, consider the farthest indoor unit.

NOTE:

1. Above data is assuming that the height difference between indoor unit and outdoor unit is 0m.
2. Be sure to minimize length of connection pipes to optimize performance. If the outdoor unit is installed higher or lower than the indoor unit, it is necessary to apply height correction factor additionally to length correction factor to calculate cooling.

   If outdoor unit is higher, correction should be applied to cooling capacity, if outdoor unit is lower, correction should be applied to heating capacity.

Capacity Charts

The correction factor of height difference between indoor unit and outdoor unit

Height difference	16ft(5m)	33ft(10m)	108ft(30m)
Factor	0.01	0.02	0.025

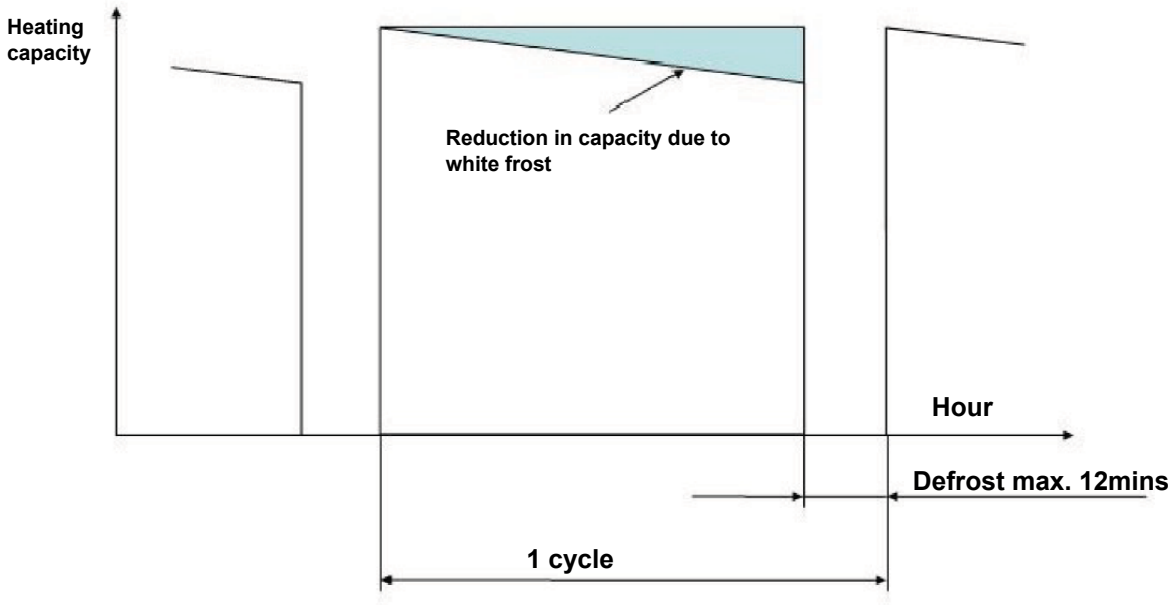
5.3 Correction Factors According To Defrosting Operation

The heating capacity in the preceding paragraph, excludes the condition of defrosting operation period. In consideration of defrosting operation, the heating capacity is corrected by the equation below.

Corrected heating capacity = Defrost Correction factor x unit capacity

Outdoor Temperature [℉(℃)DB]	-13 (-25)	-4 (-20)	5 (-15)	14 (-10)	23 (-5)	32 (0)	44.6 (7)	50 (10)	59 (15)
9K~60K	0.97	0.96	0.95	0.95	0.95	0.85	1.0	1.0	1.0

Correction Factor



NOTE:
The correction factor is not valid for special conditions such as snowfall or operation in a transitional period.

9. Blower Data (only for Air Handler type)

Airflow performance data is based on cooling performance with a coil and no filter in place. Check the performance table for appropriate unit size selection. External static pressure should stay within the minimum and maximum limits shown in the table below in order to ensure proper cooling, heating.

Air Flow Table

Model Number	Motor Speed		SCFM						
			External Static Pressure-Inches W.C.[kPa]						
			0.1[.02]	0.2[.05]	0.3[.07]	0.4[.10]	0.6[.145]	0.7[.170]	0.8[.20]
18K/24K	Tap (1)	CFM	1121	1117	1112	1106	1142	1140	1121
		Watts	57	80	96	120	161	186	214
	Tap (2)	CFM	1204	1231	1220	1213	1260	1261	1243
		Watts	69	95	113	139	183	210	242
	Tap (3)	CFM	1343	1360	1348	1337	1385	1391	1383
		Watts	87	116	135	164	212	242	277
	Tap (4)	CFM	1423	1433	1422	1410	1464	1473	1458
		Watts	98	129	150	180	231	262	298
	Tap (5)	CFM	1533	1544	1530	1519	1579	1584	1576
		Watts	115	150	173	207	261	294	334
36K	Tap (1)	CFM	897	898	906	909	907	902	890
		Watts	115	151	174	208	260	289	321
	Tap (2)	CFM	964	989	993	998	1000	998	987
		Watts	140	180	204	241	296	327	364
	Tap (3)	CFM	1075	1093	1098	1100	1100	1101	1098
		Watts	175	219	246	284	342	376	417
	Tap (4)	CFM	1139	1151	1158	1160	1163	1166	1158
		Watts	198	243	272	312	374	407	448
	Tap (5)	CFM	1227	1240	1246	1250	1254	1253	1252
		Watts	232	283	314	357	422	458	502
48K	Tap (1)	CFM	1405	1432	1441	1439	1430	1421	1405
		Watts	203	247	275	316	375	406	442
	Tap (2)	CFM	1518	1549	1552	1560	1547	1537	1528
		Watts	245	295	320	367	426	458	498
	Tap (3)	CFM	1683	1694	1693	1695	1692	1685	1668
		Watts	313	356	388	434	509	538	579
	Tap (4)	CFM	1725	1750	1756	1766	1765	1751	1741
		Watts	335	386	419	466	546	581	619
	Tap (5)	CFM	1838	1856	1863	1870	1867	1854	1852
		Watts	393	443	476	532	608	647	699

[!] Required 340-450CFM/ton range.

[!] CFM means Cubic Foot per Minute.

[!] Airflow based upon the Unit operates at 230V with no electric heater kit and no filter. Airflow at 208V is approximately the same as 230V.

Figure 219

INSTALLATION

Outdoor Unit

NOTE:

- This air conditioner is designed for the following temperatures.
  It should be operated within this range:

Capacity (Btu/h)	Mode	Outdoor operation temperature range [°F (°C)]	
		Maximum	Minimum
24K~48K	Cooling Operation	125(52)	5(-15)
	Heating Operation	75(24)	-22(-30)

- Storage condition: Temperature -13~140°F (-25~60°C)
  Humidity 30%~80%
- The capacity on the outdoor unit's label is its rated capacity. The actual capacity of the entire unit, when paired with a different indoor unit, will be determined by the capacity on the indoor unit's label.

INSTALLATION

Outdoor Unit

Safety Precautions

1. **This air conditioner uses new refrigerant HFO (R454B). R454B refrigerant is flammable.**
2. **HFC R454B is different from HFC R22 / R410A/ R32, some of the piping and installation and service tools are special.**
3. **This air conditioner uses power supply：208/230V ~, 60Hz.**
4. **Specified filter drier is required on the liquid pipe when installing AHU units.**
5. **Be sure that servicing equipment and replacement components are applicable for R454B refrigerant.**
6. **Do not discharge R454B refrigerant into the air, and when recover it, the cylinder service pressure rating must be over 600 psig. R454B refrigerant systems should be charged with liquid refrigerant and the service pressure rating of the hoses used must be over 750 psig.**
7. **Leak detectors should be designed to detect HFC refrigerant.**
8. **R454B refrigerant is only compatible with POE oils, which could absorb moisture rapidly, so do not expose it to the air, in case that it damages certain plastics materials.**
9. **Replace all the filter driers after maintenance.**

Please read these SAFETY PRECAUTIONS carefully to ensure correct installation.

- Be sure to use a dedicated power circuit, and do not put other loads on the power supply.
- Be sure to read these SAFETY PRECAUTIONS carefully before installation.
- Be sure to comply with SAFETY PRECAUTIONS of installation manual, because it contains important safety issues. Definitions for identifying hazard levels are provide below with their respective safety symbols.

⚠ WARNING： Hazards or unsafe practices which COULD result in severe personal injury or death.
⚠ CAUTION： Hazards or unsafe practices which COULD result in minor personal injury or product or property damage.

- Please carefully file indoor and outdoor unit manual away for future reference.

⚠WARNING

- Installation should be performed by qualified personnel.
  Improper installation may cause water leakage, electrical shock or fire.
- Install the air conditioner on a solid base that can support the unit weight.
  An inadequate base or incomplete installation may cause injury if the unit falls off the base.
- Use the specified type of wire for electrical connections safely between the indoor and outdoor units.
  And firmly clamp the interconnecting wires so their terminals receive no external stresses.
- For wiring, use a cable long enough to cover the entire distance with no connection.
  And do not connect multiple devices to the same AC power supply.
  Otherwise, it may be due to bad contact, poor insulation, exceed the allowable current and cause a fire or electric shock.
- After all installation is completed, check to make sure that no refrigerant is leaking out.
  If the refrigerant gas leakage to the interior, and the heater, stove flame touching it, will generate harmful substances.
- Perform the installation securely referring to the installation manual.
  Incomplete installation could cause a personal injury due to fire, electric shock, the unit falling or leakage of water.
- In accordance with the installation instructions for electrical work, please be sure to use a dedicated line.
- If the power supply circuit capacity or electrical work is not in place, may cause a fire or electric shock.
- Attach the electrical cover to the indoor unit and the service panel to the outdoor unit securely.
- If the electrical covers on the indoor unit or the service panel of the outdoor unit are not attached securely, it could result in a fire or an electric shock due to dust water, etc.
- Please be sure to cut off the main power supply before the installation of indoor electronic PCB or wiring. Otherwise, it will cause electric shock.
- The device should be in accordance with the state provisions for installation wiring.

INSTALLATION

Outdoor Unit

Safety Precautions

- The outdoor machine installation location should pay attention to the protection, avoid people or other small animals contact with electrical components, please keep the outdoor unit of the surrounding environment clean and tidy.
- When installing or relocating the unit, make sure that no substance other than the specified refrigerant (R454B) enters the refrigerant circuit.
  Any presence of foreign substance such as air can cause abnormal pressure rise or an explosion.

⚠ CAUTION

- Perform grounding
  Does not connect the earth wire to a gas pipe, water pipe, lightning rod or telephone earth wire.
  Defective grounding could cause an electric shock.
- Do not install the unit in a place where an inflammable gas leaks.
  If gas leaks and accumulates in the area surrounding the unit, it could cause an explosion.
- Fasten a flare nut with a torque wrench as specified in this manual.
  When fastened too tight, a flare nut may break after a long period and cause a leakage of refrigerant.
- Install an earth leakage breaker depending on the installation place(where it is humid).
  If an earth leakage breaker is not installed, it could cause an electric shock.
- Perform the drainage/piping work securely according to the installation manual.
- If there is a defect in the drainage/piping work, water could drop from the unit and household goods could be wet and damaged.

Safety instructions

- Do not let air enter the refrigeration system or discharge refrigerant when moving the air conditioner.
- This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
- Children should be supervised to ensure that they do not play with the appliance.
- The appliance shall be installed in accordance with national wiring regulations.
- Servicing shall only be performed as recommended by the equipment manufacturer.
- Maintenance and repair requiring the assistance of other skilled personnel shall be carried out under the supervision of the person competent in the use of flammable refrigerants.
- Means for disconnection, such as circuit breaker, which can provide full disconnection in all poles, must be incorporated in the fixed wiring in accordance with the wiring rules.
  It is necessary to allow the disconnection of the appliance from the supply after installation.
  Make sure the disconnection of the appliance from the supply when service and maintenance, a disconnection with a locking system in the isolated position shall be provided.
- The method of connection of the appliance to the electrical supply and interconnection of separate components, and the wiring diagram with a clear indication of the connections and wiring to external control devices are detailed in below parts.
- Details of type and rating of circuit breakers / ELB is detailed in below parts.
- The information of dimensions of the space necessary for correct installation of the appliance including the minimum permissible distances to adjacent structures is detailed in below parts.
- This appliance is intended to be used by expert or trained users in shops, in light industry and on farms, or for commercial use by lay persons.
- Instructions on additional charging of refrigerants are detailed below.
- Assure that the maximum operating pressure is considered when connecting to any indoor unit.
- Assure that the units shall only be connected to an appliance suitable for the same refrigerant.
- This unit must only be connected to other units that have been confirmed as complying to corresponding PARTIAL UNIT requirements of this Standard, UL 60335-2-40/CSA C22.2 No. 60335-2-40, or UL 1995/CSA C22.2No.236.

INSTALLATION

Outdoor Unit

Safety Precautions

Precautions for using R454B refrigerant

The basic installation work procedures are the same as the conventional refrigerant (R22 or R410A). However, pay attention to the following points:

⚠ WARNING

1.Transport of equipment containing flammable refrigerants.

Attention is drawn to the fact that additional transportation regulations may exist with respect to equipment containing flammable gas. The maximum number of pieces of equipment or the configuration of the equipment, permitted to be transported together will be determined by the applicable transport regulations.

2. Marking of equipment using signs

Signs for similar appliances (containing flammable refrigerants) used in a work area generally are addressed by local regulations and give the minimum requirements for the provision of safety and/or health signs for a work location. All required signs are to be maintained and employers should ensure that employees receive suitable and sufficient instruction and training on the meaning of appropriate safety signs and the actions that need to be taken in connection with these signs. The effectiveness of signs should not be diminished by too many signs being placed together. Any pictograms used should be as simple as possible and contain only essential details.

3.Disposal of equipment using flammable refrigerants

Compliance with national regulations

4.Storage of equipment/appliances

The storage of equipment should be in accordance with the manufacturer's instructions.

5.Storage of packed (unsold) equipment

- Storage package protection should be constructed such that mechanical damage to the equipment inside the package will not cause a leak of the refrigerant charge.
- The maximum number of pieces of equipment permitted to be stored together will be determined by local regulations.
- The storage temperature should not exceed 60°C, as the refrigerant leakage may occur above 140°F(60°C), which can cause danger.

6.Information on servicing

6-1 Checks to the area

Prior to beginning work on systems containing flammable refrigerants, safety checks are necessary to ensure that the risk of ignition is minimized. For repair to the refrigerating system, the following precautions should be complied with prior to conducting work on the system.

6-2 Work procedure

Work shall be undertaken under a controlled procedure so as to minimise the risk of flammable gas or vapour being present while the work is being performed.

6-3 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.

6-4 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 flammable atmospheres.
- Ensure that the leak detection equipment being used is suitable for use with flammable refrigerants, i.e. non-sparking, adequately sealed or intrinsically safe.

6-5 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 CO2 fire extinguisher adjacent to the charging area.

6-6 No ignition sources

- No person carrying out work in relation to a refrigeration system which involves exposing any pipe work that contains or has contained flammable refrigerant 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 flammable 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.

6-7 Ventilated area

- 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 mechanical 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.

6-8 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.

Safety Precautions

⚠ WARNING

- The following checks shall be applied to installations using flammable refrigerants:
  - The charge amount 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 used, the secondary circuit shall be checked for the leak of refrigerant;
  - Marking of the equipment should be visible and legible. Illegal markings and signs hall 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.

6-9 **Checks of electrical devices**

- Repair and maintenance of 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:
- Do not discharge capacitors. Remove power from the unit and check that the LEDs on all PCBs are out before working on the unit.
- That there no live electrical components and wiring are exposed while charging, recovering or purging the system;
- That there is continuity of earth bonding.

7. **Repairs of sealed components**
Sealed electrical components shall be replaced.

8. **Repairs of intrinsically safe components**
Intrinsically safe components must be replaced.

9. **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.

10. **Detection of flammable refrigerants**

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

11. **Leak detection methods**

The following leak detection methods are deemed acceptable for systems containing flammable refrigerants:

- Electronic leak detectors shall be used to detect flammable refrigerants, but 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 (maximum 25%) is confirmed.
- Leak detection fluids are 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.
- 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.
- Removal of refrigerant shall be according to the manual.

⚠ WARNING

12. **Removal and evacuation**

- 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;
  - Evacuate;
  - Purge the circuit with nitrogen
  - Evacuate
  - Cut out components to open circuit, do not use flame.
  - Open the circuit.
- The refrigerant charge shall be recovered into the correct recovery cylinders.
- The system shall be “flushed” with OFN to render the unit safe.
- This process may need to be repeated for several times.
- Compressed air or oxygen shall not be used for this task.
- Flushing shall be achieved by breaking the vacuum in the system with OFN and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum.
- This process shall be repeated until no refrigerant is within the system. When the final OFN charge is used, the system shall be vented down to atmospheric pressure to enable working.
- This operation is absolutely vital if brazing operations on the pipe-work are to take place.
- Ensure that the outlet for the vacuum pump is not close to any ignition sources and there is ventilation available.

13. **Charging procedures**

- 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 minimise the amount of refrigerant contained in them.
  - Cylinders shall be kept upright.
  - Ensure that the refrigeration 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 refrigeration system.
  - Prior to recharging the system pressure shall be tested with OFN.
- 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.

14. **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 that all refrigerants are recovered safely.

Prior to the task, an oil and refrigerant sample shall be taken in case that an analysis is required prior to the re-use of recovered refrigerant. It is essential that electrical power is available before the task.

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.

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

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

Safety Precautions

⚠ WARNING

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 refrigeration system unless it has been cleaned and checked.

15. **Labelling**

Equipment shall be labelled stating that it has been de-commissioned and empty 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 REFRIGERANTS.

16. **Recovery**

- When removing refrigerant from a system, either for servicing or decommissioning, it is recommended that all refrigerant is removed safely.
- 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 labelled 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.

17. **Competence of service personnel**

Information and training
The training should include the substance of the following:
Information about the explosion potential of flammable refrigerants to show that flammables may be dangerous when handled without care.
Information about potential ignition sources, especially those that are not obvious, such as lighters, light switches, vacuum cleaners, electric heaters.
Information about the concept of sealed components and sealed enclosures according to UL 60335.
Information about the correct working procedures:

a) Commissioning
- Ensure that the floor area is sufficient for the refrigerant charge or that the ventilation duct is assembled in a correct manner.
- Connect the pipes and carry out a leak test before charging with refrigerant.
- Check safety equipment before putting into service.

b) Maintenance
- Portable equipment shall be repaired outside on in a workshop specially equipped for servicing units with flammable refrigerants.
- Ensure sufficient ventilation at the repair place.
- Be aware that malfunction of the equipment may be caused by refrigerant loss and a refrigerant leak is possible.
- Discharge capacitors in a way that won't cause any spark. The standard procedure to short circuit the capacitor terminals usually creates sparks.
- Reassemble sealed enclosures accurately If seals are worn, replace them.
- Check safety equipment before putting into service.

c) Repair
- Portable equipment shall be repaired outside or in a workshop specially equipped for servicing units with flammable refrigerants.
- Ensure sufficient ventilation at the repair place.
- Be aware that of the equipment may be caused by refrigerant loss and a refrigerant leak is possible.
- Discharge capacitors in a way that won't cause any spark.
- When brazing is required the following procedures shall be carried out in the right order.

- Remove the refrigerant.

INSTALLATION

Outdoor Unit

Safety Precautions

⚠ WARNING

- Evacuate the refrigerant circuit.
- Purge the refrigerant circuit with nitrogen for 5 min.
- Evacuate again
- Remove parts to be replaced by cutting, not by flame.
- Purge the braze point with nitrogen during the brazing procedure.
- Carry out a leak test before charging with refrigerant.

● Reassemble sealed enclosures accurately. If seals are worn, replace them.
● Check safety equipment before putting into service.

d) Decommissioning

• If the safety is affected when the equipment is putted out of service. the refrigerant charge shall be removed before decommissioning.
• Ensure sufficient ventilation at the equipment location.
• Be aware that malfunction of the equipment may be caused by refrigerant loss and a leak is possible.
• Do not discharge capacitors. Remove power from the unit and check that the LEDs on all PCBs are out before working on the unit.
• Remove the If the recovery is not required by national regulations, drain the refrigerant to the outside. Take care that the drained refrigerant will not cause any danger. In doubt, one person should guard the outlet .Take special care that drained refrigerant will not float back into the building.

e) Disposal

• Ensure sufficient ventilation at the working place.
• Remove the refrigerant. If the recovery is not required by national regulations, drain the refrigerant to the outside. Take care that the drained refrigerant will not cause any danger. In doubt, one person should guard the outlet. Take special care that drained refrigerant will not float back into the building.
• Evacuate the refrigerant circuit
• Purge the refrigerant circuit with nitrogen for 5 min.
• Evacuate again.
• Cut out the compressor and drain the oil.

•The pipe-work shall be complianced with national gas regulations.
•The maximum refrigerant charge amount is X kg (X see below).
•Where addition of charge is required to complete installation, according to the content in "Refrigerant piping" . After charged, finish the label (in accessory bag) and paste it near the nameplate.
•When moving or relocating the air conditioner, consult experienced service technicians for disconnection and reinstallation of the unit.
•Do not place any other electrical products or household belongings under indoor unit or outdoor unit.
•Condensation dripping from the unit might get them wet, and may cause damage or malfunction of your property.
•Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.
•The appliance shall be stored in a room without continuously operating ignition sources（for example: open flames, an operating gas appliance or an operating electric heater).
•Do not pierce or burn.
•Be aware that refrigerants may not contain an odour.
•To keep ventilation openings clear of obstruction.
•The appliance shall be stored in a well-ventilated area where the room size corresponds to the room area as specified for operation.
•The appliance shall be stored in a room without continuously operating open flames (for example an operating as appliance) and ignition sources (for example an operating electric heater).
•Any person who is involved with working on or breaking into a refrigerant circuit should hold a current valid certificate from an industry-accredited assessment authority, which authorises their competence to handle refrigerants safely in accordance with an industry recognised assessment specification.
•Servicing shall only be performed as recommended by the equipment manufacturer.
•Maintenance and repair requiring the assistance of other skilled personnel shall be carried out under the supervision of the person competent in the use of flammable refrigerants.
•The appliance shall be installed and stored so as to prevent mechanical damage from occurring.
•Mechanical connectors used indoors shall comply with ISO 14903. When mechanical connectors are reused indoors, sealing parts shall be renewed. When flared joints are reused indoors, the flare part shall be re-fabricated.
•The installation of pipe-work shall be kept to a minimum.
•Mechanical connections shall be accessible for maintenance purposes.

INSTALLATION

Outdoor Unit

Safety Precautions

⚠ WARNING

- That pipe-work including piping material, pipe routing, and installation shall include protection from physical damage in operation and service, and be in compliance with national and local codes and standards, such as ASHRAE 15, ASHRAE 15.2, IAPMO Uniform Mechanical Code, ICC International Mechanical Code, or CSA B52. All field joints shall be accessible for inspection prior to being covered or enclosed;
- That after completion of field piping for split systems, the field pipework shall be pressure tested with an inert gas and then vacuum tested prior to refrigerant charging, according to the following requirements;

  The minimum test pressure for the low side: 415psig(2.86MPa)
  The minimum test pressure for the high side: 600psig(4.14MPa)
- Field-made refrigerant joints indoors shall be tightness tested. The test method shall have a sensitivity of 0.18 oz per year of refrigerant or better under a pressure of at least 0,25 times the maximum allowable pressure. No leak shall be detected. The joints must be welded or brazed.

Label in accessory bag

Contains Flammable Refrigerants
Contient des réfrigérants inflammables

Refrigerant:
Fluide frigorigène: R454B

Additional Charge:
Charge supplémentaire: _____ oz

Total Charge (Installer Reference):
Charge totale (Référence du Programme d'installation): _____ oz

Max. Refrigerant Charge Amount X[oz.(g)]

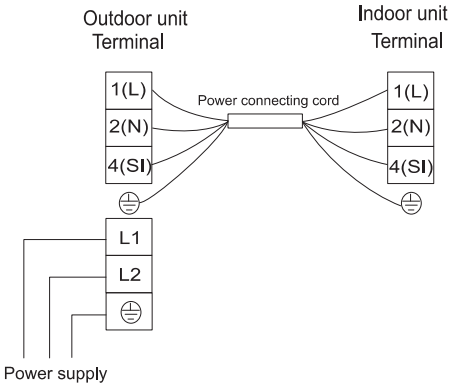
Capacity (Btu/h)	24K	36K	48K
Max. Refrigerant charge [oz.(g)]	126.53(3587)	165.22(4684)	256.2(7263)

Explanation of symbols displayed on the indoor unit or outdoor unit.

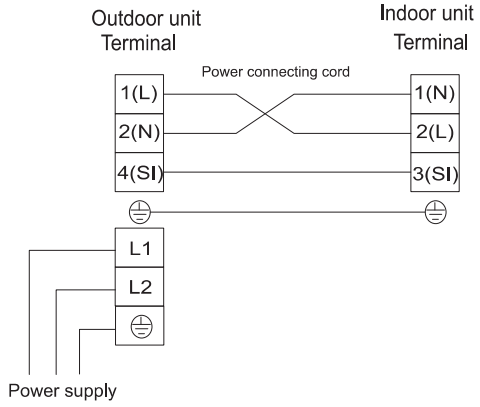
  Refrigerant safety group A2L	**WARNING**	This symbol shows that this appliance uses a flammable refrigerant. If the refrigerant is leaked and exposed to an external ignition source, there is a risk of fire.
	**CAUTION**	This symbol shows that the operation manual should be read carefully.
	**CAUTION**	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.

Electrical Wiring Diagram

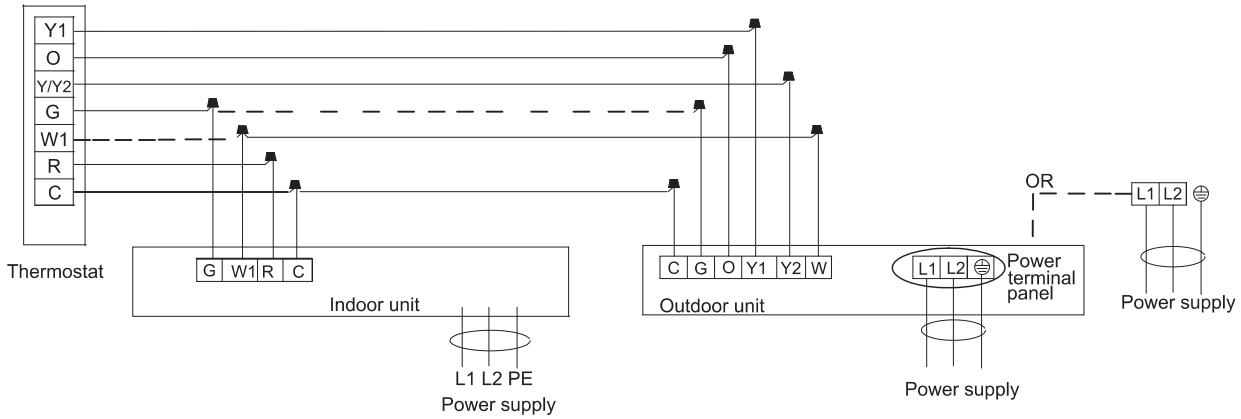
Outdoor unit connected to a Duct /Cassette / Matched AHU indoor unit



Outdoor unit connected to a Wall-mounted indoor unit



Outdoor unit connected to a 3rd party AHU indoor unit



EXPLANATION OF TERMINALS
Y1: COOLING/ HEATING (LOW RANGE)
Y2: COOLING/ HEATING (HIGH RANGE)
O - REVERSING VALVE SIGNAL (ENERGIZE TO COOL)
C- COMMON
R-24v AC
G- INDOOR FAN SIGNAL
W - DEFROST SIGNAL
W1 - ELECTRIC AUXILIARY HEAT SIGNAL

NOTE 1: INDOOR UNIT SHOULD BE CONNECTED ACCORDING TO THE WIRING DIAGRAM OF THE INDOOR UNIT.
NOTE 2: WHEN AUXILIARY HEATING IS SELECTED, THE THERMOSTAT NEEDS TO BE CONNECTED TO TERMINALS W1 AND W2 OF THE INDOOR UNIT, AS SHOWN BY THE DOTTED LINE.
NOTE 3: WIRING FROM G TERMINAL ON THERMOSTAT TO G TERMINAL ON OUTDOOR UNIT IS OPTIONAL. THIS INDOOR FAN SIGNAL PROVIDES FEEDBACK TO THE OUTDOOR UNIT FOR THE COOL/HEAT PURGE CYCLE. THIS WIRE MAY BE DISCONNECTED, AND THE UNIT WILL STILL RUN, BUT WITH LESS EFFICIENCY.

Note:
1) When connecting AHU indoor units, the indoor unit wiring should be operated according to the indoor unit wiring diagram.
2) Dashed line is only hooked up when aux heat kit is installed.

INSTALLATION

Outdoor Unit

Installation Instructions

Transportation and Handling before Installation

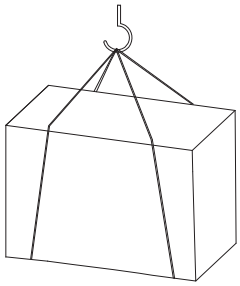
Transport the product as close to the installation location as practical before unpacking.

- Handling Method

  When handling the unit, ensure a balance of the unit, check safety and lift it up smoothly.

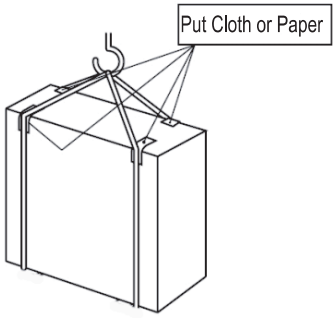
(1) Do not remove any packing materials.

(2) Hang the unit under packing condition with two ropes, as shown in Fig. blow.



- Handling

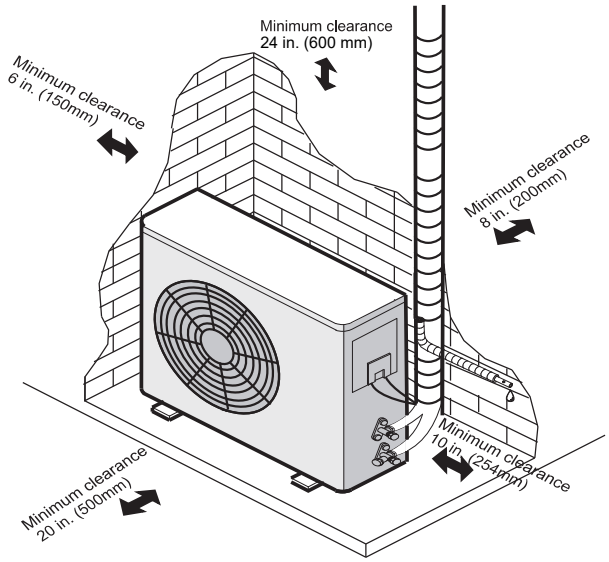
  If have no package to move, please protect with cloth or paper.



Installation Locations Selection

Selection of installation locationDuring installation, it is essential to fully consider the space required for maintenance and to avoid placing any obstacles at the ventilation outlets that could block air circulation.
The following installation locations should be avoided:

- Places with flammable and explosive hazards, such as coal dust, metal dust, cotton lint, petroleum, natural gas, etc.. and places like mines, gas stations, or production workshops in industries such as coal dust, garment manufacturing, woodworking, cement, and cotton quilt factories;
- Special places with strong heat sources, steam, constant temperature, and humidity, such as fruit preservation warehouses, bath centers, etc.;
- Environments with corrosive or sulfurous, volatile gases, such as sulfur, acid, salt, papermaking sites, sulfur springs, chemical plants, etc.;
- Places with high frequency electromagnetic interference facilities, such as welding machines, frequency converters, radio transmission equipment, medical equipment, etc.;
- Places filled with mineral oil fumes or spray or steam, for example, the kitchen.
  If the oil is attached to the heat exchanger, it will degrade the performance of the indoor unit and may damage its plastic parts.



INSTALLATION

Outdoor Unit

Installation Instructions

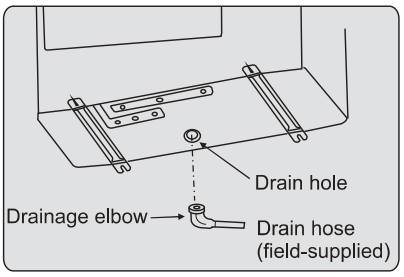
Drainage Elbow and Drain Hose Installation

Install Drainage Elbow and Drain Hose

• The condensate water may drain from the outdoor unit when the unit operates in heating mode. In order to avoid disturbing neighbors and to protect the environment, it is necessary to install a drainage elbow and a condensate drain hose to drain out the condensate water.

• Perform drainage work before the indoor unit and outdoor unit are connected. Otherwise, it will be difficult to install drainage elbow after the machine becomes immovable.)

• Connect the drain hose [field-supplied, inside diameter: 5/8 in. (15mm)] as shown in the figure for drainage.



Note:

• Do not use the drainage elbow in the cold region. Drain may freeze.

Outdoor Unit Installation

(1) Use the washers to fasten the machine at the foundation bolts.

(2) When fastening the outdoor unit with the foundation bolts, the fasten holes position as the Fig.1.

(3) Fasten the outdoor unit as shown in Fig.2.

(4) Make sure to fasten the outdoor unit tight and level to prevent noise from occurring.

(5) Do not drain off water to the public places to hazardous slips/falls.

(6) The strong base (made of concrete, etc.) should be made. The appliance should be placed not less than 4in. (10cm) high to avoid being wet or corroded. Otherwise, it may cause damage to the appliance or reduce its life time. (Fig.3)

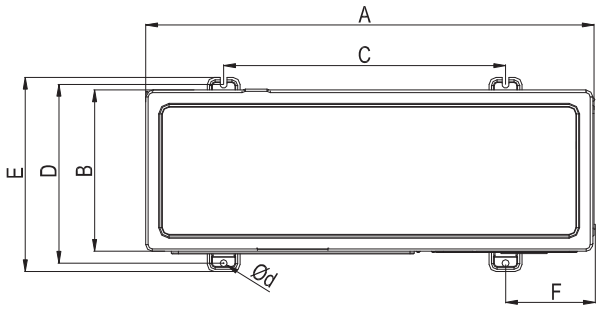
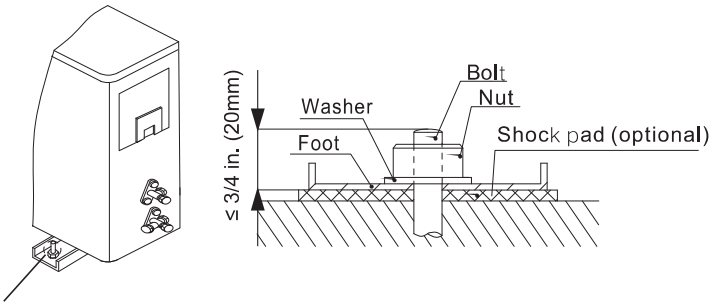


Fig.1

[unit: in. (mm)]

Capacity (Btu/h)	A	B	C	D	E	F	d
24K	35-3/8 (900)	13-3/8 (340)	23-7/8 (608)	14-1/2 (368)	15-5/8 (398)	5-3/4 (146)	3/8*3/4 (10*20)
36K	43-1/4 (1100)	17-3/4 (450)	25-1/4 (640)	19-1/8 (485)	20-1/4 (515)	9-1/4 (235)	1/2*3/4 (12*20)
48K	41-3/4 (1060)	13 (330)	23 (585)	14-1/2 (367)	15-1/2 (395)	7-5/8 (195)	1/2*3/4 (12*20)



The anchor bolts should be protruded ≤ 3/4 in. (20mm) (Refer to figure), otherwise, it is not conducive to removing the service plate.

Fig.2

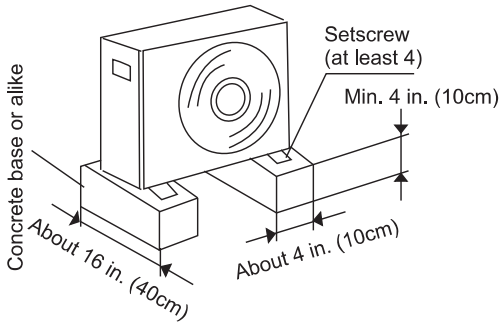


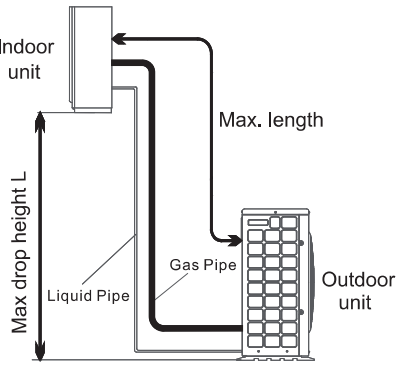
Fig.3

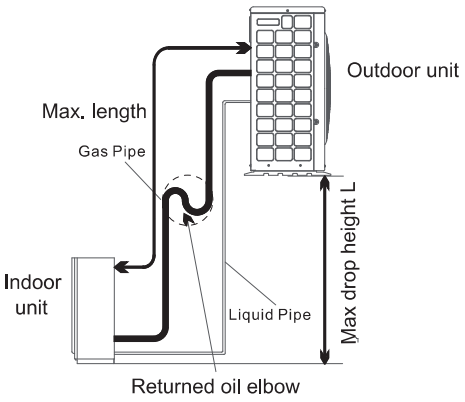
Refrigerant Piping

1. Piping Diameter

Capacity(Btu/h)	Outer Diameter of Pipe	
	Gas [in.(mm)]	Liquid [in.(mm)]
24K/36K	Φ 5/8 (15.88)	Φ 3/8 (9.52)
48K	Φ 3/4 (19.05)	Φ 3/8 (9.52)

2. Pipe length





Capacity (Btu/h)	Min. Pipe length (L)	Max. Pipe length (L)	Max. Height difference (H)
24K/36K	10ft. (3m)	165ft. (50m)	100ft. (30m)
48K	10ft. (3m)	250ft. (75m)	100ft. (30m)

⚠ CAUTION

It is better with the shorter refrigerant piping length to maintain the capacity. So the connecting pipe should be as short as possible.
When the indoor unit is lower than outdoor unit and the height difference is larger than 32.8 ft.(10m), a returned oil elbow should be installed on the vertical gas pipe for every 20 ft.(6m).

3. Piping Material

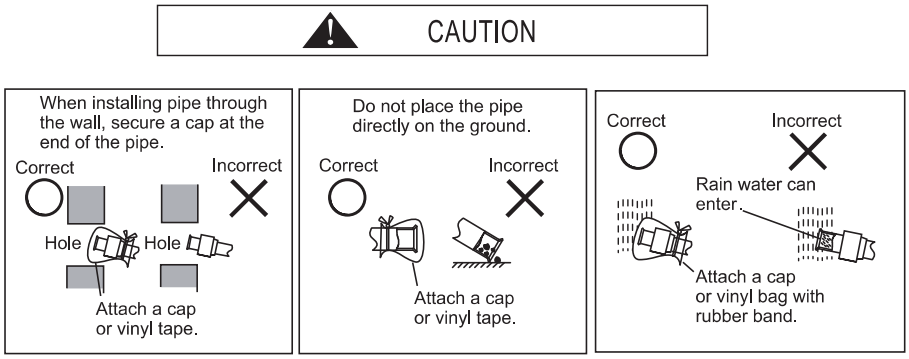
(1) Prepare locally-supplied copper pipes.
(2) Select clean copper pipes. Make sure there is no dust and moisture inside the pipes. Blow the inside of the pipes with nitrogen, to remove any dust or foreign materials before connecting pipes.
(3) Piping thickness and material are shown as below.

Diameter [in. (mm)]	ø 1/4 (6.35)	ø 3/8 (9.52)	ø 1/2 (12.70)	ø 5/8 (15.88)	ø 3/4 (19.05)	ø 7/8 (22.22)
Thickness [in. (mm)]	1/32 (0.8)	1/32 (0.8)	1/32 (0.8)	1/32 (1.0)	1/32 (1.0)	1/32 (1.0)
Material	C1220T-O, Type O, TP2M					

INSTALLATION

Outdoor Unit

Installation Instructions



4. Refrigerant piping work

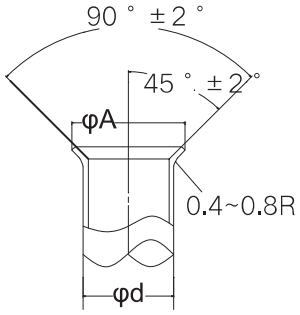
(1) Pipe cutting
Cut the copper pipe correctly with a pipe cutter.

(2) Burrs removal
Completely remove all burrs from the cross section of the pipe.
Orient the end of the copper pipe downward to prevent burrs from dropping in the pipe.

(3) Putting nut on
Remove flare nuts attached to indoor and outdoor units, then put them on the pipe, burrs of which have been removed.
(Not possible to put them on after flaring work).
Flare nut for pipe depends on the diameter of pipe.

(4) Flaring work
Perform flaring work with a flaring tool as shown below.

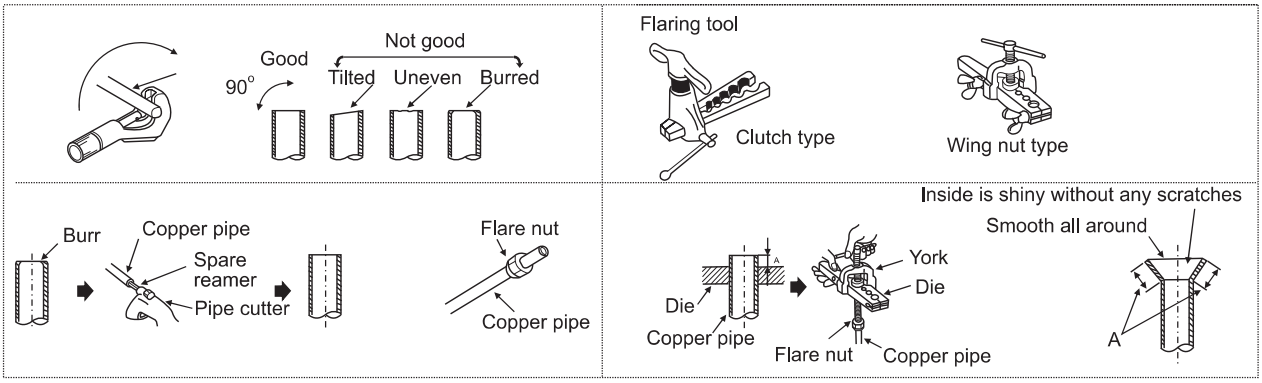
(5) Check
Compare the flared work with the figure below.
If flare is noted to be defective, cut off the flared section and perform flaring work again.



[Unit: in. (mm)]

Diameter ød	$A^{+0}_{-1/64}$ $(^{+0}_{-0.4})$
1/4 (6.35)	11/32 (9.1)
3/8 (9.52)	1/2 (13.2)
1/2 (12.7)	10/16 (16.6)
5/8 (15.88)	3/4 (19.7)
3/4 (19.05)*	15/16 (24.0)

*: Perform the flaring work with type O material.



5. Piping connection (when outdoor unit connected to a duct /cassette /wall-mount indoor unit)

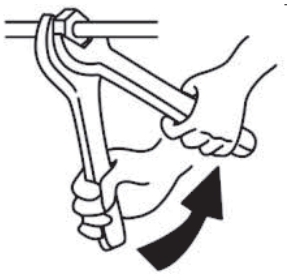
(1) Confirm that the valve is closed.

(2) Connect the indoor unit and the outdoor unit with field-supplied refrigerant piping. Suspend the refrigerant piping at certain points and prevent the refrigerant piping from touching the weak part of the building such as wall, ceiling, etc. (If touched, abnormal sound may occur due to the vibration of the piping. Pay special attention in case of short piping length.)

(3) Tighten the flare nut with two spanners (one being a torque wrench) as shown in the right figure.

(4) Apply the refrigerant oil (field-supplied) thinly at the seat surface of the flare nut and pipe before connecting and tightening.
And when tightening the flare nut, use two spanners.

(5) Outdoor refrigerant piping should connect with stop valve.



Double Spanner Work

Pipe size [in. (mm)]	Torque [lbf·ft. (N·m)]
ø 1/4 (6.35)	14.8 (20)
ø 3/8 (9.52)	29.5 (40)
ø 1/2 (12.7)	44.3 (60)
ø 5/8 (15.88)	59.0 (80)
ø 3/4 (19.05)	73.8 (100)

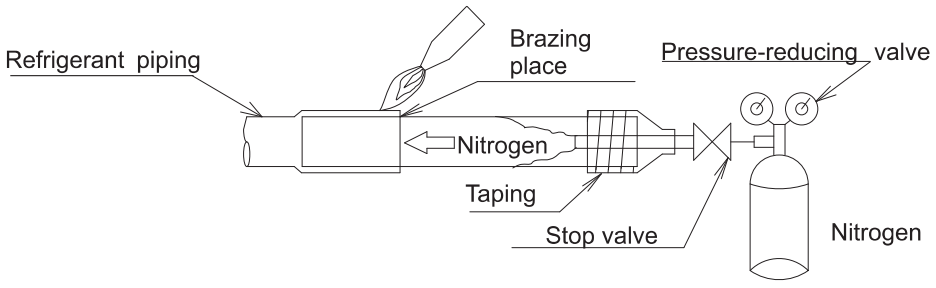
Tightening Torque for Flare Nut

⚠ CAUTION

Precautions when brazing the refrigerant pipings

When brazing the refrigerant piping, carry out brazing work(CAUTION2) after substituting nitrogen for air [flow nitrogen into the piping and substitute nitrogen for air(CAUTION1)(see the drawing below)].

1. The proper pressure for having nitrogen flow through the piping is approximately 2.9 psig(0.02 MPa), a pressure that makes one feel like breeze and be obtained through a pressure reducing valve.
2. Do not use flux when brazing refrigerant piping. Use phosphor copper brazing filler metal (BCuP-2; JIS Z 3264/ B-Cu93P-710/795: ISO 3677) that does not require flux. (If chlorinated flux is used, the piping will be corroded and, in addition if fluorine is contained, the refrigerant oil will be deteriorated and the refrigerant circuit will be affected badly.)



⚠ CAUTION

Do not use anti-oxidants when brazing the piping joints(Residue can clog pipes and break equipment).
Do not reuse joint which have been used once already.

6. Piping connection (when outdoor unit connected to an AHU indoor unit)

(1) R454B refrigerant is flammable, confirm that the valves are closed.

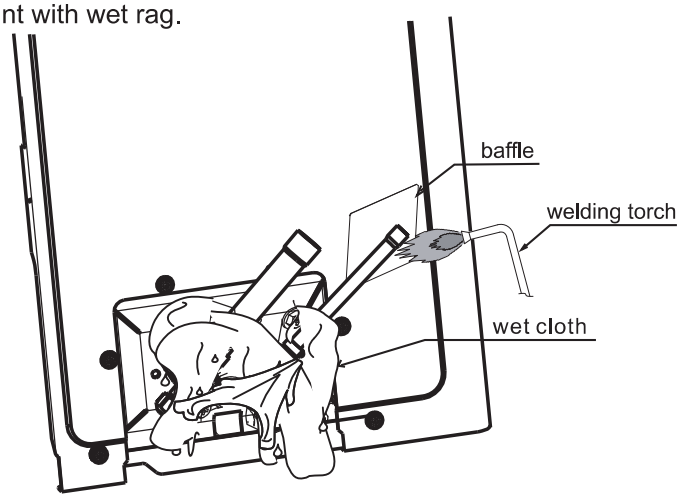
(2) Connect the indoor unit and the outdoor unit with field-supplied refrigerant pipes. The refrigerant piping should be brazed with a phosphorous-copper alloy material such as Silfos-15 or equivalent.

Precautions and steps during brazing:

a. Remove the adapter fittings (liquid piping/gas piping) from the accessory kit. Connect the flare nut ends to the corresponding service valves(liquid valve/ gas valve), then detach the copper sealing caps by performing nitrogen-purged brazing on the opposite ends.

b. Braze the liquid piping and gas piping to the adapter fittings.
Precautions should be taken to prevent heat damage to service valve by wrapping a wet cloth around it.
Also, a Heat shield can be set to protect all painted surfaces, insulation, during brazing.

c. After brazing cool joint with wet rag.



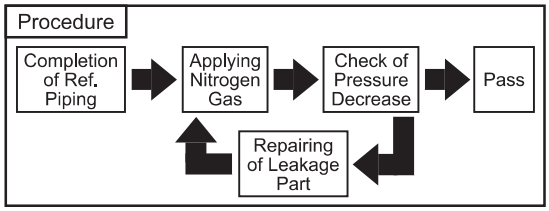
(3) After finishing connecting the refrigerant pipes, insulate with proper insulation.

- For outside unit, insulate both pipes.
- Cover piping joints with pipe cover.
- Using piping tape, apply taping starting from the entry of outdoor unit.
  - Fix the end of piping tape with adhesive tape.
  - When piping has to be arranged through above ceiling, closet or area where temperature and humidity are high, install additional sold insulation for prevention of condensation.

7. Line pressure tightness test

-Use Nitrogen only. Do not used compressed air.

Connect the gauge manifold using charging hoses with a nitrogen cylinder to the check joints of the liquid line and the gas line stop valves.
Perform the line pressure tightness test.
Don't open the gas line stop valves.
Apply nitrogen gas pressure of 550 psig (3.79 MPa).
Check for any gas leakage at the flare nut connections, or brazed parts by gas leak detector or foaming agent.
Gas pressure doesn't decrease is OK.
After the air tight test, release nitrogen gas.



Air tight procedure

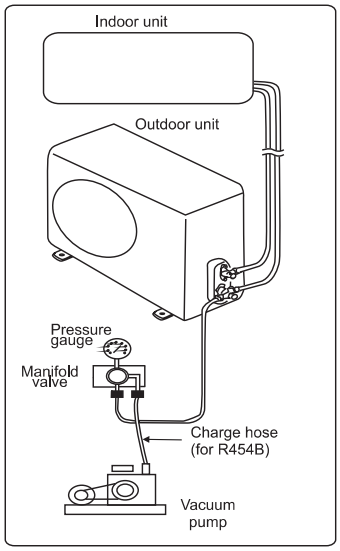
INSTALLATION

Outdoor Unit

Installation Instructions

8. Vacuum Pumping

(1) Remove the service port cap of the stop valve on the gas pipe side of the outdoor unit.
(2) Connect the manifold gauge and vacuum pump to the service port of the stop valve on the gas pipe side of the outdoor unit.
(3) Run the vacuum pump. (Work for more than 15 minutes.)
(4) Check the vacuum with the gauge manifold valve, then close the gauge manifold valve and stop the vacuum pump.
(5) Leave it as is for one or two minutes. Make sure that the pointer of the manifold gauge remains in the same position. Confirm that the pressure gauge shows -14.7psig (-0.101MPa or -760mmHg).
(6) Remove the manifold gauge quickly from the service port of the stop valve.
(7) After refrigerant pipes are connected and evacuated, fully open all stop valves on both sides of gas pipe and liquid pipe.
(8) Open adjusted valve to add refrigerant (the refrigerant is liquid).
(9) Tighten the cap to the service port .
(10) Retighten the cap.
(11) Leak test foam with halogen leak detector to check the flare nut and brazing for leaks. Use foam that does not generate ammonia (NH3) in the reaction.



⚠ CAUTION

This system is only applicable to R454B refrigerant, and the pressure gauge and charging hose must be special for R454B. If the pressure gauge pointer does not move to -14.5psig [-0.1 MPa (-756 mmHg)], please make sure to check for leaks at the valve connection between the indoor and outdoor units, and then proceed to the next step after repairing the leak.

Methods for opening and closing the stop valve

- The following figure shows the names of each component required to process the stop valve(Fig.1). The stop valve is closed before installation.
- Opening and closing the stop valve: Prepare hexagon wrenches.
  (1) Open the stop valve: Insert the hexagon wrench into the valve stem, rotate the valve stem counterclockwise, and stop rotating when the valve stem can no longer rotate. At this point, the valve has already opened.
  (2) Close the stop valve: Insert the hexagon wrench into the valve stem, rotate the valve stem clockwise, and stop rotating when the valve stem can no longer rotate. At this point, the valve has already closed.

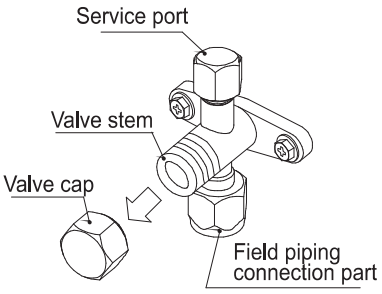


Fig.1

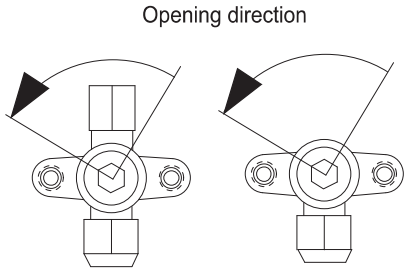


Fig.2 Liquid pipe

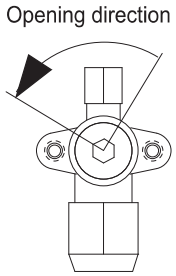


Fig.3 Gas pipe

9. Additional Refrigerant Charge

This operation must be completed with an electronic scale for weighing. The refrigerant is charged to the air conditioning unit through the service port of the stop valve at low-pressure side.

(1) Connect the manifold pressure gauge to the refrigerant cylinder first, remove the air from the charging hose, and then connect it to the charging port of the stop valve at the low-pressure side of the outdoor unit.
(2) Start the air conditioning unit for refrigeration.
(3) Open the refrigerant cylinder and pressure gauge valve.
(4) After the required amount of refrigeration is charged into the unit, quickly close the valves at the low-pressure side and of the refrigerant cylinder.
(5) Disconnect the charging hose from the service port of the stop valve and tighten the service port cap.

⚠ CAUTION

- Excessive or insufficient refrigerant is the main cause of unit faults. The outdoor unit is pre-charged with refrigerant when it leaves the factory, please charge the correct amount of refrigerant according to the instructions.
- After charging, please close the valve and record the refrigerant charging amount.

Amount of refrigerant additionally charged

If the pipe length is less than 25ft.(7.5 m), *there is no need for additional charging after triple evacuation. When the length of the pipe is greater than 25ft.(7.5 m), calculate according to the following table.

Capacity (Btu/h)	Amount of refrigerant pre-charged before leaving the factory/W_0[oz(g)]	Amount of refrigerant additionally charged X [oz(g)]	
		pipe length(L)≤ 25ft.(7.5m)	pipe length(L)≥ 25ft.(7.5m)
24K*	74.1(2100)	0	X=0.38(oz/ft) [35(g/m)]× [L-25ft.(7.5m)]
36K	112.8(3200)	0	X=0.38(oz/ft) [35(g/m)]× [L-25ft.(7.5m)]
48K	172.8(4900)	0	X=0.38(oz/ft) [35(g/m)]× [L-25ft.(7.5m)]

*: Regardless of pipe length, when an AHU is connected to a 24k outdoor unit, an additional refrigerant charge of 7.05 oz (200g) is required. This is due to the increased refrigerant requirement of the AHU coil, and is required for proper operation.

Wiring

⚠ WARNING

- Turn OFF the main power switch to the indoor unit and the outdoor unit and wait for more than 3 minutes before electrical wiring work or a periodical check is performed.
- Check to ensure that the indoor fan and the outdoor fan have stopped before electrical wiring work or a periodical check is performed.
- Protect the wires, electrical parts, etc. from rats or other small animals. If not protected, rats may gnaw at unprotected parts and at the worst, a fire will occur.
- Avoid the wirings from touching the refrigerant pipes, plate edges and electrical parts inside the unit. If not do, the wires will be damaged and at the worst, a fire will occur.
- An ELB type circuit breaker may be required for this unit depending on local and national electrical codes. An ELB type breaker is recommended in moist and/ or humid locations.
- This unit uses an inverter, which means that it must be used an earth leak detector capable handing harmonics in order to prevent malfunctioning of the earth leak detector itself.
- Do not use intermediate connection wires, stranded wires (For Main Power Supply), extension cables or control line connection, because the use of these wires may cause high temperature, electric shock or fire.

- The tightening torque of each screw shall be as follows.
  M4: 0.7 to 1.0 lbf·ft. (1.0 to 1.3 N·m)
  M5: 1.5 to 1.8 lbf·ft. (2.0 to 2.5 N·m)
  M6: 3.0 to 3.7 lbf·ft. (4.0 to 5.0 N·m)
  M8: 6.6 to 8.1 lbf·ft. (9.0 to 11.0 N·m)
  M10: 13.3 to 217 lbf·ft. (18.0 to 23.0 N·m)
  Keep the above tightening torque when wiring work.

⚠ CAUTION

- With tape material along the wire wrapped, sealed wiring holes, prevent the condensed water and insects.
- Tightly secure the power source wiring using the cord clamp inside the unit.
  Note: Fix the rubber bushes with adhesive when conduit tubes to the outdoor unit are not used.

General check

(1) Make sure that the field-selected electrical components (main power switches, circuit breakers, wires, conduit connectors and wire terminals) have been properly selected according to the electrical data.
Make sure that the components comply with National Electrical Code (NEC).

(2) Check to ensure that the voltage of power supply is within +10% of nominal voltage and earth phase is contained in the power supply wires. If not, electrical parts will be damaged.

(3) Check to ensure that the capacity of power supply is enough.
If not, the compressor will be not able to operate cause of voltage drop abnormally at starting.

(4) Check to ensure that the earth wire is connected.

(5) Install a main switch, multi-pole main switch with a space of 0.14 in. (3.5mm) or more, single phase main switch with a space of 0.12 in. (3.0mm) or more between each phase.

(6) Check to ensure that the electrical resistance is more than 2 MΩ, by measuring the resistance between ground and the terminal of the electrical parts. If not, do not operate the system until the electrical leakage is found and repaired.

INSTALLATION

Outdoor Unit

Installation Instructions

Electrical Data

Capacity (Btu/h)	Power Supply	ELB		MCA (A)	Transmitting Cable Size	Circuit Breaker (A)
		Rated Current (A)	Nominal Sensitive Current (mA)			
24K	208/230V ~/60Hz	30	30	22	4x14AWG stranded THHN	30
36K	208/230V ~/60Hz	50	30	30	4x14AWG stranded THHN	50
48K	208/230V ~/60Hz	60	30	50	4x14AWG stranded THHN	60

Max. Running Current (A): REFER TO NAMEPLATE

Note:

(1) Follow local codes and regulations when select field wires, and all the above are the minimum wire size.

(2) 18AWG. color-coded low voltage wire may be used for lengths less than 100ft(30m). For wire lengths than 100ft.(30m), 16AWG. wire may be used. When transmitting cable length is longer than 262ft. (80m), a larger wire size should be selected.

(3) Install main switch and ELB for each system separately. Select the high response type ELB that is acted within 0.1second. Recommended capacity to see outdoor machine switch capacity.

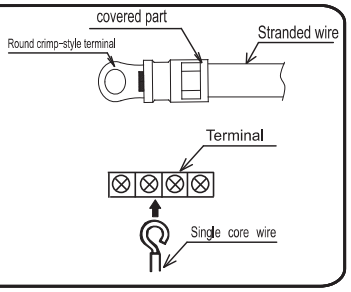
(4) For non-matched AHU configuration, 6 wire thermostat wire is required without aux. heat, and 8 wire should be used with aux. heat.

<Notice - When connecting the transmitting cable to indoor unit.>

1. When connecting the terminal block, use stranded wire. Make sure to use the round crimp-style terminal for connection to the power supply terminal block. Place the round crimp-style terminals on the wires up to the covered part and secure in place.

2. NOTICE- When connecting main power supply to the unit.

3. When connecting the terminal block using a single core wire, be sure to perform curing.



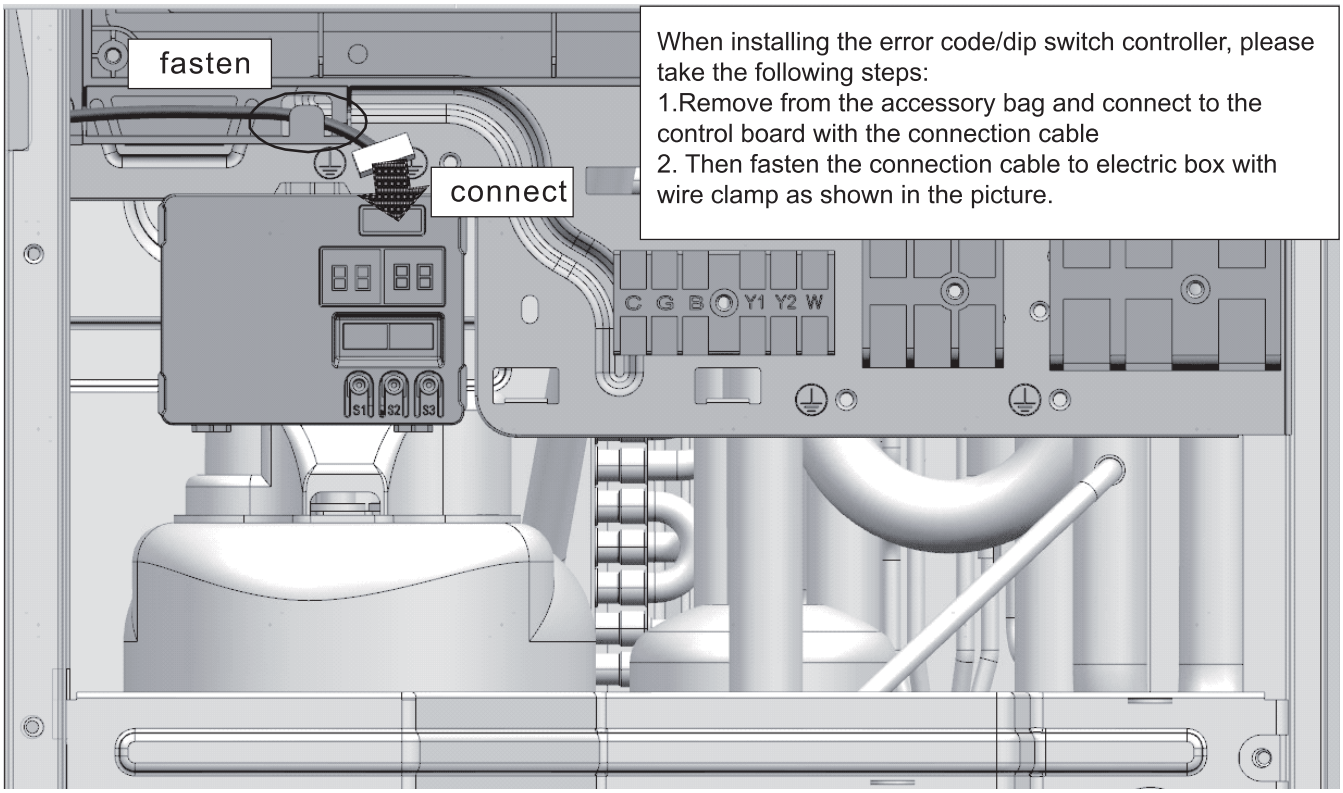
Dip Switch Setting

When connecting the 24k Condenser to an 18k air handler, the S5-1 dip switch must be placed in the ON position.

S5 DIP Switch Setting	
Capacity Setting	
Capacity High—Low	

Checker Box (Only for 36K)

For 36K, during installation, please connect the Checker box supplied in the accessories to the electrical box as shown in the figure below.



When installing the error code/dip switch controller, please take the following steps:
1.Remove from the accessory bag and connect to the control board with the connection cable
2. Then fasten the connection cable to electric box with wire clamp as shown in the picture.

Test Run

1. Preparation before test run and precautions

Please turn off all power supplies and confirm with a testing instrument whether all power supplies have been turned off.

Before running, please proceed the following steps to inspect the installation status:

(1) Structural damage inspection
Confirm whether there is no damage on the surface and interior of the equipment.

(2) Outdoor fan inspection
Confirm whether the impeller of the fan is located in the middle of the air outlet. Do not touch the air outlet.

(3) Fastening screw inspection
Check whether the screw parts become loose due to vibration during transportation, In addition, confirm whether the screws are tightened during installation.
Especially, be sure to inspect the screws of electrical wiring more carefully.

(4) Refrigerant leakage inspection
Vibration during transportation may cause loosening of the fastening (flaring part) position of the pipe. Check for refrigerant leakage.
Be sure to carry out this inspection carefully.

(5) Dial switch setting inspection
Confirm whether the dial switch is in the set position at the time of delivery (see: Dial setting of the outdoor unit).

(6) Insulation resistance inspection
Measure whether the resistance between the electrical component terminals and the ground reaches 2 MΩ or above with a 500 V megameter. When the resistance is below 2 MΩ, it indicates poor insulation at the electrical connection position, and the equipment cannot be operated at this time.
In addition, do not apply power to the communication line terminal block (otherwise it will cause damage to the printed circuit board).

(7) Full opening of stop valve
Before conducting a test run, please check whether the stop valve of the outdoor unit is fully open.

(8) Power supply phase inspection
Do not operate when the phase sequence is incorrect or missing.

(9) Power-on of crankcase heating belt
After completing the inspection of item (1) to (8), connect the outdoor unit power supply. After powering on the crankcase heating belt, the compressor can be preheated. If outdoor ambient temperature is below 32 degrees F, the compressor is not preheated and started directly, the compressor will fail. The unit can only be started after 6 hours of power-on.

(10) Confirmation of indoor and outdoor ambient temperature
The indoor ambient temperature during refrigeration operation shall not be lower than 80.6℉(27°C), and the outdoor ambient temperature during heating operation shall not exceed 66.2℉(19°C).

⚠ WARNING

The machine can be started only after all checkpoints are checked without problems.

(1) Check to ensure that the ground resistance of the wiring terminals exceeds 2 MΩ, Otherwise, find out and repair the leaking part before starting the system.

(2) Check and ensure that all stop valves of the outdoor unit are turned on before starting the system.

(3) It is recommended to power on for at least 6 hours to ensure sufficient lubrication of the compressor and extend its service life.

2. Identification of test run functions

Turn on the thermostat/wall controller and perform a test run.

Test whether the function and display of the air conditioning unit are normal and whether the temperature control is in good state during the test run.

When the system is operating, the following conditions shall be noticed.

(1) Do not touch any parts at the exhaust end to avoid scald. This is because the temperature of the compressor and pipes at the exhaust end is heated to above 194℉(90°C).

(2) After the test run is completed, turn off the power. Do not touch any electrical components within 10 mins after switching off the main power supply.
After completing the above operations, the installation of the equipment is usually completed. If you still have any questions, please contact our local technical service center for more information.

INSTALLATION

Air Handler Unit

Safety Precautions

Alert Symbols:

⚠ DANGER : The symbol refers to a hazard which can result in severe personal injury or death.

⚠ WARNING : The symbol refers to a hazard or an unsafe practice which may result in severe personal injury or death.

⚠ CAUTION : The symbol refers to a hazard or an unsafe practice which may result in minor personal injury, product or property damage.

NOTE : It refers to the remarks and instruction to the operation, maintenance and service.

- Installation, maintenance and repair of this unit must be performed by a qualified, licensed service personnel.
- Read these instructions thoroughly before installation or operation. Failure to follow these instructions may result in improper installation, service or maintenance, possibly resulting in fire, electrical shock, property damage, personal injury or death.
- Before installation, check if the voltage of the power supply at installation site is the same as the voltage shown on the nameplate.

⚠ DANGER

- Do not perform any alteration to this product, otherwise, it may cause water leakage, breakdown, short circuit, electric shock, fire, etc.
- An unventilated area where the appliance using FLAMMABLE REFRIGERANTS is installed shall be so constructed that should any refrigerant leak, it will not stagnate so as to create a fire or explosion hazard.
- Piping, welding and other such work should be carried out far away from the flammable and explosive materials, including the air conditioner refrigerant, to guarantee the security of the site.
- To protect the air conditioner from heavy corrosion, avoid installing the outdoor unit in the place, where sea water can splash directly onto it or in sulphurous air near a spa.

⚠ WARNING

- The appliance shall be installed in accordance with national wiring regulations;
- This unit must only be connected to other units that have been confirmed by the manufacturer.
- This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
  Children should be supervised to ensure that they do not play with the appliance.
- The place where this product is installed must have the reliable electrical grounding facilities and protections. Please do not connect the grounding of this product to various kinds of air feeding ducts, drain pipes, lightning protection facilities as well as other piping lines to avoid electric shock and damage caused by other factors.
- Wiring must be done by the qualified electrician. All the wiring operations must be conducted according to the local electrical codes.
- You should consider the capacity of the electric current of your electrical meter and socket before installation.
- The power wire where this product is installed should have the independent leakage protection device and the electric current over-load protection device provided for this product.
- Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.
  The appliance shall be stored in a room without continuously operating ignition sources(for example: open flames, an operating gas appliance or operating electric heater.) Do not pierce or burn.
- Be aware that refrigerants may not contain an odour.
- For duct connected appliances, false ceilings or drop ceilings can't be used as a return air plenum.

INSTALLATION

Air Handler Unit

Safety Precautions

⚠ WARNING

- Never use gasoline or other flammable gas near the air conditioner to avoid danger. When any abnormality like burnt smell, deformation, fire, smoke, etc. is found, you should stop using the air conditioner, immediately cut off the main power supply and contact the dealer.
- The first 6 inches of supply air plenum and duct work must be constructed of sheet metal as required by NFPA 90B.
- The supply air plenum or duct must have a solid sheet metal bottom piece directly after the air handler unit with no opening, registers or flexible air ducts located in it. If flexible supply air ducts are used, they may be located only in the side walls of the rectangular plenum, a minimum of 6 inches from the solid bottom.
- Do not install the air conditioner where excessively high heat-generating objects are placed.
- Auxiliary devices which may be a POTENTIAL IGNITION SOURCE shall not be installed in the duct work. Examples of such POTENTIAL IGNITION SOURCES are hot surfaces with a temperature exceeding 600°C and electric switching devices.
- Only auxiliary devices approved by the appliance manufacturer or declared suitable with the refrigerant shall be installed in connecting ductwork. You can contact the manufacturer for the detail.

⚠ WARNING

PROPOSITION 65:

- This appliance contains fiberglass insulation. Respirable particles of fiberglass are known to State of California to cause cancer.
- All manufacturer products meet current federal OSHA Guidelines for safety. California Proposition 65 warnings are required for certain products, which are not covered by the OSHA standards.
- California's Proposition 65 requires warnings for products sold in California that contain or produce any of over 600 listed chemicals known to the State of California to cause cancer or birth defects such as fiberglass insulation, lead in brass, and combustion products from natural gas.
- All "new equipment" shipped for sale in California will have labels stating that the product contains and /or produces Proposition 65 chemicals. Although we have not changed our processes, having the same label on all our products facilitates manufacturing and shipping. We cannot always know "when, or if" products will be sold in the California market.
- You may receive inquiries from customers about chemicals found in, or produced by, some of our heating and air conditioning equipment, or found in natural gas used with some of our products. Listed below are those chemicals and substances commonly associated with similar equipment in our industry and other manufacturers.
  - –Glass Wool (Fiberglass) Insulation
  - –Carbon Monoxide(CO)
  - –Formaldehyde
  - –Benzene
- More details are available at the websites for OSHA (Occupational Safety and Health Administration), at www.osha.gov and the State of California's OEHHA (Office of Environmental Health Hazard Assessment), at www.oehha.org. Consumer education is important since the chemicals and substances on the list are found in our daily lives. Most consumers are aware that products present safety and health risks, when improperly used, handled and maintained.

INSTALLATION

Air Handler Unit

Safety Precautions

⚠ CAUTION

- Do not turn the air conditioner on and off from the main power switch. Use the ON/OFF operation button.
- Do not stick anything into the air inlet and air outlet of both the indoor and outdoor units. This is dangerous because the fan is rotating at a high speed.
- Do not cool or heat the room too much if babies or invalids are present.
- Means for disconnection from the supply mains having a contact separation in all poles that provide full disconnection under over voltage category III conditions must be incorporated in the fixed wiring in accordance with the wiring rules.
- Type and rating of circuit breakers / ELB are detailed below.
- The method of connection of the appliance to the electrical supply and interconnection of separate components are detailed below.
- The information of dimensions of the space necessary for correct installation of the appliance including the minimum permissible distances to adjacent structures is detailed below.
- The range of external static pressures for ducted appliances is detailed below.
- Make sure the blower motor support is tight (3-motor mounting bolts). Then check to see if wheel is tightly secured to motor shaft before operation unit.

NOTE:

- **Storage condition: Temperature -13~140°F (-25~60°C)**
  Humidity 30%~80%
- **Heating and electric heater function are only valid for heat pump types.**
- **This air conditioner uses new refrigerant HFC (R454B). R454B refrigerant is flammable.**
- **Read this manual carefully before using this air conditioner. If you still have any difficulties or problems, consult your dealer for help.**
- **The air conditioner is designed to provide you with comfortable room conditions. Use this unit only for its intended purpose as described in this instruction manual.**
- **The minimum rated airflow:**

Model	Min. rated airflow required CFM(gph)
18K/24K	238.4(1.07×10^5)
36K	327.5(1.47×10^5)
48K	479.0(2.15×10^5)

INSTALLATION

Air Handler Unit

Safety Precautions

Precautions for using R454B refrigerant

The basic installation work procedures are the same as the conventional refrigerant (R22 or R410A). However, pay attention to the following points:

⚠ WARNING

1. **Transportation equipment containing flammable refrigerants.**
Pay attention to the fact that additional transportation regulations may exist with respect to equipment containing flammable gas. The maximum number of pieces of equipment or the configuration of the equipment, permitted to be transported together will be determined by the applicable transport regulations.

2. **Equipment signs**
Signs for similar appliances (containing flammable refrigerants) used in a work area generally are addressed by local regulations and give the minimum requirements for the provision of safety and/or health signs for a work location. All required signs are to be maintained and employers should ensure that employees receive suitable and sufficient instruction and training on the meaning of appropriate safety signs and the actions that need to be taken in accordance with these signs.
The effectiveness of signs should not be diminished by too many signs being placed together. Any pictograms used should be as simple as possible and contain only essential details.

3. **Disposal of equipment containing flammable refrigerants**
In compliance with national regulations.

4. **Storage of equipment/appliances**
The storage of equipment should be in accordance with the manufacturer's instructions.

5. **Storage of packed (unsold) equipment**
- Storage package protection should be constructed so that mechanical damage to the equipment inside the package will not cause a leak of the refrigerant.
- The maximum number of pieces of equipment permitted to be stored together will be determined by local regulations.
- The storage temperature should not exceed 140°F (60°C), as the refrigerant leakage may occur above 140°F (60°C), which can cause danger.

6. **Information on servicing**

6-1 **Checks to the area**
Prior to beginning work on systems containing flammable refrigerants, safety checks are necessary to ensure that the risk of ignition is minimized. To repair the refrigerating system, the following precautions should be complied with prior to conducting work on the system.

6-2 **Work procedure**
Work shall be undertaken following a controlled procedure so as to minimise the risk of flammable gas or vapour being leaked while the work is being performed.

6-3 **General working 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 controlling flammable material.

6-4 **Checking for leakage of refrigerant**
- The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potential flammable atmospheres.
- Ensure that the leak detection equipment being used is suitable for flammable refrigerants, i.e. non-sparking, adequately sealed or intrinsically safe.

6-5 **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.

6-6 **No ignition sources**
- No person carrying out work in relation to a refrigeration system which involves exposing any pipe work that contains or has contained flammable refrigerant 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 flammable refrigerant can possibly be released to the surrounding space.
- Prior to working, the area around the equipment should be checked to make sure that there are no flammable hazards or ignition risks. “No Smoking” signs shall be displayed.

6-7 **Ventilated area**
- Ensure that the area is in the open air or that it is adequately ventilated before tearing down the system or conducting any hot work.

INSTALLATION

Air Handler Unit

Safety Precautions

⚠ WARNING

•A degree of ventilation shall be kept during the period that the work is carried out.
•The ventilation should safely disperse any released refrigerant and preferably discharge it externally into the atmosphere.

6-8 **Checks of the refrigeration equipment**

- Where electrical components are being changed, they shall be fit for the purpose and 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 charge amount 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 used, the secondary circuit shall be checked for the leak of refrigerant;
  - Marking of the equipment should be visible and legible. Illegal markings and signs hall 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.

6-9 **Checks of electrical devices**

- Repair and maintenance of 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:
- Do not discharge capacitors. Remove power from the unit and check that the LEDs on all PCBs are out before working on the unit.
- That there no live electrical components and wiring are exposed while charging, recovering or purging the system;
- That there is continuity of earth bonding.

7. **Repairs of sealed components**
Sealed electrical components shall be replaced.

8. **Repairs of intrinsically safe components**
Intrinsically safe components must be replaced.

9. **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.

10. **Detection of flammable refrigerants**

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

11. **Leak detection methods**

The following leak detection methods are deemed acceptable for systems containing flammable refrigerants:

- Electronic leak detectors shall be used to detect flammable refrigerants, but 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 (maximum 25%) is confirmed.
- Leak detection fluids are 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.
- 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.
- Removal of refrigerant shall be according to the manual.

Safety Precautions

⚠ WARNING

12. **Removal and evacuation**

- 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;
  - Evacuate;
  - Purge the circuit with inert gas;
  - Evacuate;
  - Continuously flush or purge with inert gas when using flame to open circuit;
  - Open the circuit.
- The refrigerant charge shall be recovered into the correct recovery cylinders.
- The system shall be “flushed” with OFN to render the unit safe.
- This process may need to be repeated for several times.
- Compressed air or oxygen shall not be used for this task.
- Flushing shall be achieved by breaking the vacuum in the system with OFN and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum.
- This process shall be repeated until no refrigerant is within the system. When the final OFN charge is used, the system shall be vented down to atmospheric pressure to enable working.
- This operation is absolutely vital if brazing operations on the pipe-work are to take place.
- Ensure that the outlet for the vacuum pump is not close to any ignition sources and there is ventilation available.

13. **Charging procedures**

- 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 minimise the amount of refrigerant contained in them.
  - Ensure that the refrigeration 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 refrigeration system.
  - Prior to recharging the system pressure shall be tested with OFN.
- 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.

14. **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 that all refrigerants are recovered safely.

Prior to the task, an oil and refrigerant sample shall be taken in case that an analysis is required prior to the re-use of recovered refrigerant. It is essential that electrical power is available before the task.

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.

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

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

Safety Precautions

⚠ WARNING

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 refrigeration system unless it has been cleaned and checked.

15. **Labelling**

Equipment shall be labelled stating that it has been de-commissioned and empty 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 REFRIGERANTS.

16. **Recovery**

- When removing refrigerant from a system, either for servicing or decommissioning, it is recommended that all refrigerant is removed safely.
- 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 labelled 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.
- 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 flammable refrigerants.
- 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.
- Before using the recovery machine, check that it is in satisfactory working order, has been properly maintained and that any associated electrical components are sealed to prevent ignition in the event of a refrigerant release.
- Consult manufacturer if in doubt.
- The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder, and the relevant Waste Transfer Note arranged.
- Do not mix refrigerants in recovery units and especially not in cylinders.
- 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 evacuation process shall be carried out prior to returning the compressor to the suppliers.
- Only electric heating to the compressor body shall be employed to accelerate this process.
- When oil is drained from a system, it shall be carried out safely.

17. **Competence of service personnel**

Information and training
The training should include the substance of the following:
Information about the explosion potential of flammable refrigerants to show that flammables may be dangerous when handled without care.
Information about potential ignition sources, especially those that are not obvious, such as lighters, light switches, vacuum cleaners, electric heaters.
Information about the concept of sealed components and sealed enclosures according to UL 60335.
Information about the correct working procedures:

a) Commissioning

- Ensure that the floor area is sufficient for the refrigerant charge or that the ventilation duct is assembled in a correct manner.
- Connect the pipes and carry out a leak test before charging with refrigerant.
- Check safety equipment before putting into service.

INSTALLATION

Air Handler Unit

Safety Precautions

⚠ WARNING

b) Maintenance
- Portable equipment shall be repaired outside on in a workshop specially equipped for servicing units with flammable refrigerants.
- Ensure sufficient ventilation at the repair place.
- Be aware that malfunction of the equipment may be caused by refrigerant loss and a refrigerant leak is possible.
- Discharge capacitors in a way that won't cause any spark. The standard procedure to short circuit the capacitor terminals usually creates sparks.
- Reassemble sealed enclosures accurately If seals are worn, replace them.
- Check safety equipment before putting into service.

c) Repair
- Portable equipment shall be repaired outside or in a workshop specially equipped for servicing units with flammable refrigerants.
- Ensure sufficient ventilation at the repair place.
- Be aware that of the equipment may be caused by refrigerant loss and a refrigerant leak is possible.
- Do not discharge capacitors. Remove power from the unit and check that the LEDs on all PCBs are out before working on the unit.
- When brazing is required the following procedures shall be carried out in the right order.
  - Remove the refrigerant.
  - Evacuate the refrigerant circuit.
  - Purge the refrigerant circuit with nitrogen for 5 min.
  - Evacuate again
  - Remove parts to be replaced by cutting, not by flame.
  - Purge the braze point with nitrogen during the brazing procedure.
  - Carry out a leak test before charging with refrigerant.
- Reassemble sealed enclosures accurately. If seals are worn, replace them.
- Check safety equipment before putting into service.

d) Decommissioning
- If the safety is affected when the equipment is putted out of service. the refrigerant charge shall be removed before decommissioning.
- Ensure sufficient ventilation at the equipment location.
- Be aware that malfunction of the equipment may be caused by refrigerant loss and a leak is possible.
- Do not discharge capacitors. Remove power from the unit and check that the LEDs on all PCBs are out before working on the unit.
- Remove the refrigerant

e) Disposal
- Ensure sufficient ventilation at the working place.
- Remove the refrigerant.
- Evacuate the refrigerant circuit
- Purge the refrigerant circuit with nitrogen for 5 min.
- Evacuate again.
- Cut out the compressor and drain the oil.

INSTALLATION

Air Handler Unit

Safety Precautions

⚠ WARNING

- The pipe-work shall be compliianced with national gas regulations.
- Appliance shall be installed, operated and stored in a room with a floor area larger than Y (Y see below).
- The installation of pipe-work shall be kept to a a room with a floor area larger than Y (Y see below).
- When moving or relocating the air conditioner, consult experienced service technicians for disconnection and reinstallation of the unit.
- Do not place any other electrical products or household belongings under indoor unit or outdoor unit. Condensation dripping from the unit might get them wet, and may cause damage or malfunction of your property.
- Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.
- The appliance shall be stored in a room without continuously operating ignition sources（for example: open flames, an operating gas appliance or an operating electric heater).
- Do not pierce or burn.
- Be aware that refrigerants may not contain an odor.
- To keep ventilation openings clear of obstruction.
- The appliance shall be stored in a well-ventilated area where the room size meets requirements as specified for operation.
- The appliance shall be stored in a room without continuously operating open flames (for example an operating gas appliance) and ignition sources (for example an operating electric heater).
- Any person involved with a refrigerant circuit should hold a valid certificate from an industry-accredited assessment authority, which authorizes their competence to handle refrigerants safely in accordance with required specification.
- Service shall only be performed as recommended by the equipment manufacturer.
- Maintenance and repair requiring the assistance of other skilled personnel shall be carried out under the supervision of the person competent in the use of flammable refrigerants.
- The appliance shall be installed and stored so as to prevent mechanical damage.
- Mechanical connectors used indoors shall comply with ISO 14903. When mechanical connectors are reused indoors, sealing parts shall be renewed. When flared joints are reused indoors, the flare part shall be re-fabricated.
- The installation of pipe-work shall be kept to a minimum.
- Mechanical connections shall be accessible for maintenance purposes.
  - That pipe-work including piping material, pipe routing, and installation shall include protection from physical damage in operation and service, and be in compliance with national and local codes and standards, such as ASHRAE 15, ASHRAE 15.2, IAPMO Uniform Mechanical Code, ICC International Mechanical Code, or CSA B52. All field joints shall be accessible for inspection prior to being covered or enclosed;
  - That afer completion of field piping for split systems, the field pipework shall be pressure tested with an inert gas and then vacuum tested prior to refrigerant charging, according to the following requirements;
    The minimum test pressure for the low side: 414psig (2.86MPa)
    The minimum test pressure for the high side: 600psig (4.14MPa)
  - Field-made refrigerant pipe joints shall be tightness Tested. The Test method shall be Nitrogen pressure of at least 550psi for 30 minutes. The joints must be welded, brazed, or press-fit tight and hold maximum allowable system pressure. No Leak shall be detected.
  - The appliances are equipped a REFRIGERANT DETECTION SYSTEM.
    The indoor unit must be powered except for service.
    And the selected controller shall be connected to this symbol wire and can display the caution information if the REFRIGERANT leakage is detected.
    When REFRIGERANT leakage is detected, the fan shall work. And the compressor shall stop.
    You must contact qualified personnel to repair.
  - REFRIGERANT DETECTION SYSTEM include a means for self-testing to determine if a REFRIGERANT SENSOR or SENSING ELEMENT malfunction has occurred. If occurs, the fan shall work, and the compressor shall stop. The controller displays the caution information.
    You must contact qualified personnel to repair.
    REFRIGERANT DETECTION SYSTEM shall only be replaced by the appliance manufacture

INSTALLATION

Air Handler Unit

Safety Precautions

⚠ WARNING

Note:

- The indoor unit shall be installed in the room whose area Y bigger than the below requirements;
  Or installed in a room, naturally ventilated to outdoors;
  Or installed in a room without continuously operating open flames (e.g. an operating gas appliance) or other POTENTIAL IGNITION SOURCES (for e.g. an operating electric heater, hot surfaces).
  A flame-producing device may be installed in the same space if the device is provided with an effective flame arrest.
- If the duct system meet the below requirement, the minimum room area of conditioned space (equal to Y) can be calculated by all the rooms.
  1) The appliances shall be connected via an air duct system to one or more rooms, the supply and return air shall be directly ducted to the space.
  2) If no refrigerant detection system is provided, then, spaces where the airflow may be limited by zoning dampers shall not be included in the determination of Y. Y shall not less than below requirement.
- If the duct system doesn't meet the below requirement, any one room shall meet below minimum room area. And any duct outlet(the supply and return air) shall be 7.2ft.(2.2m) high.

Required minimum room area Y [ft.^{2}(m^2)]

Refrigerant charge amount X[oz.(g)]	Air handler unit					
	Return air outlet height [ft.(m)]	Y[ft.^{2}(m^2)]	Return air outlet height [ft.(m)]	Y[ft.^{2}(m^2)]	Return air outlet height [ft.(m)]	Y[ft.^{2}(m^2)]
70.54(2000)	2(0.6)	401(37.3)	5.9(1.8)	80(7.5)	7.2(2.2)	65(6.1)
81.13(2300)		530(49.3)		92(8.6)		76(7.1)
88.88(2500)		628(58.3)		101(9.4)		83(7.7)
91.71(2600)		678(63)		105(9.8)		86(8)
98.77(2800)		787(73.1)		113(10.5)		93(8.6)
105.82(3000)		903(83.9)		122(11.3)		99(9.2)
112.88(3200)		1028(95.5)		129(12)		105(9.8)
119.93(3400)		1160(107.8)		138(12.8)		112(10.4)
126.99(3600)		1328(123.4)		147(13.7)		121(11.2)
134.04(3800)		1449(134.6)		161(15)		126(11.7)
141.10(4000)		1606(149.2)		179(16.6)		132(12.3)
148.15(4200)		1771(164.5)		197(18.3)		139(12.9)
155.21(4400)		1943(180.5)		216(20.1)		145(13.5)
162.26(4600)		2124(197.3)		236(21.9)		158(14.7)
169.32(4800)		2312(214.8)		257(23.9)		172(16)
176.37(5000)		2509(233.1)		279(25.9)		186(17.3)
183.42(5200)		2714(252.1)		301(28)		202(18.8)
190.48(5400)		2927(271.9)		325(30.2)		217(20.2)
197.53(5600)		3147(292.4)		350(32.5)		236(21.7)
204.59(5800)		3376(313.6)		375(34.8)		251(23.3)
211.64(6000)		3613(335.7)		402(37.3)		269(25)
218.7(6200)		3858(358.4)		428(39.8)		287(26.7)
225.75(6400)		4111(381.9)		456(42.4)		306(28.4)
232.81(6600)		4371(406.1)		485(45.1)		325(30.2)
239.86(6800)		4640(431.1)		516(47.9)		346(32.1)
246.92(7000)		4918(456.9)		547(50.8)		366(34)
253.97(7200)		5202(483.3)		578(53.7)		388(36)
261.03(7400)		5496(510.6)		610(56.7)		409(38)

INSTALLATION

Air Handler Unit

Safety Precautions

Explanation of symbols displayed on the indoor unit or outdoor unit.

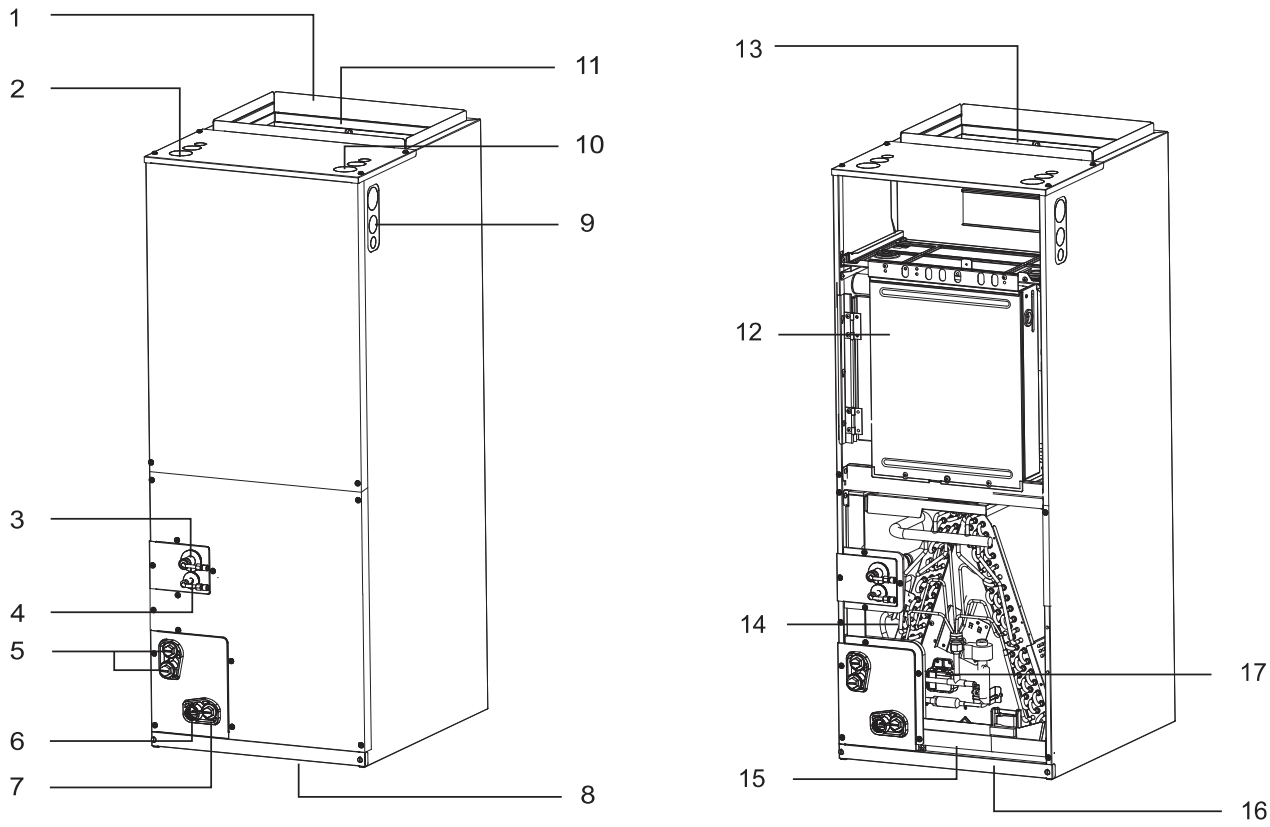
	**WARNING**	This symbol shows that this appliance uses a flammable refrigerant. If the refrigerant is leaked and exposed to an external ignition source, there is a risk of fire.
	**CAUTION**	This symbol shows that the operation manual should be read carefully.
	**CAUTION**	This symbol shows that a service 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.

INSTALLATION

Air Handler Unit

Composition of the Air conditioner

Indoor unit (18K/24K)



1. Supply air outlet flange
2. Low voltage connection (for 24V)
3. Refrigerant pipe (Gas)
4. Refrigerant pipe (Liquid)
5. Auxiliary drainage hole
6. Primary drain connection
7. Auxiliary drainage connection
8. Return air inlet
9,10. Knockout for power cable & To outdoor control
11. Supply air outlet
12. Electrical enclosure
13. Auxiliary heater (Optional)
14. Evaporator
15. Condensate drain pan
16. Filter cover
17. Refrigerant detection sensor

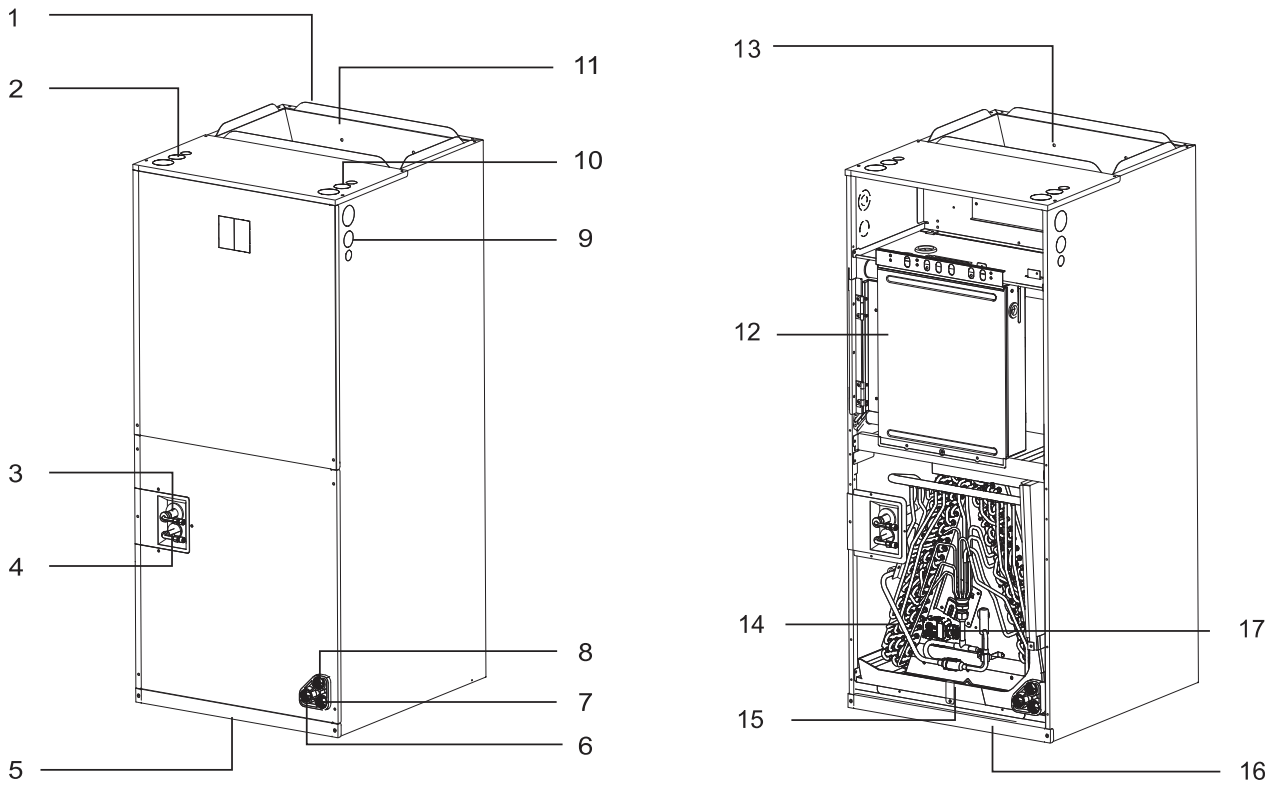
NOTE: The figures are based on the external views of the standard model.
Consequently, the shape may differ for the air conditioner model you have selected.

INSTALLATION

Air Handler Unit

Composition of the Air conditioner

Indoor unit (36K/48K)



1. Supply air outlet flange
2. Low voltage connection (for 24V)
3. Refrigerant pipe (Gas)
4. Refrigerant pipe (Liquid)
5. Return air inlet
6. Auxiliary drainage hole
7. Primary drain connection
8. Auxiliary drainage connection
9,10. Knockout for power cable & To outdoor control
11. Supply air outlet
12. Electrical enclosure
13. Auxiliary heater (Optional)
14. Evaporator
15. Condensate drain pan
16. Filter cover
17. Refrigerant detection sensor

NOTE: The figures are based on the external views of the standard model.
Consequently, the shape may differ for the air conditioner model you have selected.

Trouble Shooting

Trouble Shooting

⚠ CAUTION

When drain water overflows from the indoor unit, stop the operation and contact your dealer.
When you smell or see white smoke coming out of the unit, turn OFF the main power supply and contact your dealer.

1. If Trouble still Exists
If the trouble still exists even after checking the following, contact your dealer and inform them of the following items.
(1) Unit Model Name
(2) Content of Trouble

2. No Operation
Check whether the SET TEMP is set at the correct temperature.
Inspect outdoor unit for error codes displayed.

3. Not Cooling or Heating Properly

- Check for obstruction of air flow of outdoor or indoor units.
- Check if there are too many heating sources in the room.
- Check if the air filter is clogged with dust.
- Check if the doors or windows are open.
- Check if the temperature condition is within the operation range.

4. This is Not Abnormal

- **Odour from Indoor Unit**
  Unpleasant odour diffuses from indoor unit after a long period of time. Clean the air filter and panels or allow a good ventilation.
- **Sound from Deforming Parts**
  When start or stop the system, a sound might be heard. However, this is due to thermal deformation of plastic parts. It is not abnormal.
- **Steam from Outdoor Heat Exchanger**
  During defrosting operation, ice on the outdoor heat exchanger melts resulting in steam.
- **Dew on Air Panel**
  When the cooling operation continues for a long period of time under high humidity conditions, dew can form on the air panel.
- **Refrigerant Flow Sound**
  While the system is being started or stopped, the refrigerant flow sound may be heard.

Air Filter

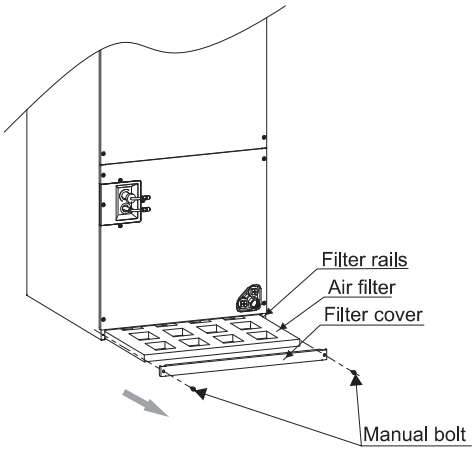
Air Filter (Not Factory-installed)

Please replace or clean the filter regularly, because there will be lots of dust accumulated on the surface of the filter after a period of time.

Follow these steps to properly replace the filter:

After removing the two manual bolts, take down the filter cover and pull out the filter from the case, then insert the new one into the case along the filter rail, at last fix the filter cover with manual bolts.

Model	Filter size (L×W×H) in.
18K/24K	20×16×1
36K	20×18×1
48K	22×20×1



INSTALLATION

Air Handler Unit

1. Safety Notice

⚠ WARNING

- Install the air conditioner on a solid base that can support the unit weight. (An inadequate base or incomplete installation may cause injury due to falling off from the base.)
- Electrical work should be carried out in accordance with the installation manual and the local and national electrical wiring rules or code.
  (Insufficient capacity or incomplete electrical work may cause electrical shock or fire.)
- Be sure to use a dedicated power circuit. (Never use the power supply shared by another appliance.)
- For wiring, use a cable long enough for the entire distance, and do not use an extension cord.
- Do not put other loads on the power supply, and please use a dedicated power circuit.
- Use the specified types of wires for electrical connections between the indoor and outdoor units. (Firmly clamp the interconnecting wires so that the terminals receive no external stress.)
- Incomplete connections or clamping may cause terminal overheating or fire.
- After establishing connection between all the wires, fix the cables to prevent undue force on the electrical covers or panels. (Install covers over the wires, incomplete cover installation may cause terminal overheating, electrical shock or fire.)
- There is **100PSIG** high pressure nitrogen in the evaporator, please release it first before installation. It proves the evaporator to be in good state if there is nitrogen out, otherwise, it indicates the evaporator leaks.
- When installing or relocating the system, be sure to keep the refrigerant circuit free from air (Air in the refrigerant circuit may cause an abnormal pressure rise or rupture, resulting in injury.)
- If any refrigerant leakage occurs during the installation work, ventilate the room.
- After all installations are completed, make sure that no refrigerant leaks. (The refrigerant produces, toxic gas if exposed to flames.)
- When carrying out piping connection, do not let air substances other than the specified refrigerant get into refrigeration cycle. (Otherwise, it will cause decreased performance, abnormal high pressure in the refrigeration cycle, explosion and injury.)
- Make sure that the installation has a proper earth connection. Do not ground the unit to a utility pipe, arrester, or telephone grounding. Incomplete grounding may cause electrical shock. (A high surge current from lightning or other sources may cause damage to the air conditioner.)
- An earth leakage circuit breaker may be required depending on the site condition to prevent electrical shock.
- Disconnect the power supply before wiring, piping, or checking the unit.

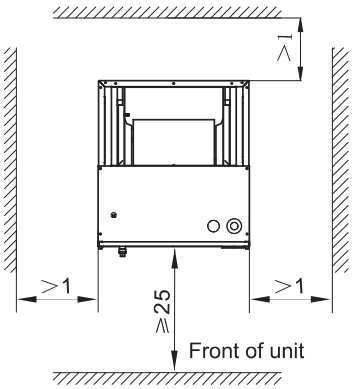
2. Installation of the Indoor Unit

2.1 Initial Check

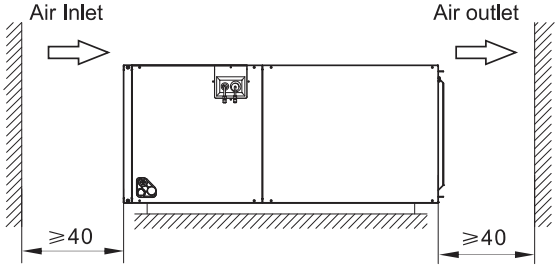
⚠ CAUTION

- When moving the unit after unpacking, make sure not to exert any pressure on other parts, especially the refrigerant piping, drain piping and flange parts.
- Wear protective gears when installing the unit.

(Unit: in.)



Clearance in the Vertical Position



Clearance in the Horizontal Position

INSTALLATION

Air Handler Unit

Installation and Maintenance

2.2 Installation Location

Before choosing the installation site, obtain the user's approval

- Optimum air distribution is ensured.
- The air path is not blocked.
- Condensation can drain properly.
- Ensure sufficient clearance for maintenance and servicing.
- Piping between the indoor and outdoor units should be within the allowable limits. (Refer to the installation of the outdoor unit)
- The indoor unit, outdoor unit, power supply wiring and transmission wiring should be kept at least 3.3 feet away from televisions and radio, which prevents image interference and noise in those electrical appliances. (Noise may be generated depending on the conditions under which the electric wave is generated, even if a one-meter distance is maintained.)
- Do not install the indoor unit in a machinery shop or kitchen where vapor from oil or its mist flows to the indoor unit. The oil will deposit on the heat exchanger, thereby reducing the performance of the indoor unit, and may deform and in the worst case, break the plastic parts of the indoor unit.
- When the unit is installed in a hot and humid place, it is recommended to insulate the cabinet exterior and to use auxiliary drain pans.
- If installed above a finished living space, a auxiliary drain pan(as required by many building codes), must be installed under the entire unit and its condensate drain line must be routed to a location such that the user will see the condensate discharge.

2.3 Installation

NOTE:

These appliances are designed for indoor installation only.

The indoor units can be installed in one of the upflow, horizontal left, horizontal right or vertical downflow orientations as shown in Figures below.

INSTALLATION

Air Handler Unit

18K/24K

● Up-flow installation

Up-flow installation method is selected by default.

● Horizontal left installation

When the unit is horizontal left mounted, Place the air outlet facing the left.

● Vertical downfow installation and Horizontal right installation

When the unit is vertical downfolw installation or horizontal right hand installation, the following steps are required. The treatment is the same for both installation methods.

(1) Remove the lower panel and pipe cover (including two rubber ring), then remove the drainage hole cover. Unscrew screws. (Refer to Fig.1)

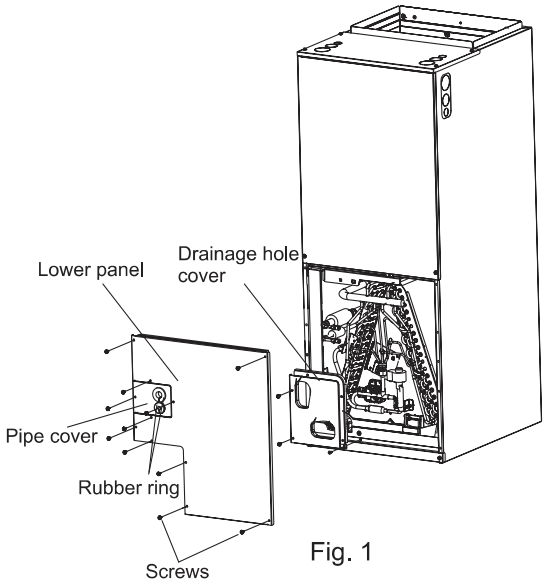


Fig. 1

(2) Remove the upper panel. (Refer to Fig.2)

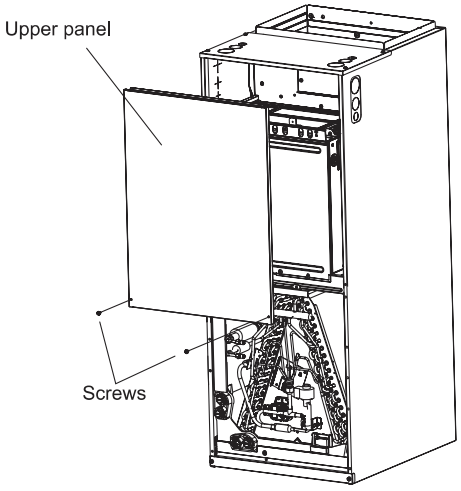


Fig. 2

(3) Remove the electrical box cover and fixing screws of the electrical box. (Refer to Fig.3)

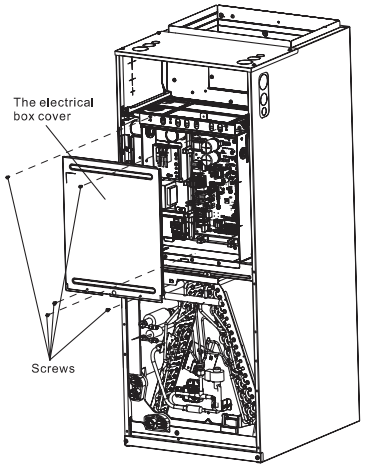
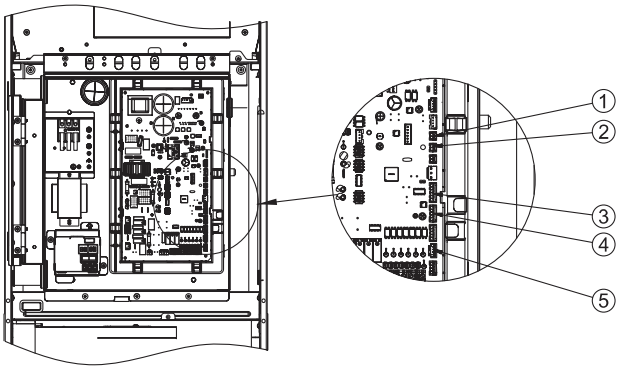


Fig. 3

(4) Remove the wiring clamps, Ti(Air inlet temperature sensor), Tc(Coil temperature sensor), EVI(Micro-Computer Control Expansion Valve), Tr(Refrigerant sensor) and humidity sensor from the socket. Take out the wires from the electrical box plugs, and put them together with the evaporator (Take care not to damage the wires and plugs). (Refer to Fig.4)



① —— Ti (yellow)
② —— Tc (black)
③ —— EVI (white)
④ —— Tr (blue)
⑤ —— Humidity sensor (red)

Fig. 4

INSTALLATION

Air Handler Unit

Installation and Maintenance

(5) Extract the evaporator with the removed wires. (Refer to Fig.5)

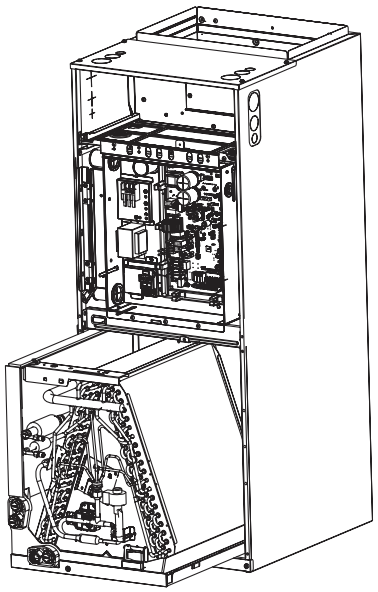


Fig. 5

(6) Remove the wiring clamps and remove the plate from the evaporator, then remove Ti(Air inlet temperature) and Humidity sensor. (Refer to Fig.6)

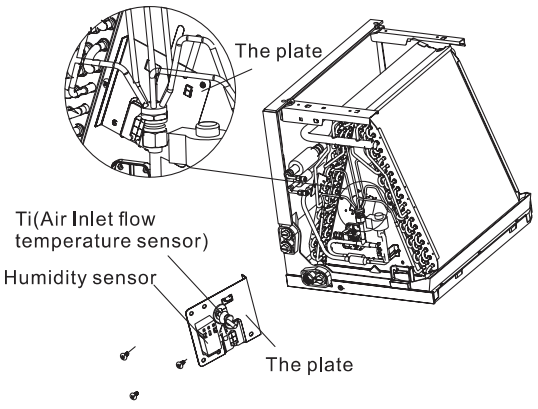


Fig. 6

(7) Follow the steps in Fig. 7 for the installation of the sensor, the plate, and the two deflectors (which need to be obtained from the dealer).

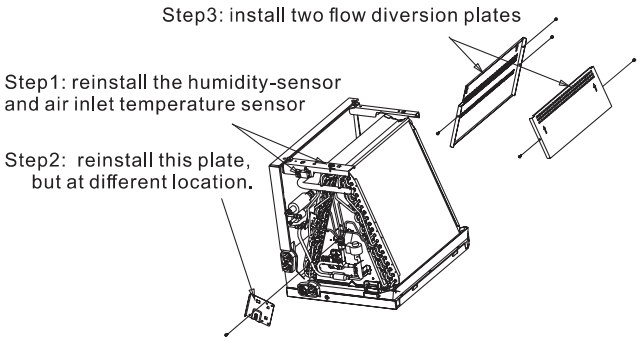


Fig. 7

NOTE:
When reinstalling the plate, the position of the plate is different from the original installation, and a hole position needs to be shifted to the right relative to the original position, and the position of the installation completion is shown in Fig. 8

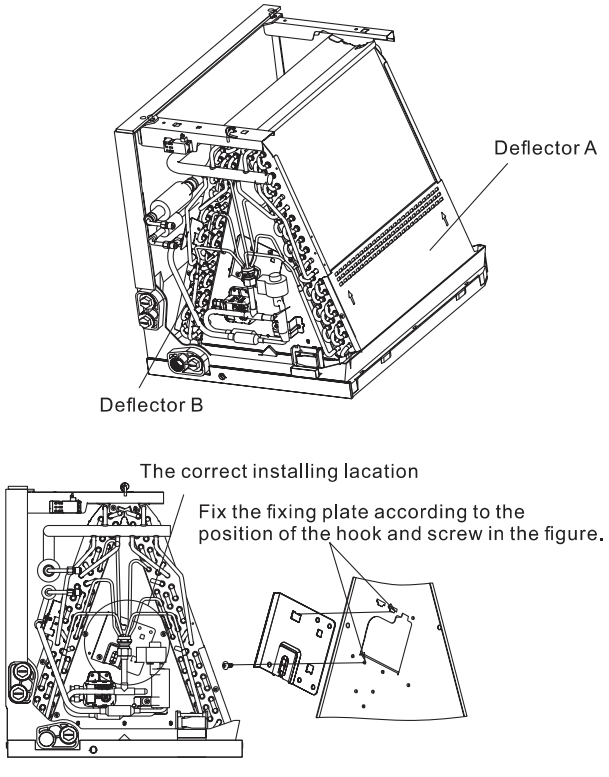


Fig. 8

(8) The wire should be arranged again. As shown in Fig. 9, first use the wire tie to fix all the sensor wire harness on the copper pipe, and then the wire harness extends down to the bottom of the water receiving tray, and forms a waterproof bend through the wire clamp, please strictly follow the step and the path in the figure to route the wire, otherwise there will be a small amount of condensation flowing out of the connecting tray along the wire harness.

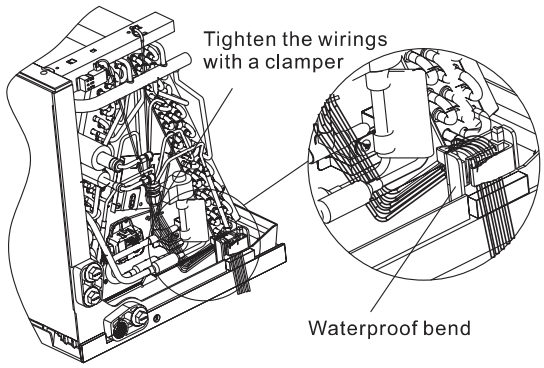


Fig. 9

(9) Rotate the evaporator for 180° and insert into the upper side of the lead rail. Pay attention to protecting the wires during the process. (Refer to Fig.10)

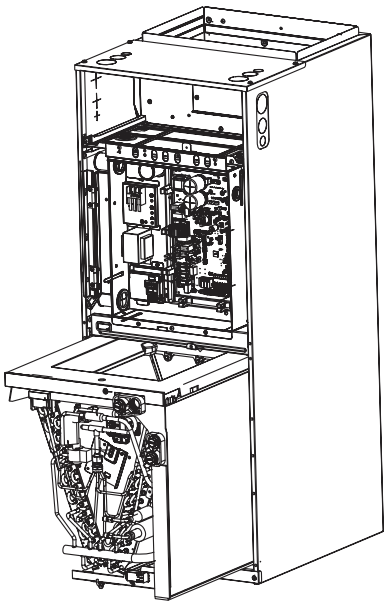


Fig. 10

(10) Rotate to open the electrical box, according to Fig. 11, pass the sensor harness through the wire hole of the middle cross beam, and then enter the inside of the electrical box through the rubber ring of the electrical box. After the wiring is completed, thermal insulation sponge should be adhered the surface of the wire harness as shown in Fig.12.

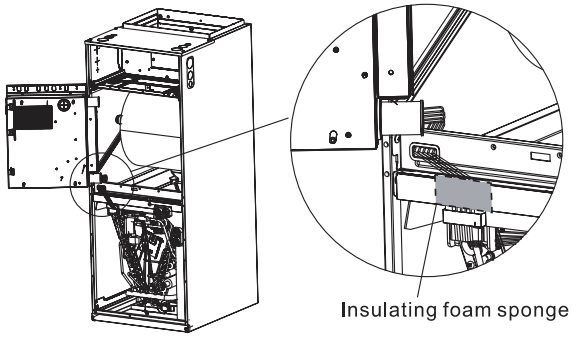
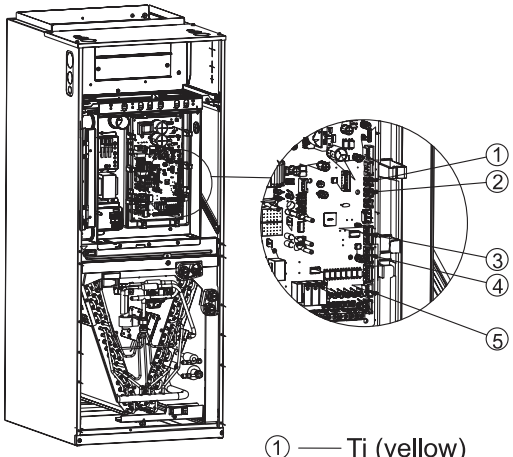


Fig. 11

(11) Insert the wires into the electrical box in its original position (Fig.4). And then refit the wires with wire clamps.



① —— Ti (yellow)
② —— Tc (black)
③ —— EVI (white)
④ —— Tr (blue)
⑤ —— Humidity sensor (red)

Fig. 12

(12) Reinstall electrical box cover, the lower panel, pipe and drainage hole cover and the upper panel.
(Refer to Fig.13)

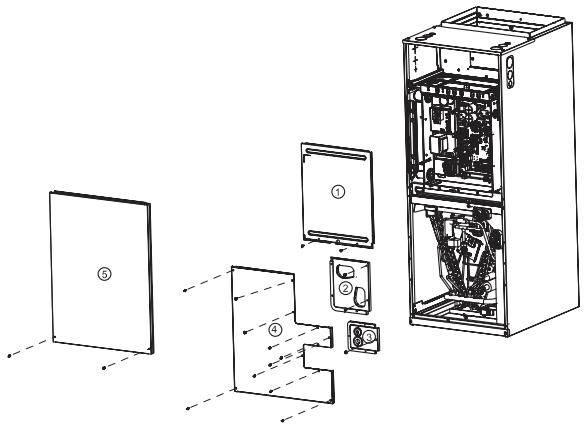
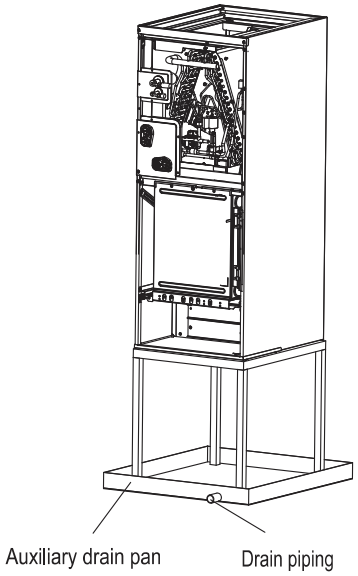


Fig. 13

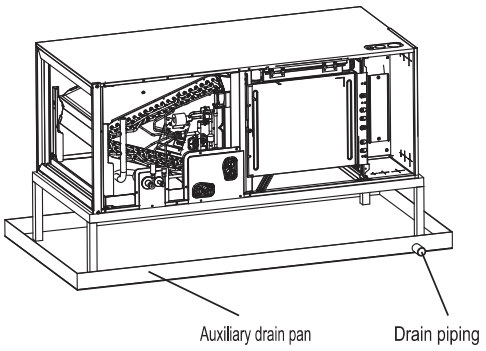
After the above operations, rotate the machine 180° so that the air outlet is downward, that ism it is installed vertically downstream.
(Refer to Fig.14)



Vertical downflow installation

Fig. 14

Rotate the machine 90° clockwise so that the air outlet is facing to the right, which is a horizontal right side installation. (Refer to Fig.15)



Horizontal right installation

Fig. 15

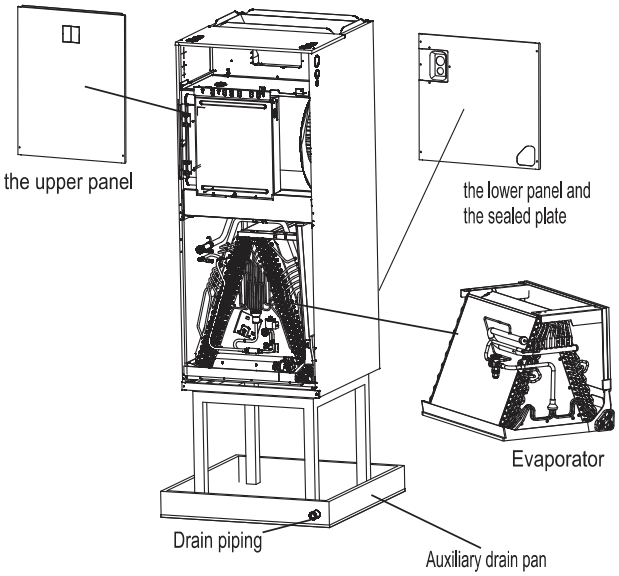
INSTALLATION

Air Handler Unit

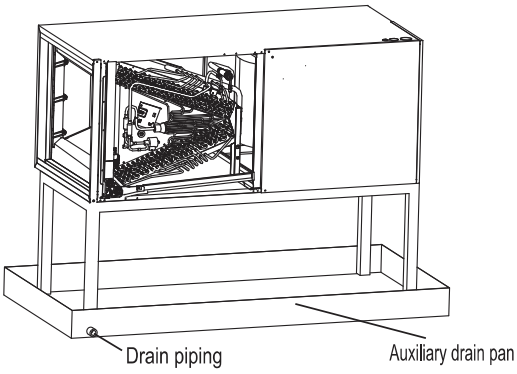
Installation and Maintenance

36K/48K

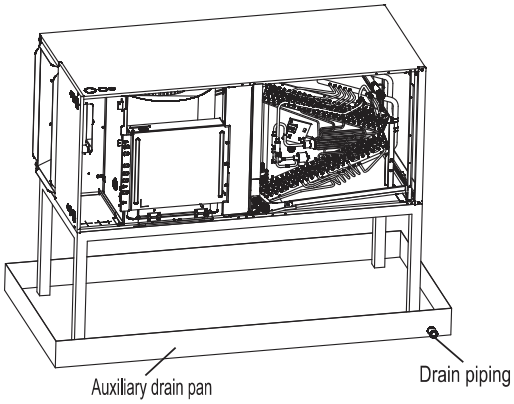
● Up-flow installation
Up-flow installation method is selected by default.
● Horizontal right installation
When the unit is horizontal right mounted, Place the air outlet facing the right.



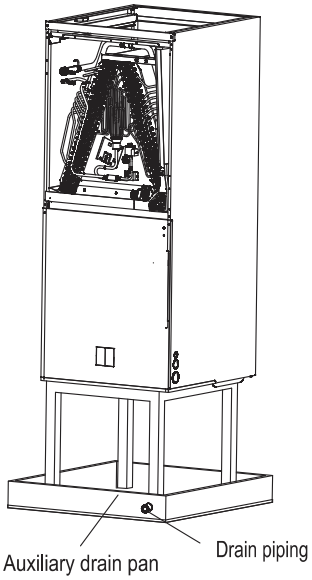
Upflow installation



Horizontal right installation



Horizontal left installation



Vertical downflow installation

● Vertical downflow installation and Horizontal right hand installation
When the unit is vertical downflow installation or horizontal left hand installation, the following steps are required. The vertical downflow installation modification method is the same as the horizontal right hand installation.

(1)Remove the lower panel and pipe cover (incuding two rubber ring), then remove the drainage hole cover. Remove the upper panel. Remove the electrical box cover. Unscrew screws.
(Refer to Fig. 1)

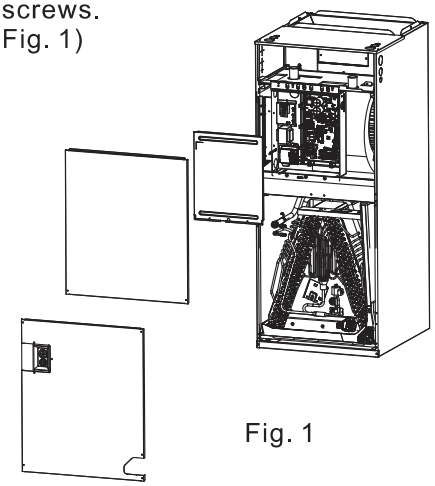


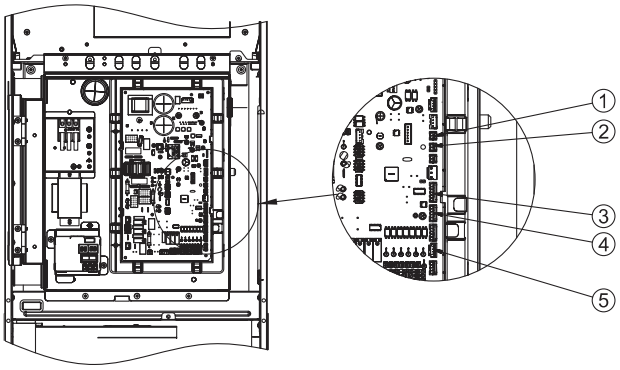
Fig. 1

INSTALLATION

Air Handler Unit

Installation and Maintenance

(2) Remove the wiring clamps, Ti(Air inlet temperature sensor), Tc(Coil temperature sensor), EVI(Micro-Computer Control Expansion Valve), Tr(Refrigerant sensor) and humidity sensor from the socket. Take out the wires from the electrical box plugs, and put them together with the evaporator (Take care not to damage the wires and plugs). (Refer to Fig.2)



① —— Ti (yellow)
② —— Tc (black)
③ —— EVI (white)
④ —— Tr (blue)
⑤ —— Humidity sensor (red)

Fig. 2

(3)Extract the evaporator with the removed wirings. (Refer to Fig. 3)

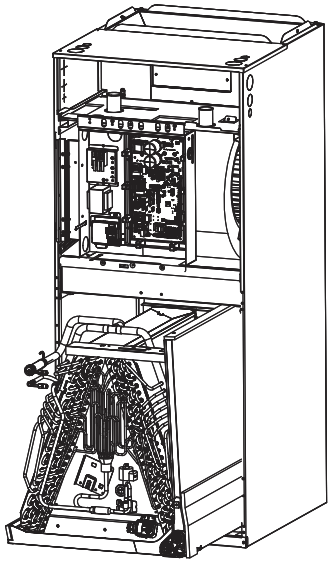


Fig. 3

(4)Remove the wiring clamps. Remove the plate from the evaporator, then remove Ti (Air inlet temperature sensor) and Humidity sensor. (Refer to Fig. 4)

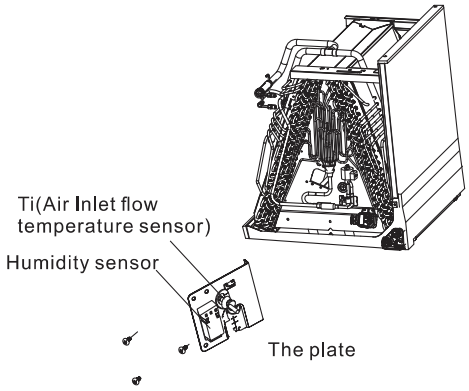


Fig. 4

(5)Install the removed Ti (Air inlet temperature sensor) and Humidity sensor. Meanwhile, add two flow diversion plates (which are got from the distributor or dealer of Hisense.). (Refer to Fig. 5)

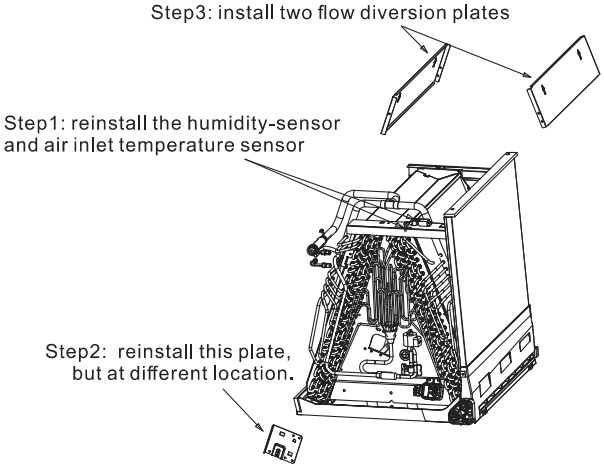


Fig. 5

NOTE:

When restall the plate, pay attention to at the correct location.

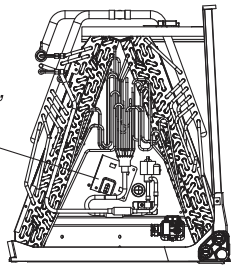
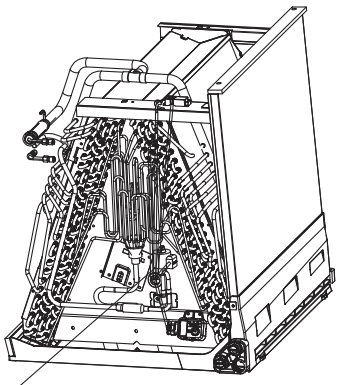
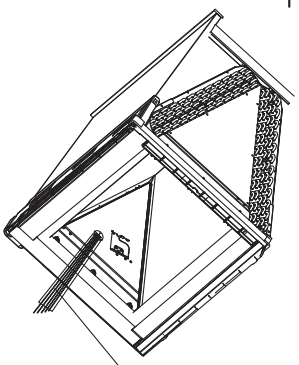


Fig. 6



The wirings should be arranged again.

Fig. 6



Paste the insulations around wirings.

Fig. 7

(6)Rotate the evaporator for 180 degrees and insert into the upper side of the lead rail. Pay attention to protecting the wirings during the process. (Refer to Fig. 8)

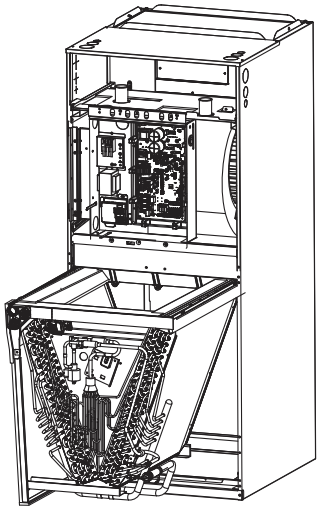


Fig. 8

(7)Remove the screws of the the electrical box and rotate it. Tighten the wirings with a clamper. Insert the wirings through the rubber ring into the electrical box. (Refer to Fig. 9)

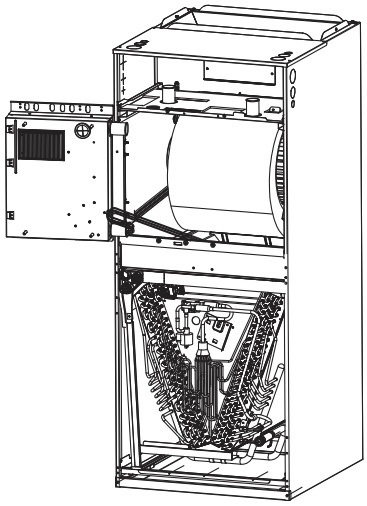


Fig. 9

(8)Insert the wirings into the electrical box in its original position (refer to Fig.4). And then refix the wirings with wire clamps.

(9) Reinstall electrical box cover, the lower panel, pipe and drainage hole cover and the upper panel. (Refer to Fig. 10)

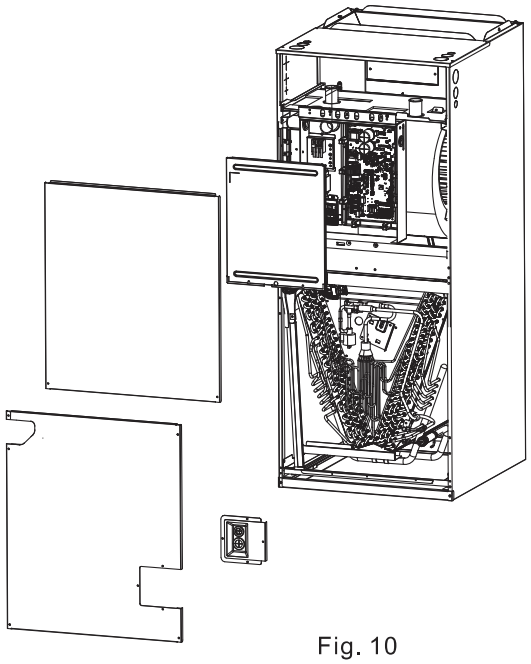


Fig. 10

2.4 Air duct

⚠ WARNING

Field duct work must comply with the **National Fire Protection Association NFPA 90NFPA 90B** and any applicable local ordinance.

Do not, under any circumstances, connect return duct work to any other heat producing device such as fireplace insert, stove, etc. Unauthorized use of such devices may result in fire, carbon monoxide poisoning, explosion, personal injury or property damage.

Sheet metal duct work run in unconditioned spaces must be insulated and covered with a vapor barrier. Fibrous duct work may be used if constructed and installed in accordance with **SMACNA Construction Standard on Fibrous Glass Ducts.** Duct work must comply with National Fire Protection Association as tested by U/L Standard 181 for Class I Air Ducts. Check local codes for requirements on duct work and insulation.

Duct system must be designed within the range of external static pressure the unit is designed to operate against. It is important that the system airflow be adequate. Make sure supply and return duct work, grills, special filters, accessories, etc, are accounted for in total resistance.

3. Refrigerant Pipe

⚠ DANGER

Use the refrigerant according to outdoor nameplate. When carrying out the leakage check and test, do not mix in the oxygen, the acetylene and the flammable and the reactive gas, because these gases may result in explosion. it is suggested to use nitrogen to perform these experiments.

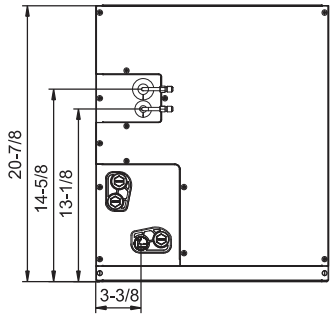
3.1 Pipe Material

(1) Prepare the copper pipe on the spot.
(2) Choose dustless, non-humid, clean copper pipe Before installing the pipe, use nitrogen or dry air to below away the dust and impurity on the pipe.
(3) Choose the copper pipe according to outdoor manual.

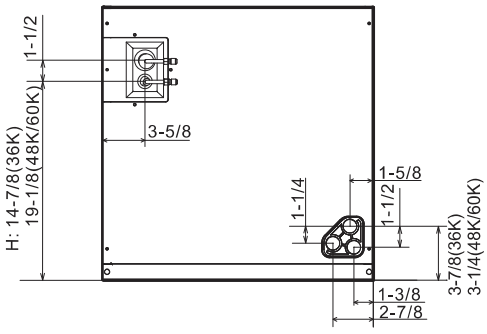
3.2 Pipe Connection

(1) The connection positions of the pipe are shown below.

(Unit: in.)



18K/24K



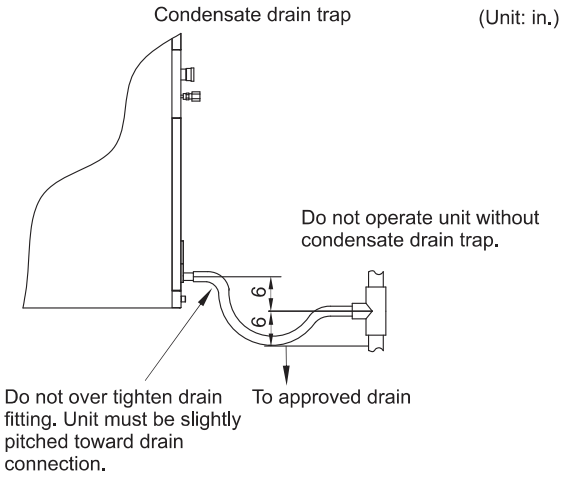
36K/48K

Connection positions of the pipe

Refer to the outdoor unit Installation Instructions for details on piping size selection, piping installation, and charging information.
Coil is shipped filled with Nitrogen. Evacuate the system before charging with refrigerant.
Install refrigerant lines so that it does not block service access to the front of the unit.
Nitrogen should flow through the refrigerant lines while brazing.
Use a wet rag or an approved heat paste to protect the TXV sensing bulb during the brazing process.
(The joints must be welded or brazed.)

4. Drain Piping

The coil drain pan has a primary and a secondary drain with 3/4" NPT female connections. The connectors required are 3/4" NPT male, either PVC or metal pipe. To prevent damage of the drain pan connection, it is recommended to seal the connector with Teflon tape, and should be hand-tightened with a torque less than 37 in-lbs. An insertion depth of approximately 3/8" to 1/2"(5-8 turns)should be expected at this torque.
All horizontal drain pipes must be pitched downward away from the unit a minimum of 1/8" per foot to provide free drainage.



Do not connect the drain pipes directly to sewage pipes to avoid ammonia odour. The ammonia in the sewage might enter the indoor unit through the drain pipes and corrode the heat exchanger. Do not twist or bend the drain hose, because excessive force is applied during twisting or bending and may also cause leakage.
The drain line should be insulated where necessary to prevent sweating and damage due to condensate forming on the outside surface of the pipe.Test condensate drain pan and drain pipe after installation is complete. Keep the case horizontal (horizontal left or horizontal right) to ensure a smooth drainage, or incline the case 0.5° to the drainage hole, making it the lowest point for draining.Pour water into drain pan, enough to fill drain trap and line. Check to make sure drain pan is draining completely, no leaks are found in drain pipe fittings, and water is draining from the termination of the primary drain pipe.

NOTES:
If unit is located in or above a living space where damage may result from condensate overflow, a field-supplied, external condensate pan should be installed underneath the entire unit, and a secondary condensate line (with appropriate trap) should be run from the unit into the pan. Any condensate in this external condensate pan should be drained to a noticeable place. The owner of the structure must be informed that when condensate flows from the secondary drain or external condensate pan, the unit requires servicing or water damage will occur. Install traps in the condensate lines as close to the coil as possible.

5. Electrical Wiring

5.1 Electrical Installation

⚠ CAUTION

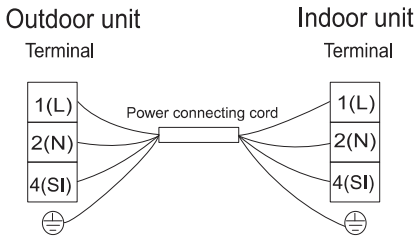
· Before proceeding with electrical connections, make certain that power supply are as specified on the unit rating plate. See unit wiring label for proper field high and low-voltage wiring. Make all electrical connections in accordance with the NEC and any local codes or ordinances that may apply. Refer to the NEC(USA) or CSA(Canada) for wire sizing. Use copper wire only.
· Every installation must include an NEC(USA) or CSA (Canada) approved over-current protection device.

⚠ WARNING

Disconnect all power before servicing or installing this unit.
To avoid the electrical shock, please ensure the air conditioner is proper grounded.
All routing of electrical wiring must be made through provided electrical knockouts. Do not cut, puncture or alter the cabinet for electrical wiring.
Knockouts are provide on the indoor unit top panel and sides of the cabinet to allow for the entry of the supply voltage conductors. If the knockouts on the cabinet sides are used for electrical conduit, an adapter ring must be used in order to meet **UL 60335** safety requirements. An MEC or CEC approved strain relief is to be used at this entry point. Some codes/municipalities require the supply wire to be enclosed in conduit. Consult your local codes.

Electrical wiring diagram

Indoor unit connected to an outdoor unit of the same brand



Note:
***Since there may be differences in some model's terminal blocks, wiring connection should be done according to letters on the terminal block. Please disregard numbers in this case.**

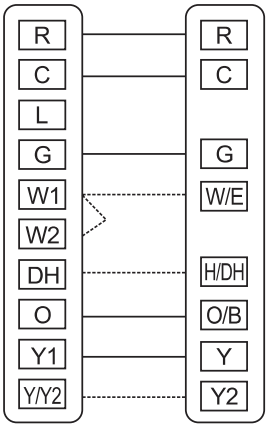
INSTALLATION

Air Handler Unit

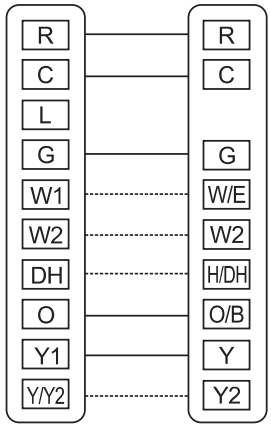
Installation and Maintenance

Indoor unit connected to a thermostat

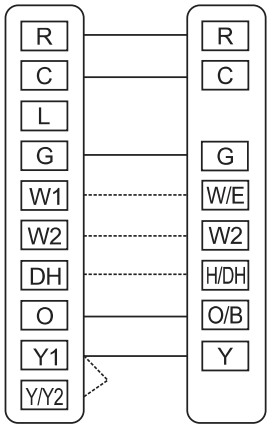
Support 3H and 2C thermostat



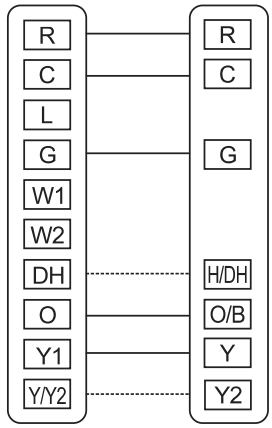
Support 4H and 2C thermostat



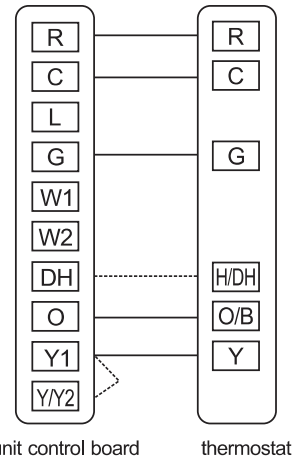
Support 3H and 1C thermostat



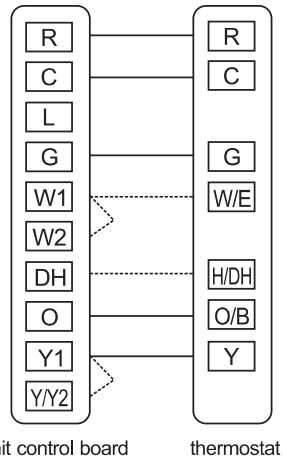
Support 2H and 2C thermostat



Support 1H and 1C thermostat



Support 2H and 1C thermostat



Indoor unit main control board 24V interface definition:

Terminal	Definition
R	AC 24V power supply
C	AC 24V common
L	Fault terminal
G	Fan signal
W1/W2	Electric auxiliary heat signal
DH	Dehumidification
O	4-Way valve
Y1	Cool1/ Heat 1
Y/Y2	Cool 2/ Heat 2

Note:

1. The "L" terminal displays fault information. If the thermostat has a terminal with function corresponding to "L", it needs to be connected to the "L" terminal of the unit.
2. When the machine does not have auxiliary electric heating, the machine only supports 2H2C and 1H1C working modes.
3. Mode Interfere
   Multi-zone outdoor units can only support a single mode at one time (cooling or heating). When the mode set at one or more indoor unit is different from the mode that outdoor unit is using, mode interfere will occur.

Active mode \ Driven choice	Cooling	Dry	Heating	fan
Cooling	√	√	×	√
Dry	√	√	×	√
Heating	×	×	√	×
Fan	√	√	×	√

√ --- Normal
X --- Mode interfere
Outdoor unit always run with the mode of first indoor unit that turned on. When the setting mode of following indoor unit is interfered with it, 3 beeps would be heard, and the indoor unit interfered with the normal running units would turn off automatically. If auto mode is selected, the actual running mode of the unit will be dominated by the unit of which first select auto mode. (Auto mode is invalid for some models.)

5.2 Electrical Data

⚠WARNING

- This product must be installed on a single dedicated electrical circuit. Circuit breaker protection must be installed in accordance with this manual. In moist and humid locations,and ELB type circuit breaker must be used.
  When the Electric Heater Kit is installed, a separate power supply must be used to power the electric heater kit. Refer to the Heater Kit Selection kit table, and the heater kit instructions. All wiring shall be installed in accordance with local and national codes.
- Do not operate the system until all the check points have been cleared.
  (A) Check to ensure that the insulation resistance is more than 2MΩ, by measuring the resistance between ground and the terminal of the electrical parts. If not, do not operate the system until the electrical leakage is found and repaired.
  (B) Check to ensure that the stop valves of the outdoor unit are fully opened and then start the system.
- Pay attention to the following items while the system is running.
  Do not touch any of the parts by hand at the discharge gas side, since the compressor chamber and the pipes at the discharge side are heated higher than 194°F (90°C).

Capacity (Btu/h)	Transmitting Cable Size	Thermostat Signal Size
18K/24K/36K/48K	4x14AWG stranded THHN	18AWG

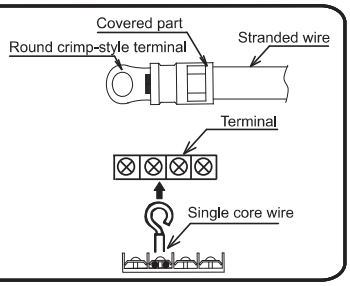
Note：

(1) Follow local codes and regulations when select field wires, and all the above are the minimum wire size.
(2) Use copper supply wires.
(3) Install main switch and ELB for each system separately. Select the high response type ELB that is acted within 0.1second.

<Attentions when Connect the power supply wiring>

1. When connecting the terminal block using stranded wire (Communication wire); make sure to use the round crimp- style terminal for connection to the power supply terminal block.

2. When connecting the terminal block using a single core wire; (power wiring to the Outdoor Unit or the Aux Heater Kit) be sure to curl the conductor.



5.3 Change of Static Pressure

The static pressure can be selected by setting Dip Switches on Checker board, and the DIP switches adjustment method of the Checker board is as follows:

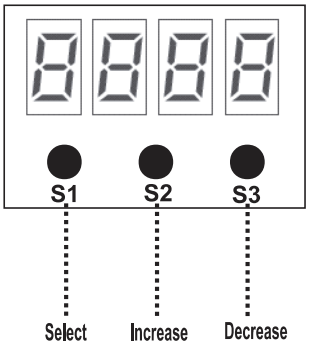
Capacity (Btu/h)	The Range of Static Pressure	Function Code Set
18K/24K/36K/ 48K	0-0.80 in. H_2O (0-200Pa)	0-200 function code value equals static pressure value, more than 145 is 0.58 in. H_2O (145Pa). [default: 0.58 in. H_2O (145Pa)]

Note: The pressure loss of filter is included in the data above.

Pa	in.H_2O	Pa	in.H_2O
5	0.02	105	0.42
10	0.04	110	0.44
15	0.06	115	0.46
20	0.08	120	0.48
25	0.10	125	0.50
30	0.12	130	0.52
35	0.14	135	0.54
40	0.16	140	0.56
45	0.18	145	0.58
50	0.20	150	0.60
55	0.22	155	0.62
60	0.24	160	0.64
65	0.26	165	0.66
70	0.28	170	0.68
75	0.30	175	0.70
80	0.32	180	0.72
85	0.34	185	0.74
90	0.36	190	0.76
95	0.38	195	0.78
100	0.40	200	0.80

5.4 Digital display

There are 3 buttons on the digital display board:
1) Select button: Select to display outdoor/indoor unit parameter.
"P.", "A." -- Parameter of indoor unit
2) INCREASE button: Each time it is pressed, the number rises by 1.
3) DECREASE button: Each time it is pressed, the number lowers by 1.
The parameter content will automatically display after the parameter code is selected for 3s.



Parameter	Prarameter
P.1	Display Static Pressure
P.3	Set Static Pressure
P.13	Monitor Indoor Fan RPM
P.19	Adjust Indoor Fan RPM
A.1	Unit A Fault Code
A.2	Unit A Valve Actual Opening
A.3	The opening of the A valve is set
A.6	Unit A Coil Temperature
A.7	Unit A Ambient Temperature

6. Test Run

Please perform test run according to installation manual of outdoor unit.

7. Electric Heat Kit Selection Table

Electric Heat Kit Model	Air Handler Model	Electric Heat (kW)	MIN. Circuit Ampacity		MAX. Fuse or Breaker (HACR) Ampacity		Fan Speed Tap
			230VAC	208VAC	230VAC	208VAC	High
AUX5KWA	18K/24K	5	25	22.6	30	30	●
AUX7KWA		7.5	37.4	33.9	40	40	●
AUX10KWA		10	49.9	45.2	60	50	●
AUX5KWA	36K	5	25	22.6	30	30	●
AUX7KWA		7.5	37.4	33.9	40	40	●
AUX10KWA		10	49.9	45.2	60	50	●
AUX15KWA		15	37.4+37.4	33.9+33.9	40+40	40+40	●
AUX5KWA	48K	5	25	22.6	30	30	●
AUX7KWA		7.5	37.4	33.9	40	40	●
AUX10KWA		10	49.9	45.2	60	50	●
AUX15KWA		15	37.4+37.4	33.9+33.9	40+40	40+40	●
AUX20KWA		20	49.9+49.9	45.2+45.2	60+60	50+50	●

●: available
×: unavailable

NOTE:

When electric heat is operating, the unit will automatically run at highest fan speed.
Heat kit is an optional part, and it must be connected to the power supply separately.
It is recommended that electric heater kit should be installed in low temperature area or when long piping is used.
Check if heat kit suitable for AHU 4-way position installation.
Heat pump systems require a specified airflow. Each ton of cooling requires between 350 and 400 cubic feet of air per minute(CFM).
A 4 pin to 6 pin adapter, or a 6 pin to 4 pin adapter may need to be installed to connect to the indoor control board.

OPERATION

Operation Range (Cooling and Heating)

Temperature		Cooling operation	Heating operation
Indoor temperature	Max	90˚F	81˚F
	Min	70˚F	45˚F
outdoor temperature	Max	125˚F	75˚F
	Min	5˚F	-13˚F

Figure 301

*Optimum performance will be achieved within these operating temperature. If air conditioner is used outside of the above conditions, the protective device may trip and stop the appliance.
*The temperature of some products is allowed beyond the range. In specific situation, please consult the merchant. When relative humidity is above 80%, if the air conditioner runs in COOLING or DRY mode with door or window opened for a long time, dew may drip down from the outlet.

OPERATION

Unit Function (Outdoor Unit)

1.1 Cooling anti-freeze protection

The indoor coil sensor functions as real time temperature detector of evaporator. It prevents the indoor unit evaporator temperature becoming too low. If the indoor coil temperature is too low, the compressor will automatically start the protection mode.

1.2 Overload protection

To prevent system overload caused by excessive pressure, the unit will implement real-time detection when outdoor coil temperature is too high during cooling mode or indoor coil temperature is too high during heating mode.

1.3 Operation mode

Air conditioning mode is the operation mode set by users through remote controller, four modes are available: cooling, heating, dehumidification, as well as fan mode.

1.4 Start-up protection

To prevent the compressor from restarting frequently when the system pressure has not been completely balanced, and it can't be restarted within 3 minutes.

1.5 Discharge temperature protection

To prevent deterioration due to high exhaust temperature of compressor, the machine will realize the real-time detection of the exhaust gas temperature. If the temperature is too high, then auto protection will shut down the compressor.

1.6 Oil-return control

When the compressor runs at low frequencies for a long time, the control system will start the oil-return function. The oil in the system returns to the compressor.

1.7 Pressure protection（24k BTU models do not have this feature）

When the pressure increases to a preset value, the pressure switch will automatically protect the unit. The compressor will stop and report the fault code protection.

Low Pressure Switch closes at 7.25 PSI (0.05 mpa)
36k BTU High Pressure Switch opens at 580 PSI (4 Mpa)
48k BTU High Pressure Switches opens at 601 PSI (4.15 Mpa)

OPERATION

Unit Function

1.3 Control Logic Description

1.3.1 Sensors in HVAC Systems

(1) Discharge temperature sensor
(2) Outdoor coil temperature sensor
(3) Outdoor ambient temperature sensor
(4) Indoor coil temperature sensor
(5) Indoor ambient temperature sensor

1.3.2 Compressor Frequency Control

(1) Compressor frequency calculation
(2) Compressor frequency range determination
(3) Compressor frequency protection limit
(4) Compressor frequency output

1.3.3 Electronic Expansion Valve Control

(1) Opening control during powering on
(2) Opening control at the start-up phase
(3) Opening control at stable operation phase
(4) Opening control during powering off

1.3.4 Indoor/Outdoor Fan Speed Control

(1) Speed control in cooling mode
(2) Speed control in heating mode

1.3.5 Defrost Control

(1) Defrost entry conditions
(2) Defrost cycle
(3) Defrost exit conditions

1.3.6 System Protection

(1) High temperature protection
(2) Low temperature protection
(3) Cold air prevention in heating

1.3.7 Others

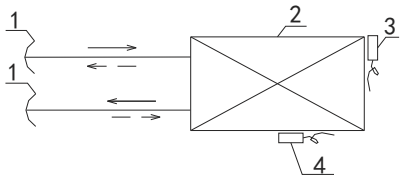
(1) Auto mode
(2) ECO mode
(3) Sleep mode
(4) Indoor self-cleaning mode
(5) 46°F heating mode

OPERATION

Unit Function

1.3.1 Sensors in HVAC Systems

Indoor unit

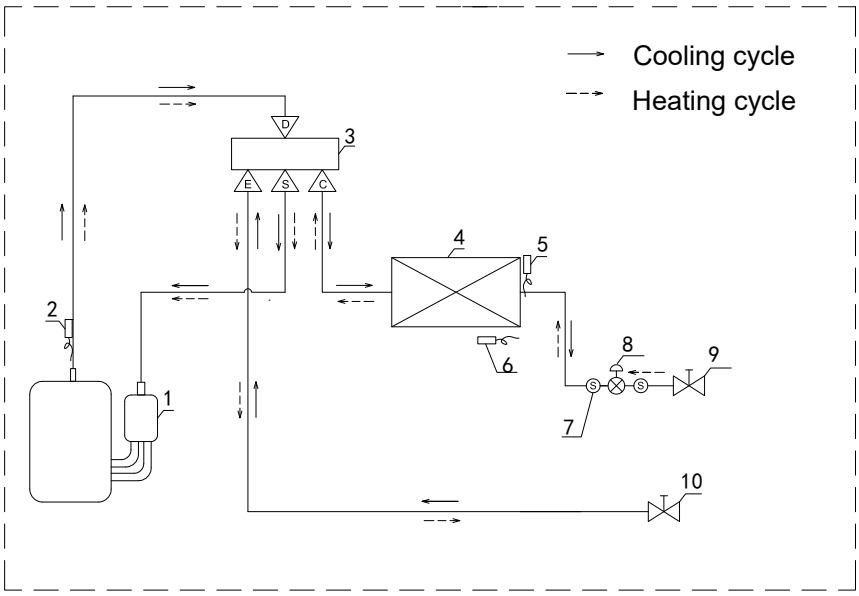


List of component

No.	Apellation
1	Hexagon nut
2	Indoor heat exchanger
3	Ambient temperature sensor
4	Coil temperature sensor

Outdoor unit

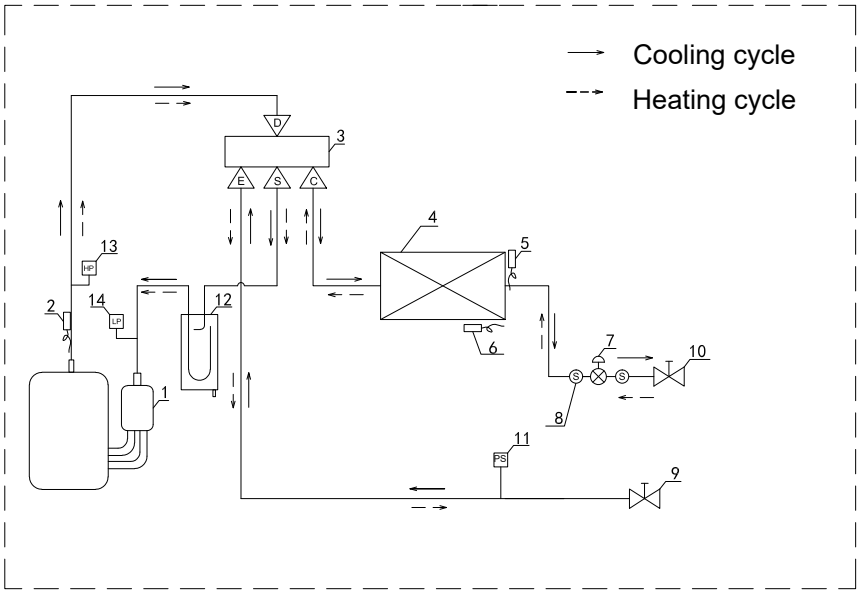
18k/24K



List of component

No.	Apellation
1	Compressor
2	Discharge temperature sensor
3	4-Way valve
4	Outdoor heat exchanger
5	Coil temperature sensor
6	Ambient temperature sensor
7	Strainer
8	Electronic expansion value
9	Stop valve(Liquid)
10	Stop valve(Gas)

36K/48k



List of component

No.	Apellation
1	Compressor
2	Discharge temperature sensor
3	4-Way valve
4	Outdoor heat exchanger
5	Ambient temperature sensor
6	Coil temperature sensor
7	Electronic expansion value
8	Strainer
9	Stop valve(Gas)
10	Stop valve(Liquid)
11	Pressure sensor
12	Gas-Liquid separator
13	High pressure switch
14	Low pressure switch

OPERATION

Unit Function

(1) Discharge temperature sensor

It is designed to detect and control the temperature at the compressor discharge port. When the discharge temperature is too high [>212℉(100°C)], the compressor will run at low frequency or shut down.

(2) Outdoor coil temperature sensor

It is designed to detect the temperature in the middle of the outdoor heat exchanger. In cooling mode. When the temperature is too high [>149℉(65°C)], the compressor will run at low frequency or shut down. Additionally, it is used to:

1) In cooling mode, detect the coil temperature and control the opening of the Outdoor Unit electronic expansion valve.
2) In cooling mode, execute the system overload control.
3) In heating mode, activate the system defrost control.

(3) Outdoor ambient temperature sensor

It is designed to detect the outdoor ambient temperature for compressor frequency control and outdoor fan speed control.

(4) Indoor coil temperature sensor

It is designed to detect the temperature in the middle of the indoor heat exchanger. In heating mode, When the temperature is too high [>149℉(65°C)], the compressor will run at low frequency or shut down. Additionally, it is used to:

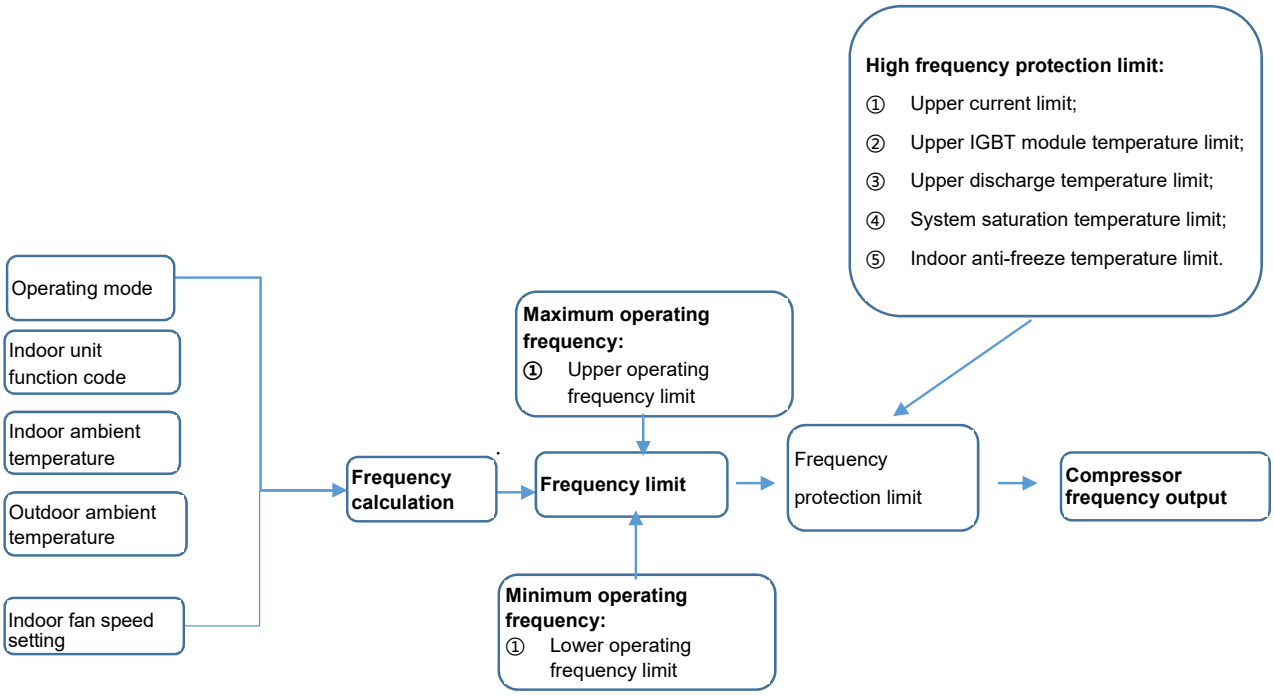
1) In heating mode, detect the coil temperature and control the opening of the Indoor Unit electronic expansion valve.
2) In heating mode, execute the system overload control.
3) In heating mode, perform the indoor cold air prevention control.
4) In cooling mode, activate the system low temperature protection.

(5) Indoor ambient temperature sensor

It is designed to detect the indoor ambient temperature for compressor frequency control.

Unit Function

1.3.2 Compressor Frequency Control



The final frequency output of the compressor is calculated as follows.

(1) Compressor frequency calculation

The compressor frequency is calculated based on the following parameters.

1) HVAC operating mode coefficient K1
   Each operating mode such as cooling, heating, dehumidification, Auto, ECO, mute, or sleep has a specific frequency demand coefficient.
2) Indoor unit capacity code K2
   Indoor units with different function codes have different capacity codes, which are generally the same as the nominal cooling capacity/100 on the nameplate.
3) Indoor ambient temperature coefficient K3
   It refers to the temperature detected by the indoor ambient temperature sensor.
4) Outdoor ambient temperature coefficient K4
   It refers to the temperature detected by the outdoor ambient temperature sensor.
5) Indoor setting speed coefficient K5
   Each indoor setting speed has a specific frequency calculation coefficient.

Indoor setting speed	Super	High	Medium	Low	Mute
Compressor frequency control coefficient	1.05	1.0	0.9	0.8	0.6

Compressor frequency = K1×K2×K3×K4×K5

Unit Function

(2) Compressor frequency range determination

1) Maximum operating frequency
   The maximum operating frequency of the compressor is set to protect the reliability of HVACs while providing a strong cooling/heating performance, keeping the operating pressure, temperature, current of electrical devices, and heating of electrical devices within a proper range, and ensuring a longer service life of HVACs.
2) Minimum operating frequency
   The minimum operating frequency of the compressor is set based on the requirements of four-way valve switching, cold air prevention in heating, and anti-freeze in cooling while providing energy-saving performance.

(3) Compressor frequency protection limit

The frequency protection conditions for compressors are mainly limited by the following 5 factors:

1) Upper current limit
   Excessive current will lead to the temperature rise of electrical devices in the outdoor control board and reduce the service life of electrical devices, so it is necessary to set a reasonable current value. When this value is reached, the operating frequency of the compressor will be reduced to protect the HVAC.
2) Upper IGBT module temperature limit
   Excessive temperature of the IGBT module poses a risk of damage to the control board chip, so it is necessary to set a reasonable temperature value. When this value is reached, the operating frequency of the compressor will be reduced to protect the HVAC.
3) Upper discharge temperature limit
   The discharge temperature represents the internal temperature of the compressor, and the excessive temperature[>248℉(120°C)] poses a risk of melting internal insulated components, causing damage to the compressor. Therefore, it is necessary to set a reasonable temperature value [generally 208℉(98°C)]. When the discharge temperature exceeds this value, the operating frequency of the compressor will be reduced.
4) System saturation temperature limit
   The HVAC system has a maximum design pressure, and the saturation temperature at the corresponding pressure is detected for small HVACs, which is generally the temperature of the coil on the condensing side. Generally, the maximum design pressure of the R-45B system is 3.85 MPa [saturation temperature is 149℉(65°C)], and the system overpressure limit is set to 3.8 MPa [saturation temperature is 140℉(60°C)]. When this value is reached, the operating frequency of the compressor will be reduced.
5) Indoor anti-freeze temperature limit
   When the indoor coil temperature is lower than 32℉(0°C), the indoor unit heat exchanger has the risk of freezing, resulting in abnormal operation of HVACs, so it is necessary to set a reasonable temperature value. Generally, it is set to 36℉(2°C), and when the indoor coil temperature in cooling mode is lower than this value, the operating frequency of the compressor will be reduced.

(4) Compressor frequency output

After the above correction, the control module outputs a compressor frequency, which is the actual operating frequency of the compressor.

OPERATION

Unit Function

Basepan Heat -

1. The base pan heat tubing element is energized according to the outdoor ambient temperature which is Tout.
The entry and exit temperature conditions are the same for all models.
When Tout is lower than 35.6°F (2°C) , the base pan heat is turned on, and when the Tout is higher than 37.4°F (3°C), the base pan heat is turned off.

Compressor crankcase heaters

2. The compressor crankcase heater is energized according to the outdoor ambient temperature which is Tout.
    2.1 When the compressor is running, the control rules for the compressor electric heating belt are as follows:
        (1) If the Tout ≤ 14°F (-10°C), turn on the compressor crankcase heaters;
        (2) If the Tout >- 41°F (5°C), turn off the compressor crankcase heaters;
        (3) If the 14°F (-10°C) < Tout ≤ 41°F (5°C), keep the previous operating state;
        (4) After each compressor starts to run for 5 minutes, turn off the compressor crankcase heaters.
    2.2 When the compressor is stopped, the control rules for the compressor crankcase heaters are as follows:
        (1) If the Tout≤ 14°F (-10°C), turn on the compressor crankcase heaters;
        (2) If the Tout > 41°F (5°C), turn off the compressor crankcase heaters;
        (3) If the 14°F (-10°C) < Tout ≤- 41°F (5°C), keep the previous operating state.

OPERATION

Unit Function

When the HVAC is powered on, the electronic expansion valve is at an initial opening, which is usually 200 steps. This opening helps to balance the pressure of the indoor and outdoor units before the HVAC is started.

(2) Opening control at the start-up phase

The first 5 minutes during compressor start-up is generally called the start-up phase, and the opening of the electronic expansion valve in this phase only depends on the compressor frequency. Typical initial openings are as follows:

Compressor frequency (Hz)		20	30	40	50	60	70	80	90
Initial opening (step)	Cooling	112	138	164	190	216	242	268	294
	Heating	84	106	128	150	172	194	216	238

(3) Opening control at stable operation phase

After 5 minutes of the compressor start-up, the HVAC is controlled by the discharge superheat (DSH).
DSH= discharge temperature − condenser coil temperature (20<DSH<50).

Note:
In cooling mode, the condenser coil temperature is the outdoor unit coil temperature.
In heating mode, the condenser coil temperature is the indoor unit coil temperature.

The control module calculates a target DSH according to the compressor frequency and outdoor ambient temperature, detects the actual DSH every 60s, and outputs the opening adjustment command of the electronic expansion valve every 60s according to the setting parameters.

δDSH = target DSH - actual DSH

$\delta DSH_{dv} = DSH_n - DSH_{n-1}$

In which, DSH_n is the DSH value of HVAC systems detected in the current cycle, DSH_{n-1} is the DSH value of HVAC systems detected in the previous cycle, and δDSH_{dv} is the difference between the DSH values of two adjacent cycles, which is available for determining the change trend of the DSH value.

1) When the target DSH is <actual DSH, the electronic expansion valve is opened.
2) When the target DSH is ≥actual DSH, the electronic expansion valve is closed.

Please refer to the following table for specific adjustments.

δDSH \ δDSH_{dv}	-5	-3	-1	0	1	3	5
10	-20	-15	-10	-7	-5	-3	0
7	-15	-10	-7	-5	-3	0	3
4	-10	-7	-5	-3	0	3	5
1	3	-1	0	0	0	1	3
0	-3	-1	0	0	0	1	3
-1	-3	-1	0	0	0	1	3
-4	5	-3	0	3	5	7	10
-7	-3	0	3	5	7	10	15
-10	0	3	5	7	10	15	20

The electronic expansion valve is controlled by the outdoor unit. When cooling, the outdoor unit EEV is fully opened while the indoor unit EEV throttles; when heating, the indoor unit EEV is fully opened while the outdoor unit EEV throttles.

Unit Function

(4) Opening control during powering off

After the HVAC receives the power-off command, the electronic expansion valve opening is maintained at 200 steps after the compressor shuts down. This opening helps to balance the pressure of the indoor and outdoor units before the HVAC is started.

1.3.3.4 Indoor/Outdoor Fan Speed Control

(1) Speed control in cooling mode

Indoor fan running rules:

In cooling mode, indoor fan runs all the time and the speed can be selected as high,(medium), low and auto.

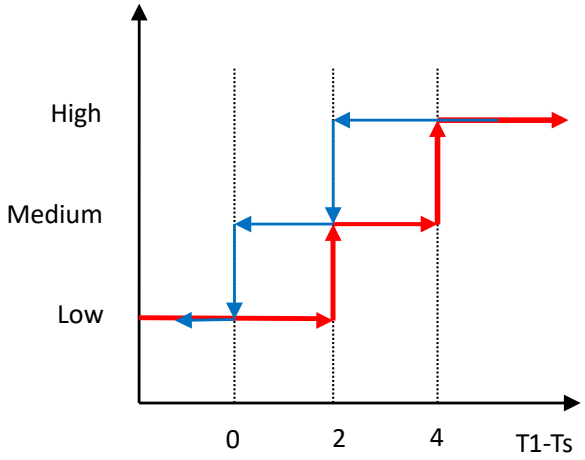
The auto fan:

T1 is indoor room temperature. Ts is setting temperature。

When the indoor ambient temperature minus the setting temperature is <36℉(2°C), the cooling mode runs at low speed.

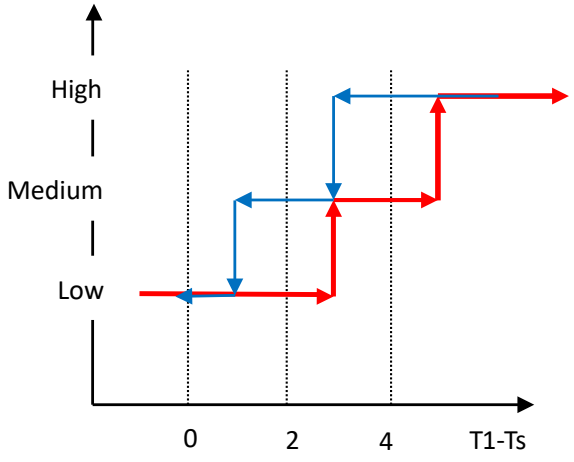
With the setting temperature unchanged, when the indoor ambient temperature minus the setting temperature is ≥36℉(2°C) and <39℉(4°C), the cooling mode runs at medium speed.

With the setting temperature unchanged, when the indoor ambient temperature minus the setting temperature is ≥39℉(4°C), the cooling mode runs at high speed.



Indoor fan running rules for Air Handler unit:

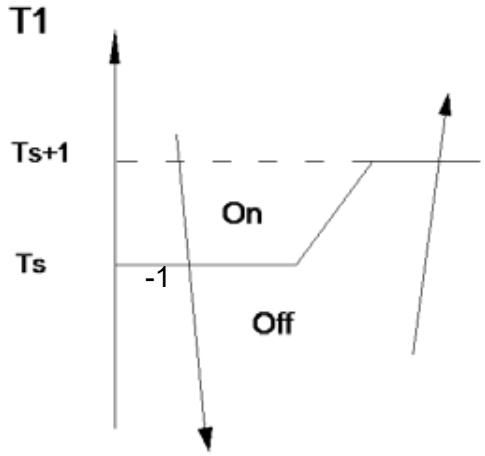
In cooling mode, indoor fan runs all the time and the speed can be selected as high and medium, The unit automatically selects according to the compressor operating parameters.



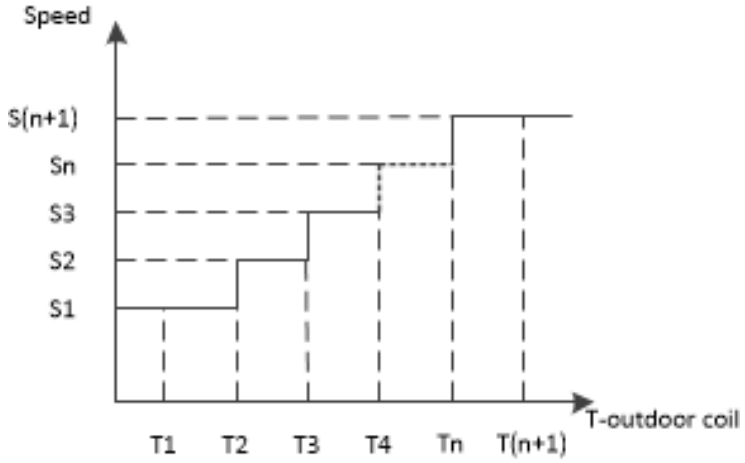
OPERATION

Unit Function

outdoor fan running rules:
Once the compressor starts up, it will follow the below rules: When indoor room temp.T1 is lower than Ts, the compressor and outdoor fan will shut off. When T1 is higher than Ts+1, the compressor and outdoor fan will start up.



Outdoor fan running rules:
Once the outdoor fan start up, it will follow the below rules:
Single outdoor fan: First, it will run in an invariable speed for a short time; Then it will regulate the speed by the outdoor-coil temperature.
Double outdoor fan: If it has two outdoor fans, the upper fan regulates the speed by the rules, and the lower fan speed is lower than the upper fan speed by 30rpm~60rpm.

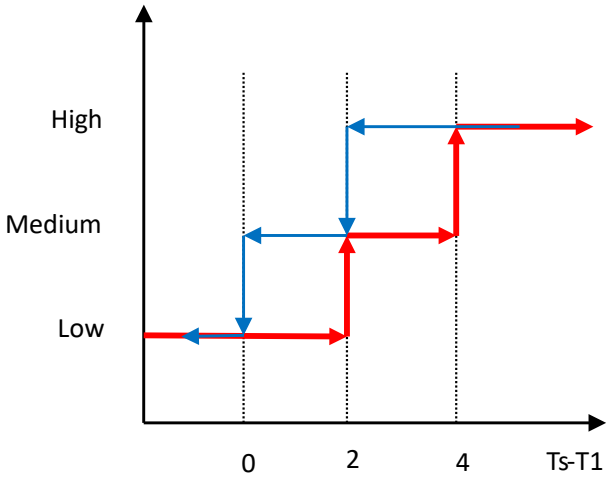


Unit Function

(2) Speed control in heating mode

After several minutes, the speed will change to high, (medium), low and auto which we selected.

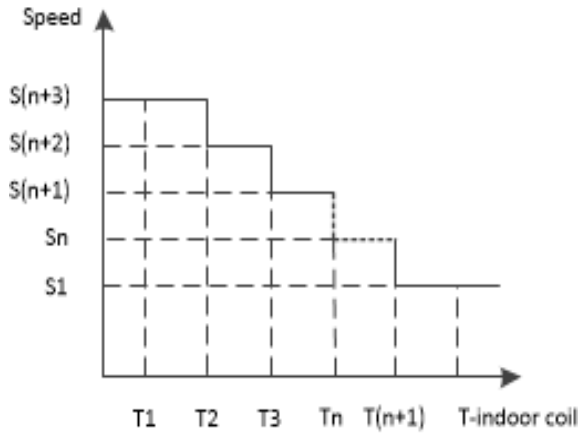
The auto fan: T1 is indoor room temperature. Ts is setting temperature.



Speed control in heating mode for Air Handler unit

In heating mode, indoor fan runs all the time and the speed can be selected as high and medium.

DC-Inverter outdoor unit:
Outdoor fan running rules:
Once the outdoor fan start up, it will follow the below rules:
Single outdoor fan: First, it will run in an invariable speed for a short time; Then it will regulate the speed by the indoor-coil temperature.
Double outdoor fan: If it has two outdoor fans, the upper fan regulates the speed by the rules, and the downer fan speed lower than the upper fan speed for 30rpm~60rpm.



OPERATION

Unit Function

1.3.3.5 Defrost Control

(1) Defrost entry conditions

1) After the compressor runs for about 40 min, the outdoor ambient temperature and the outdoor coil temperature are detected.
2) The target defrost temperature is the outdoor ambient temperature × 0.8 - 43℉(6°C), IF the outdoor coil temperature arrived at the target defrosting temperature,which is kept for 2 min, and then defrosting is enabled.

Target defrost temperature [℉ (°C)]				
Outdoor ambient temperature	41(5)	32(0)	23(-5)	14(-10)
Target defrost temperature	28(-2)	21(-6)	14(-10)	7(-14)

(2) Defrost cycle

1) No -stop defrost for 18K/24K: The compressor is reduced to 40 Hz, the internal slider of the four-way valve is changed from the heating position to the cooling position, and then the compressor rises to the defrost frequency and starts defrosting. For above 36K, the compressor stops for 1 min and then starts, rises to the defrost frequency, and starts defrosting.
2) The defrost cycle ranges from 3 min (minimum) to 10 min (maximum). Additionally, the indoor fan/outdoor fan stops during defrosting.

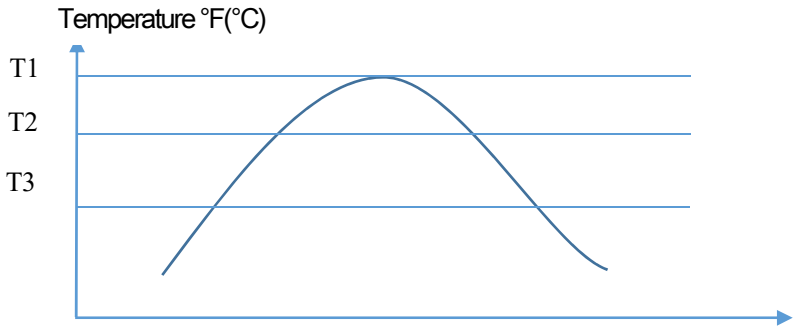
(3) Defrost exit conditions

1) When the defrost time reaches the maximum, the defrost mode automatically exits.
2) When the outdoor coil temperature reaches the defrost exit temperature [50℉(10°C)], the defrost mode keeps for 8s and then exits.

1.3.3.6 System Protection

(1) High temperature protection

There are three types of high temperature protection, namely high discharge temperature protection,cooling overload protection, and heating overload protection, and the control logic of the three is the same, as shown in the following diagram.



T1: Temperature for compressor shutdown
T2: Temperature for compressor frequency reduction
T3: Temperature for preventing the compressor from frequency increase When the temperature is too high, the control module outputs a signal as below:

OPERATION

Unit Function

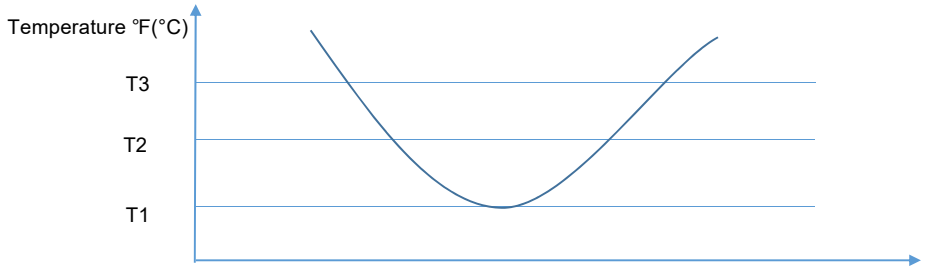
1) **When T≥T1, the compressor shuts down, and the HVAC stops.**
2) **When T1>T≥T2, the compressor frequency is reduced.**
3) **When T2>T≥T3, the compressor is prohibited from increasing the frequency.**
4) **When T<T3, the HVAC operates properly.**

Please refer to the following table for the three types of high temperature protection.

High temperature protection [℉ (℃)]			
Name	Shutdown	Frequency reduction	Frequency increase prohibited
High discharge temperature protection (discharge temperature sensor)	221(105)	208(98)	201(94)
Cooling overload protection (outdoor coil temperature sensor)	149(65)	144(62)	138(59)
Heating overload protection (indoor coil temperature sensor)	149(65)	144(62)	138(59)

(2) Low temperature protection

1) **The low temperature protection mainly refers to the anti-freeze protection of the indoor unit for correcting the operating frequency of the compressor as follows:**



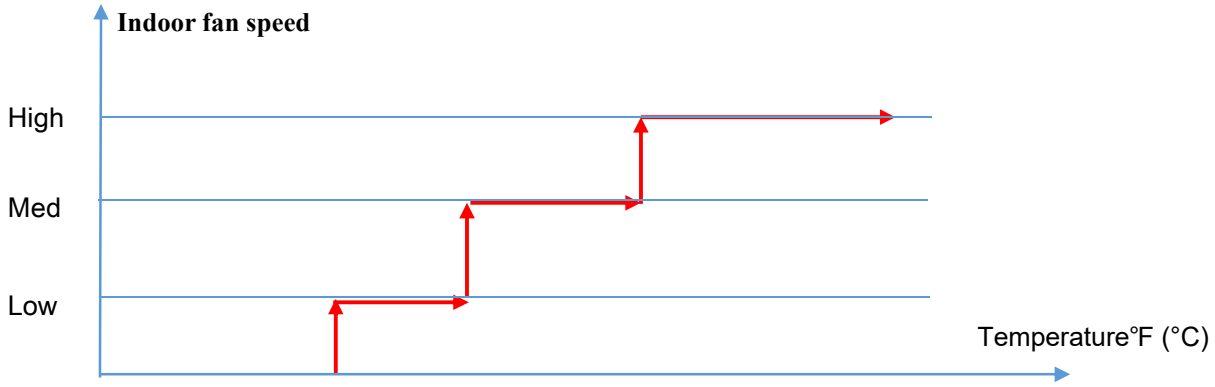
When the indoor coil temperature is too low, the control module outputs a signal as below:

1) **When T≥T3, the HVAC operates properly.**
2) **When T3>T≥T2, the compressor frequency is reduced.**
3) **When T2>T≥T1, the compressor is prohibited from increasing the frequency.**
4) **When T<T1, the compressor shuts down, and the HVAC stops.**
   Please refer to the following table for low temperature protection.

Low temperature protection [℉ (℃)]			
Name	Shutdown	Frequency reduction	Frequency increase prohibited
Anti-freeze in cooling (discharge temperature sensor)	28(-2)	36(2)	39(4)

Unit Function

(3) Cold air prevention in heating



When the indoor coil temperature is too low in heating mode, the control module outputs a signal as below:

When T<T1, the indoor fan does not start.

2) When T2>T≥T1, the indoor fan runs at low speed.
3) When T3>T≥T2, the indoor fan runs at medium speed.
4) When T≥T3, the indoor fan runs at setting speed.

Please refer to the following table for the temperature for cold air prevention in heating.

Temperature for cold air prevention in heating [℉ (°C)]			
Name	T1	T2	T3
Cold air prevention in heating (indoor coil temperature sensor)	68(20)	90(32)	100(38)

Unit Function

1.3.3.7 Others

(1) Auto Mode

This mode can be chosen with remote control and the set temperature can be changed between 61~86℉(16~30℃).
In auto mode, the unit will choose cooling, heating or fan-only mode according to ΔT (ΔT =T1-Ts).

ΔT=T1-Ts	Running mode
ΔT > 5.4℉(3℃)	Cooling
26℉(-5.4℃)≤ ΔT ≤37 ℉(5.4℃)	Fan-only
ΔT ＜-5. 4℉(-3℃)	Heating

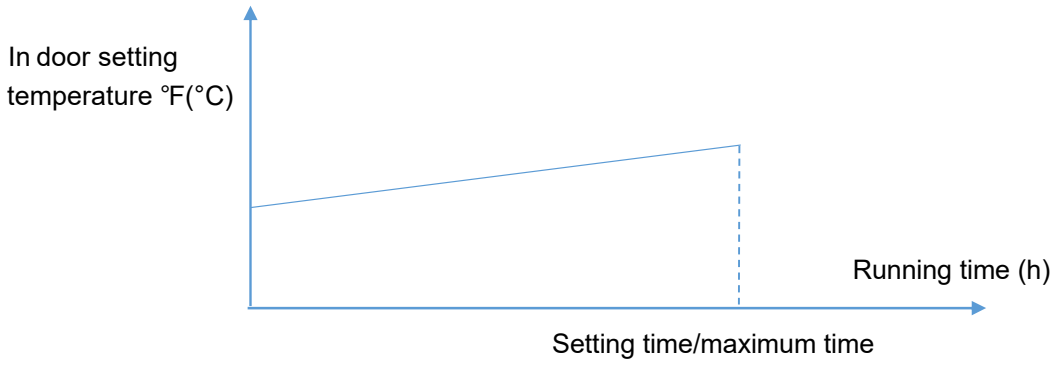
Indoor fan will run at auto fan of the relevant mode. The louver operates the same as in relevant mode. If the compressor keeps stopping for 10 minutes or the set temperature is modified, the machine will choose mode according to ΔT again.

(2) ECO mode

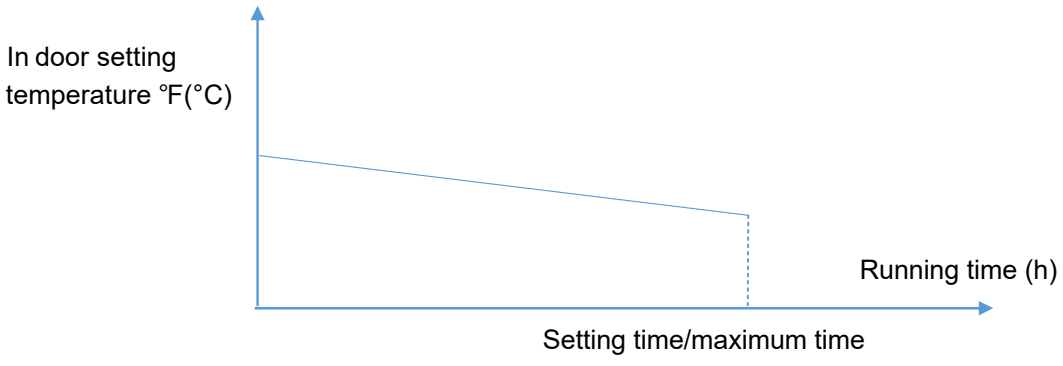
ECO mode coefficient K6
The indoor ambient temperature, outdoor ambient temperature, and indoor setting temperature are detected for recalculating the compressor frequency and improving the energy efficiency of the HVAC. Compressor frequency = K1×K2×K3×K4×K5×K6

(3) Sleep mode

After receiving the sleep command in cooling mode, the indoor unit automatically adjusts the indoor setting temperature and exits the cooling mode after the setting time is reached (forced exit after 8h).



After receiving the sleep command in heating mode, the indoor unit automatically adjusts the indoor setting temperature and exits the heating mode after the setting time is reached (forced exit after 8h).

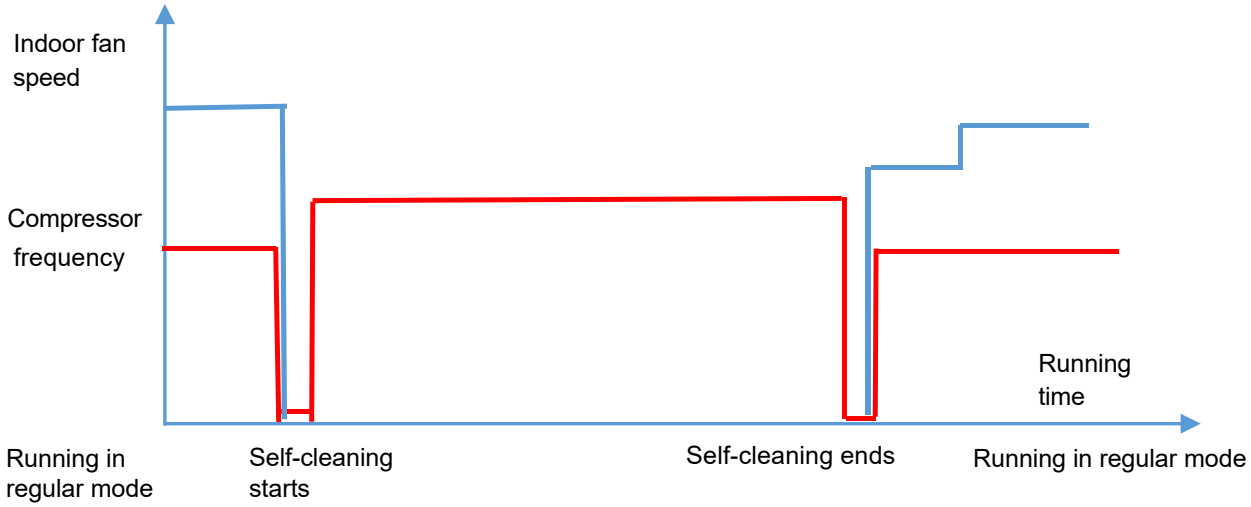


Unit Function

(4) Indoor self-cleaning mode

After receiving the self-cleaning signal, the indoor unit enters the self-cleaning mode.
The indoor fan and compressor shut down first.
After 1 min, the compressor starts and runs with the cooling mode, but the indoor fan does not run.
After the self-cleaning mode is over, the compressor shuts down, and then after 1 min, the HVAC returns to the mode before the self-cleaning starts.

After the new mode is activated, the indoor fan runs at low speed first (to prevent the water from being blown out of the evaporator) and then the setting speed.



Note:
The self-cleaning mode is available only when both the indoor and outdoor ambient temperatures are 32 ℉(0°C) to 95℉(35°C) . The self-cleaning mode runs with an interval of about 1h, so the repeat running is avoided.

(5) 46℉(8°C) heating mode

According to the remote control setting, the 46℉(8°C)heating mode is turned on, and the HVAC system responds as follows:
The indoor unit is automatically set to heating mode with an indoor setting temperature of 46℉(8°C).
The indoor unit cancels the cold air prevention.
The compressor frequency is multiplied by the 46℉(8°C) heating mode coefficient K7 as follows:
Compressor frequency = K1×K2×K3×K4×K5×K7

Note:
The parameters of the control logic part are not necessarily real data, for reference only.

OPERATION

Field Settings

2.1.1 Outdoor unit DIP switch

DIP Switch Setting of Outdoor Unit (Optional setting)

1. Turn on all power sources before setting. Without turning on, the switches settings are not refreshed and might be invalid.

2. Mark of " ■" indicates the position of DIP switches.

3. Temperature display for checker board is set to Celsius from factory. To Change display to fahrenheit; place dip switch S4-1 to the up position.

S5 DIP switch setting		S4 DIP switch setting	
Factory Setting		Factory Setting	
Capacity High /Low (Energy Management)		Pump Down Switch	
Cooling Only		Forced Defrost	
		Temperature C/ F	

Forced defrost mode

Operation:

Dial the switch from OFF to ON before turning on the appliance, and set it in heating mode, then it will run with manual defrosting mode at once.

Cooling only set

Operation:

Heating mode will be invalid after the DIP has been dialed.

Energy management (Capacity)

Actions:

The air conditioner will run more energy-saving and reduce the noise outdoor unit .

Place the S5-1 switch to on when using an AHU rated 1/2 ton less then the ODU.

Pump down mode

Actions:

The compressor runs with the target frequency, and without any protection when frequency rises; The EEV runs with setting opening; Outdoor unit fan will run with the set fan speed.

Operation procedures:

The thermostat is turned off during the whole process.

Please power off before operation.

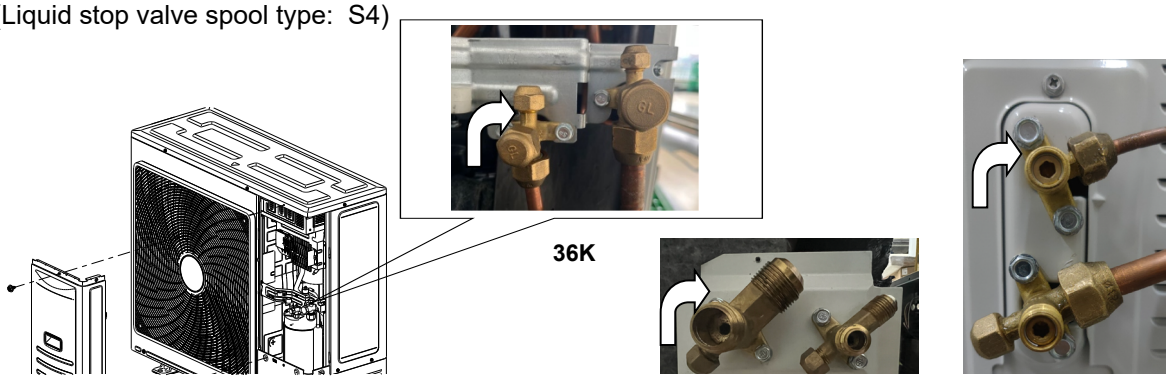
Step 1:

Open the wiring cover on the right side of the machine.

Step 2:

Close the stop valve of the liquid piping with an Allen wrench in a clockwise direction.

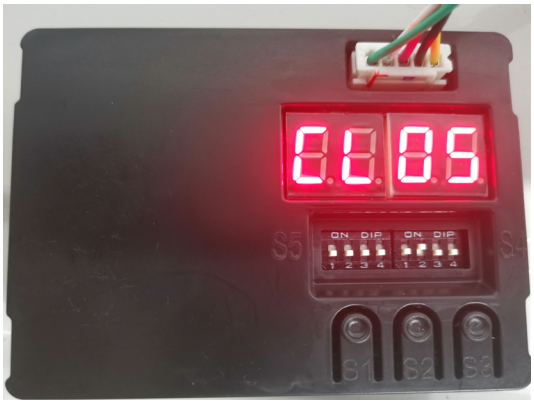
(Liquid stop valve spool type: S4)



OPERATION

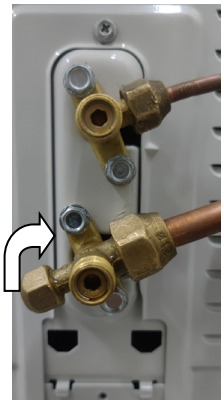
Field Settings

Step 3:
Switch on the machine power.
Step 4:
Switch S4-2 to ON position on the checker board, the outdoor unit starts, and the current frequency value is displayed on the LED digital tube of the checker board.
Step 5:
The frequency value will keep changing until "CLOS" is displayed on the LED digital tube of the checker board, then please check whether the liquid stop valve is closed.

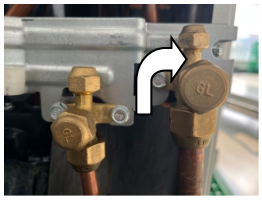


Step 6:
When "GOOD" is displayed on the LED digital tube of the checker board, please close the stop valve of the gas piping with an Allen wrench in a clockwise direction within 10s.

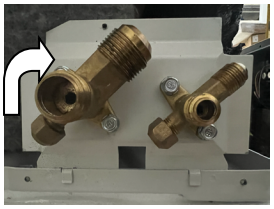




18K~24K



36K



48K

Step 7:
Cut off machine power and the procedure for recovering refrigerant is finished.

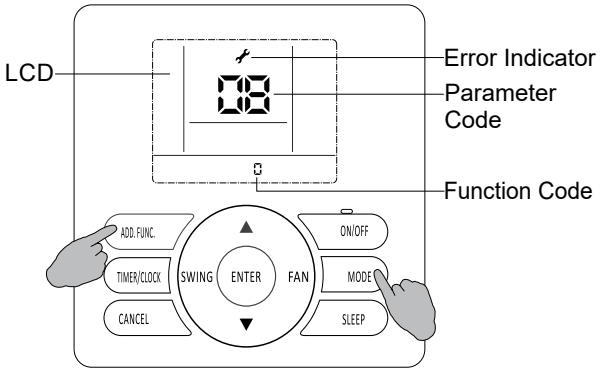
Field Settings

2.1.2 ESP setting (AHU type)

During the installation, choose proper static pressure according to the actual conditions within the range below to meet the user's requirements.
The static pressure can be freely adjusted by using specific wired remote controller.

Capacity (Btu/h)	The Range of Static Pressure	Function Code Set
18K~48K (AHU)	0-0.80 in. H_2O (0-200Pa)	0-200 function code value equals static pressure value, more than 145 is 0.58 in. H_2O (145Pa). [default: 0.58 in. H_2O (145Pa)]

Note: The pressure loss of filter is included in the data above.



Wired Controller

ESP setting (Wall controller):

1 Press and hold “MODE” button and “ADD.FUNC.” button for 3 seconds, symbol and parameter code starts blinking at the same time.
2 Press“▲/▼”button to adjust parameter number until “17” is displayed, and press “ENTER” button to enter system parameter adaption state, symbol stops blinking.
3 Select desired parameter code 10 by pressing “▲/▼” button, and press "ENTER" button to confirm.
4 Select desired function code to rewrite the parameter values by pressing “▲/▼”button, and press "ENTER" button to confirm.
5 Press “ON/OFF” button or “CANCEL”button to quit.

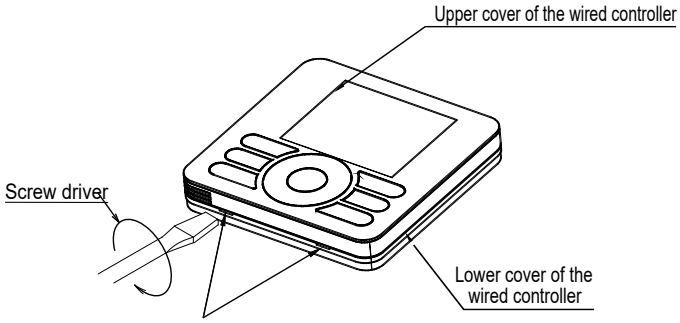
OPERATION

Field Settings

2.1.3 Indoor unit parameter revision

1) Connecting wired controller with the indoor unit

Step 1: Remove the upper cover of the wired controller

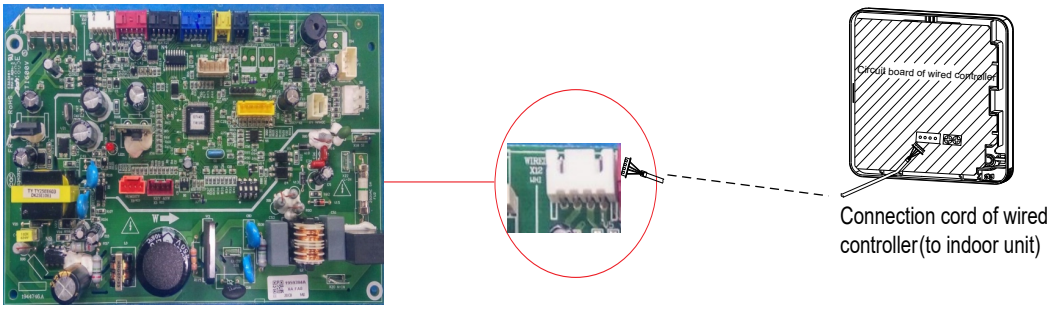


Insert a normal screw driver into the position, and gently rotate it. In this way, the upper cover can be easily removed.

NOTE:

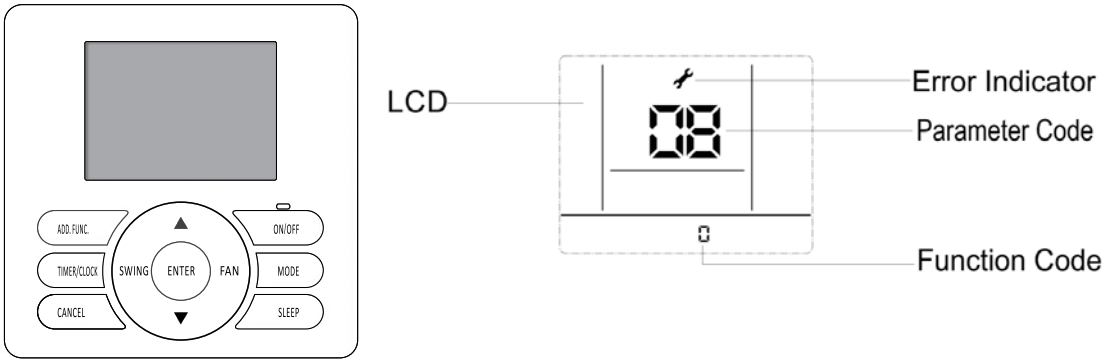
Control board of the remote controller is placed on upper cover. Please protect it from being scratched during removal and installation!

Step 2: Connect the wired controller with the indoor unit



Indoor unit control board | Marked with: wired | Wired remote controller

2) Changing system parameter



OPERATION:

① Hold down both "MODE" button and "ADD.FUNC." button for 3 seconds, symbol and parameter number blink at the same time.

② Press "▲" "▼ "button to adjust parameter number until "17" is displayed. And press "ENTER" button to enter system parameter adaption state, and symbol stops blinking, parameter number blinks.

③ Select desired parameter code by pressing "▲" / "▼"button following the table below, and press "ENTER" button to confirm.

④ Select desired function code by pressing "▲"/ "▼" button, and press "ENTER" button to confirm.

OPERATION

Field Settings

PARAMETER CODE	PARAMETER DESCRIPTION	PARAMETER VALUE&REPRESENTATION		NOTE
		DATA TYPE	REPRESENTATION (FUNCTION CODE)	
1	Self Recovery of Power Break	Integer	0：Cancel Self Recovery of Power Break function； 1：Self Recovery of Power Break； others：invalid	
2	Temperature Type	Integer	0：Centigrade Temperature； 1：Fahrenheit Temperature； others：invalid	
4	Ratio of ambient temperature sensed by indoor temperature sensor(cooling mode)	Integer	0~10valid，more than 10 default is10 0：0%；1：10%；…；10：100%	0-entirely use temperature sensed by wired remote controller; 10-entirely use temperature sensed by indoor unit
5	Filter Clean Indication	Integer	0：Cancel Filter Clean prompt function； 1：Set Filter Clean prompt function； others：invalid	
6	Filter Clean Time Set	Integer	0~32，more than 32 default is 32*1000h	
7	Installation Height Compensation	Integer	0~10m，more than 10m default is 10. =0,1,2 : no fan speed compensation; =3: increase fan speed; =4~10: increase more fan speed.	
8	Cooling Temperature Compensation （indoor unit temperature sensor）	Integer	0 : 0℃ ; 1 : -0.5℃ ; 2 : -1℃ ; 3 : -1.5℃ ; 4 : -2℃ ; 5 : -2.5℃ ; 6 : -3℃ ; 7 : -3.5℃ ; 8 : -4℃ ; 9 : -4.5℃ ; 10 : -5℃.(the wired controller displays integer with the symbol)	
9	Heating Temperature Compensation （indoor unit temperature sensor）	Integer	0 : 0℃ ; 1 : -0.5℃ ; 2 : -1℃ ; 3 : -1.5℃ ; 4 : -2℃ ; 5 : -2.5℃ ; 6 : -3℃ ; 7 : -3.5℃ ; 8 : -4℃ ; 9 : -4.5℃ ; 10 : -5℃. (the wired controller displays integer with the symbol)	
10	Static Pressure Set	Integer	1~240，function code=static pressure more than the limit static pressure default the limit static pressure，Default is 0 (default static pressure, related to models)	Duct type (DC motor)
12	Ratio of temperature sensed by indoor temperature sensor((Heating mode)	Integer	0~10valid，more than 10 default is10 0：0%；1：10%；…；10：100%	0-entirely use temperature sensed by wired remote controller; 10-entirely use temperature sensed by indoor unit
13	Temperature Adjustment-Cooling	Character	-10~10℃（Single Character with symbol）	Temperature displayed on wired controller
14	Temperature Adjustment-Heating	Character	-10~10℃（Single Character with symbol）	Temperature displayed on wired controller
25	Access control, fire protection, ON/OFF function set	Integer	=0，Access control, fire protection functions are all invalid； =1，Access control function is valid； =2，fire protection function is valid； =3，Access control, fire protection are all valid； =4，ON/OFF function is valid.	
32	Refrigerant leakage fault	Integer	0:No refrigerant leakage fault 1:The unit has a refrigerant leak fault and is locked.	

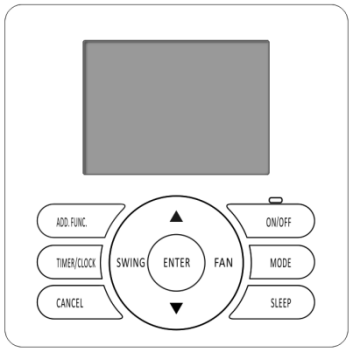
Field Settings

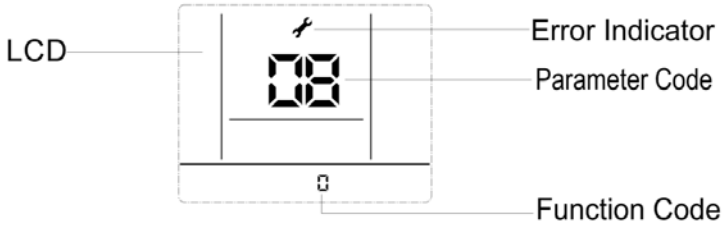
2.1.4 Running Parameter Query

Running parameter can be referred to by 7 segment display or specified wired remote controller.

Query by wired remote controller

Operation:





OPERATION:

(1) Hold down both "MODE" button and "ADD.FUNC." button for 3 seconds, symbol and parameter number blinks at the same time.

(2) Press "▲" "▼" button to select parameter number as you need, parameter value will be displayed on the LCD.

Parameter Code	Parameter Description
06	Indoor unit air inlet temperature
07	Indoor unit coil sensor temperature
08	Outdoor unit ambient sensor temperature
09	Discharge temperature
10	Suction temperature
11	Outdoor coil temperature
12	Discharge pressure
13	Suction pressure
14	Outdoor EEV opening
15	AC current input
16	AC voltage
24	Error code
25	Drive error code
26	Indoor unit air outlet temperature
28	Compressor current
29	Indoor unit room temperature
30	Indoor unit coil inlet temperature
31	Indoor unit coil outlet temperature
32	Outdoor unit condenser inlet temperature
33	Outdoor unit condenser outlet temperature
43	Outdoor unit defrost temperature
57	Outdoor fan 1 speed
58	Outdoor fan 2 speed
60	Indoor fan speed

Field Settings

2.1.5 Instructions for ON/OFF Input Control and Output Control Functions and Settings

(1) Function Introduction

● **ON/OFF Input Control**

ON/OFF-1 Input Control (**Saving Access Control Mode.**)

It is a kind of control mode to control the machine startup & shutdown based on the on & off input signal. It is an Access Control usually for Room Card control or Window control.

ON/OFF-2 Input Control (**Common Access Control Mode, or Dry Contact Mode**)

It is a kind of control mode to control the machine startup & shutdown based on the on & off input signal. It is an Access Control usually for Room Card control or Window control.

ON/OFF-3 Input Control (**Comfort Access Control Mode**)

It is a kind of control mode to control the machine startup & shutdown based on the on & off input signal. It is an Access Control usually for Room Card control or Window control.

ON/OFF-4 Input Control (**Fire Protection Mode**)

It is a kind of control mode to control the machine startup & shutdown based on the on & off input signal. It is an special control usually for fire protection.

ON/OFF-5 Input Control (**ALL On/All Off Mode A for strict local control**)

It is a kind of control mode to control the machine startup & shutdown based on the on & off input signal. It is a strict local control for all on/all off control.

ON/OFF-6 Input Control (**ALL On/All Off Mode B for flexible local control**)

It is a kind of control mode to control the machine startup & shutdown based on the on & off input signal. It is a flexible local control for all on/all off control.

● **Output Control**

There is 12V DC signal output when AC Error occurs.

From the 12V DC output, the error can be identified by alarm lights, alarm bells, etc.in the distance.

(2) Function Setting

In case of using or cancelling ON/OFF Input Control functions, use the wired controller to modify the parameters of indoor unit.

The Output Control function is ready for the indoor unit. The installer do not need to modify the parameters of indoor unit with the wired controller. Just connect the output adapter HS 2089912 in Fig1 to output 12V DC signal.

Pins of the OUT INPUT shown in the electrical wiring diagram in Fig.2 are in short circuit state before shipment (an external short circuit adapter of ON/OFF input is shown as Fig.3).



Fig.1 12V DC output adapter

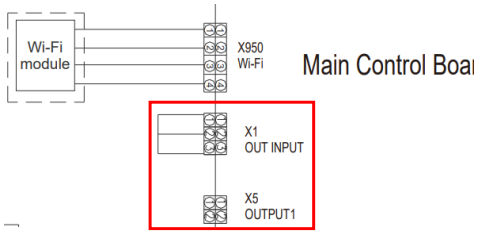


Fig.2 Example of wiring diagram



Fig.3 ON/OFF input adapter

Field Settings

Table 1 Field setting of indoor unit by the wired controller

Field setting	ON/OFF Input Control						Output Control
	Red Line			White Line			12V DC Output
Wired Controller	ON OFF-1	ON OFF-2	ON OFF-3	ON OFF-4	ON OFF-5	ON OFF-6	
0							YES
1	YES						YES
2				YES			YES
3	YES			YES			YES
4					YES		YES
5						YES	YES
6		YES		YES			YES
7			YES	YES			YES

Installer need to do the field setting of indoor unit by the wired controller according to the table1.

(3) Detailed Description

ON/OFF-1, ON/OFF-2, ON/OFF-3 Input Control is very similar. And they are usually used for the same kind of demand (for example room card) for different detailed requirement.

Tabel 2 Control logic of Input Control Modes

ON/OFF	ON Input			OFF Input		
	AC	Wired Controller	Controller control	AC	Wired Controller	Controller control
ON OFF-1	Standby	Standby	YES	Standby after 30s	Standby	NO
ON OFF-2	back to last setting	back to last setting	YES	Standby after 30s	Standby	NO
ON OFF-3	back to last setting	back to last setting	YES	Low Energy Saving	ON	Yes（Temperature and Fan Speed blocked）
ON OFF-4	Standby	Standby	YES	Standby after 3s	Standby	NO
ON OFF-5	ON（OFF blocked ）	ON（OFF blocked ）	YES（OFF blocked ）	Standby after 0s	Standby	NO（ON blocked ）
ON OFF-6	ON	ON	YES	Standby after 0s	Standby	YES

OPERATION

Field Settings

- Some project requirement of ON/OFF modes

(1) Project requirement for ON/OFF-1

For some hotel projects, the air conditioner will turn off when people pull out the room card, then check out and leave the hotel. And the air conditioner will not turn on automatically when another people come in and inset the room card in the hourly room situation because the end user is always changing and the usage habit is different. Installer should choose ON/OFF-1 for this kind of projects.

(2) Project requirement for ON/OFF-2

For some hotel projects and apartment and house projects, the air conditioner will turn off when people pull out the room card and leave the hotel. And the air conditioner will turn on automatically when people come back and inset the room card. The end user is the same one and it is good to remember the user's usage habit.

Installer should choose ON/OFF-2 for this kind of projects.

And for some window contact requirement, installer can connect the window contact sensor to the input control port and choose ON/OFF 2.

(3) Project requirement for ON/OFF-3

In some hot area and countries, when people come back to hotel and inset the room card, the air conditioner will turn on. But people have to wait for 5~10 minutes until the room is cooled down. So people do not want the air conditioner off when the room card is pulled out and they want the air conditioner still on but in low energy consumption modes. Installer should choose ON/OFF-3 for this kind of projects.

For Smart Grid of air conditioner for BAFA in 2023, installer can choose ON/OFF-3.

(4) Project requirement for ON/OFF-4

In some special projects, the tender documents require that the air conditioner should be linked to the fire signal and stops when there is a fire.

Installer should choose ON/OFF-4 for this kind of projects.

(5) Project requirement for ON/OFF-5

In some close control system, we need the backup function. Usually there is two air conditioners and if one breaks down, another one will turn on automatically.

Installer should choose ON/OFF-5 for this kind of projects. Installer needs to connect a 12V DC Relay to Output Control port of Air Conditioner A and Input Control port of Air Conditioner B. And if the air conditioner A error happens, 12V DC signal will control the relay to be ON, then the ON Input signal will control air conditioner B ON automatically.

(6) Project requirement for ON/OFF-6

The front desk staff presses a switch and all the air conditioners in the building can be turn on by the users when people comes into office. And when people leave the office, the front desk staff will press the switch to be off and all the air conditioners in the buildings will be off. If some people need to work overtime in the office, they can turn on the air conditioner locally by the remote controller or wired controller.

Installer should choose ON/OFF-6 for this kind of projects.

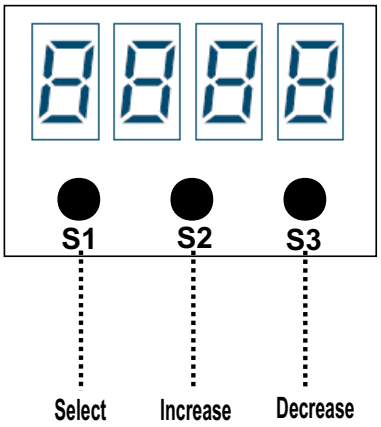
It is not friendly to choose ON/OFF-5 for this kind of projects because the people working overtime in the office can not turn on the air conditioner locally after the front desk switch is off.

OPERATION

Indoor Unit

Parameter Checking for the Indoor Unit Using Checker Board

Parameters checking for Air Handler unit:



There are 3 buttons on the digital display board:

1) Select button: Select to display outdoor/indoor unit paramet .

"P.", "A." -- Parameter of indoor unit

2) INCREASE button: Each time it is pressed, the number rises by

3) DECREASE button: Each time it is pressed, the number lowers by

The parameter content will automatically display after the parameter code is selected for 3s.

Parameter	Prarameter
P.1	Display Static Pressure
P.3	Set Static Pressure
P.13	Monitor Indoor Fan RPM
P.19	Adjust Indoor Fan RPM
A.1	Unit A Fault Code
A.2	Unit A Valve Actual Opening
A.3	DO NOT USE this setting. For Factory Use only
A.6	Unit A Coil Temperature
A.7	Unit A Ambient Temperature

2.2 Start Up

2.2.1 Preparation before start up and precautions

Please turn off all power supplies and confirm with a testing instrument whether all power supplies have been turned off.

Before running, please proceed the following steps to inspect the installation status:

(1) Structural damage inspect

Confirm whether there is no damage on the surface and interior of the equipment.

(2) Outdoor fan inspect

Confirm whether the impeller of the fan is located in the middle of the air outlet. Do not touch the air outlet.

(3) Fastening screw inspect

Check whether the screw parts become loose due to vibration during transportation. In addition, confirm whether the screws are tightened during installation.

Especially, be sure to inspect the screws of electrical wiring more carefully.

(4) Refrigerant leakage inspect

Vibration during transportation may cause loosening of the fastening (flaring part) position of the pipe. Check for refrigerant leakage.

Be sure to carry out this inspection carefully.

(5) Dial switch setting inspect

Confirm whether the dial switch is in the set position at the time of delivery (see: Dial setting of the outdoor unit).

(6) Insulation resistance inspect

Measure whether the resistance between the electrical component terminals and the ground reaches 2 MΩ or above with a 500 V megameter. When the resistance is below 2 MΩ, it indicates poor insulation at the electrical connection position, and the equipment cannot be operated at this time.

In addition, do not apply power to the communication line terminal block (otherwise it will cause damage to the printed circuit board).

(7) Full opening of stop valve

Before conducting a test run, please check whether the stop valve of the outdoor unit is fully open.

(8) Power supply phase inspect

Do not operate when the phase sequence is incorrect or missing.

(9) Power-on of crankcase heating belt

After completing the inspection of items (1) to (8), connect the outdoor unit power supply. After powering on the crankcase heating belt, the compressor can be preheated. If the compressor is not preheated and started directly, the compressor will fail. The unit can only be started after 6 hours of power-on.

(10)Confirmation of indoor and outdoor ambient temperature

The indoor ambient temperature during refrigeration operation shall not be lower than 81℉(27°C), and the outdoor ambient temperature during heating operation shall not exceed 66℉(19°C).

Field Settings

⚠ WARNING

DO NOT START THE UNIT until all start up check points have been completed.

(a) Check to ensure that the ground resistance of the wiring terminals exceeds 2 MΩ. Otherwise, find out and rep the leaking part before starting the system.
(b) Check and ensure that all stop valves of the outdoor unit are turned on before starting the system.
(c) It is recommended to power on for at least 6 hours to ensure sufficient lubrication of the compressor and extend service life.

7.2 Identification of test run functions

Turn on the remote control and perform a test run.
Test whether the function and display of the air conditioning unit are normal and whether the temperature control is in good state during the test run.
When the system is operating, the following conditions shall be noticed.

⚠ WARNING

(a) Do not touch any parts at the exhaust end to avoid scald. This is because the temperature of the compressor and pipes at the exhaust end is heated to above 194℉(90°C).
(b) Do not press the AC contactor button (or Disconnect) , otherwise a serious accident may occur.
After the test run is completed, turn off the power. Do not touch any electrical components within 10 min after switching off the main power supply.

TROUBLESHOOTING

Outdoor Unit

Basic Troubleshooting

Troubleshooting	Possible Reason of Abnormality	How to Deal With
Air conditioner does not start up	1. Power supply failure; 2. Trip of breaker or blown fuse 3. Power voltage is too low; 4. Improper setting of remote control ; 5. Remote control is short of power.	1. Check power supply circuit; 2. Measure insulation resistance to ground to see if there is any leakage; 3. Check if there is a defective contact or leak current in the power supply circuit; 4. Check and set remote control again; 5. Change batteries.
The compressor starts or stops frequently	The air inlet and outlet has been blocked.	Remove blocking obstacles.
Poor cooling/heating	1. The outdoor heat exchanger is dirty, such as condenser; 2. There are heating devices indoors 3. The air tightness is not enough. People come in and out too frequently. 4. Block of outdoor heat exchanger; 5. Improper setting of temperature.	1. Clean the heat exchanger of the outdoor unit, such as condenser ; 2. Remove heating devices; 3. Keep certain air tightness indoors; 4. Remove blocking obstacles; 5. Check and try to set temperature again.
Sound from deforming parts	During system starting or stopping, a sound might be heard. However, this is due to thermal deformation of plastic parts.	It is not abnormal, and the sound will disappear soon.
Water leakage	1. Drainage pipe blocked or broken; 2. Wrap of refrigerant pipe joint is not closed completely.	1. Change drainage pipe. 2. Re-wrap and make it tight.

Table 501

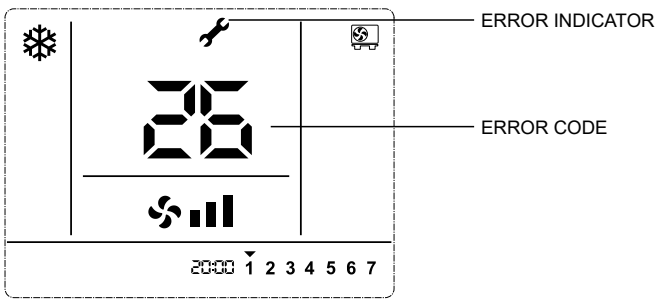
Troubleshooting according to fault codes

When the air conditioner failure occurs, the fault code will display on control board, wired controller or display panel.

How to check fault codes

Indoor unit

(1)Error codes indicated by wire remote controller (see figure below)



When the air conditioner malfunctions, will be displayed on the LCD, and error codes will appear and blink.

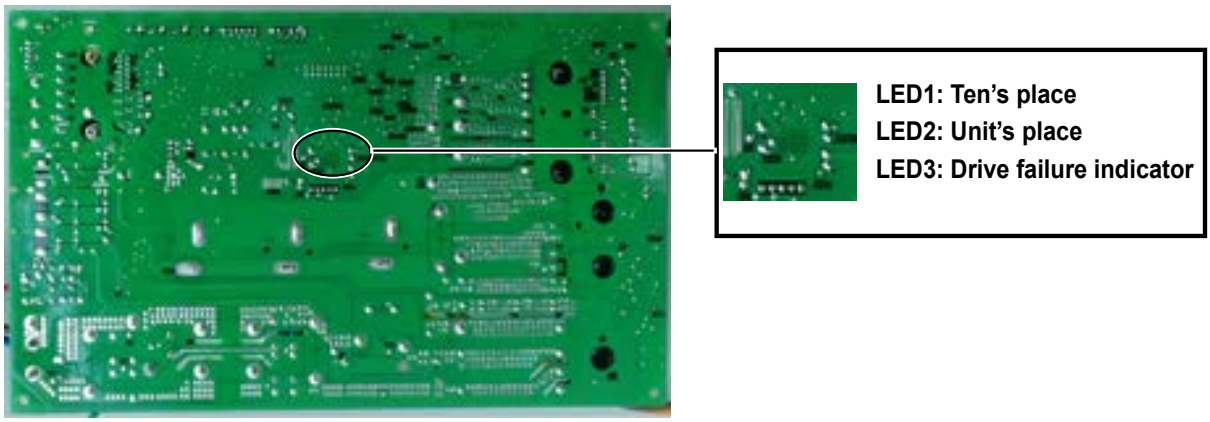
Fault code displays on wired controller

TROUBLESHOOTING

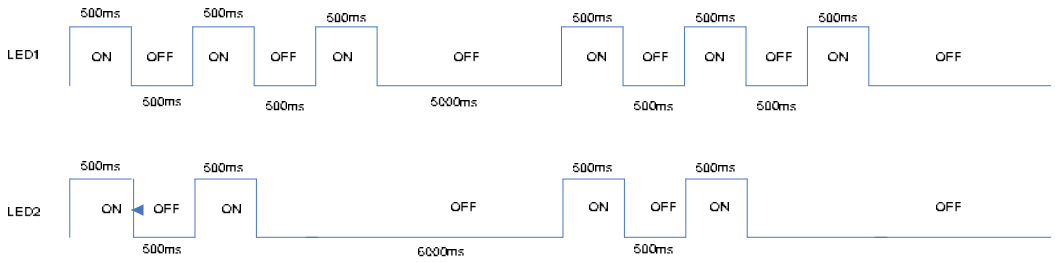
Outdoor Unit
Diagnostic Codes _ Intro

Outdoor unit（Fault code displayed by LED lamps on outdoor main control board.）

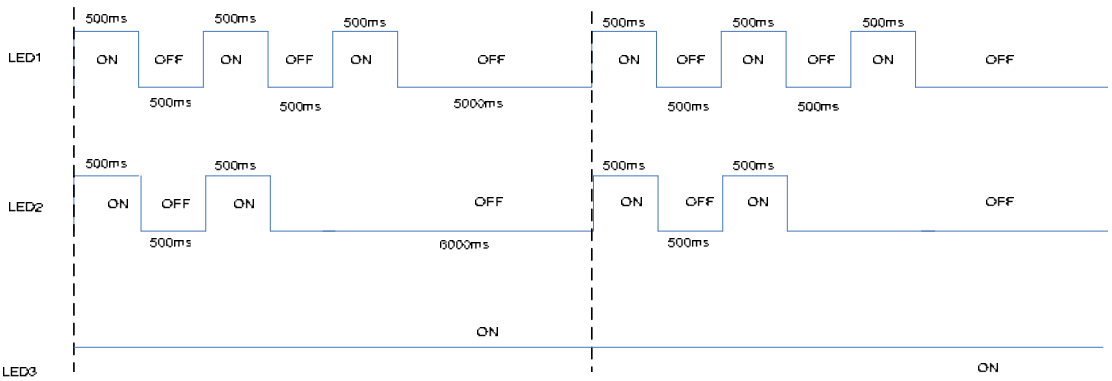
DC-Inverter unitary （Main control board upside-down)
Fault code displayed by LED lamps on outdoor main control board.
There are 3 LED lamps on control board, LED1, LED2 and LED3.
LED1 indicates fault code represented by 2-digit number, LED2 indicates fault code represented by single digit number and LED3 indicates outdoor drive control fault. When LED3 is off, LED1 and LED 2 indicate main control fault code.
Note: For 3 digit fault codes LED 1 will blink more than nine times, followed by LED 2.
For example for fault code 125; LED 1 will blink 12 times followed by LED 2 blinking 5 times.
When LED3 is on, LED1 and LED 2 indicate drive control fault code.
When LED3 is flickering and LED1, LED 2 are all off, indicate compressor is preheating. Failures display with 5s interval. It means LED will be off for 5s to report next fault code. System protection codes display method is the same with main control fault code. LED lamps will be off when there is no failure, protection or preheating.



For example, outdoor main control fault 32:



For example, outdoor drive fault 32:



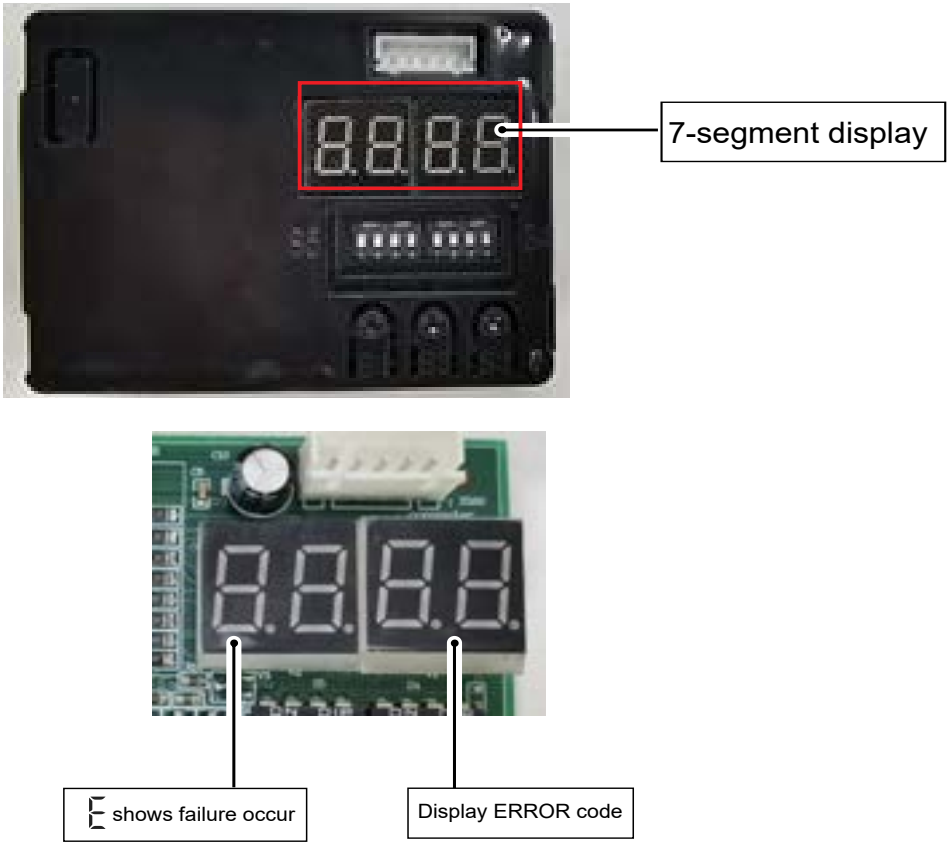
TROUBLESHOOTING

Outdoor Unit
Diagnostic Codes _ Intro

Outdoor unit

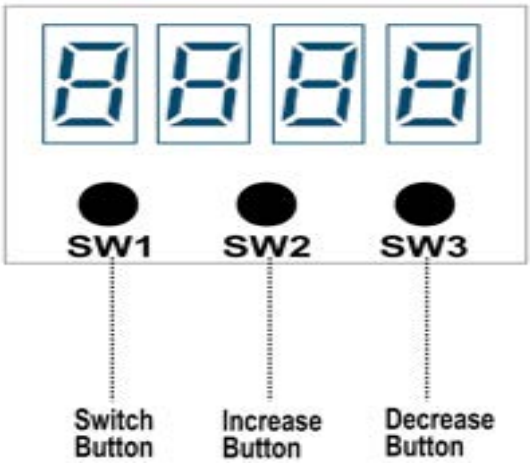
Fault code displayed on checker board

Fault code/drive fault code will be displayed on checker board.



Digital Display Switch Introduction

It can be used to check outdoor running parameters.



TROUBLESHOOTING

Outdoor Unit
Diagnostic Codes _ Intro

There are 3 buttons on the digital display board：

1) SWITCH button：Indoor parameters and outdoor parameters can be selected in turn by pressing it.
"P."-outdoor unit parameter ,"A."-indoor unit parameter；

2) INCREASE button：Each time it is pressed, the number rises by 1,hold it down, the number will rapidly increase;

3) DECREASE button：Each time it is pressed, the number lowers by 1,hold it down, the number will rapidly decrease.

4) The parameters will be displayed after 3s when the checking numbers are selected.

Parameters can be checked as following table below.

Parameter Code	Descriptions	Parameter Code	Descriptions
P.0	Fault codes	P.27	Outdoor DC Motor 2 target speed
P.1	Compressor actual frequency	P.29	The current opening of the outdoor expansion valve
P.2	Compressor driving frequency	A.1	Unit A fault codes
P.4	Compressor target frequency	A.2	Unit A valve actual opening
P.5	Compressor exhaust temperature	A.4	Unit A liquid pipe temperature
P.6	Outdoor suction Temperature	A.5	Unit A gas pipe temperature
P.7	Outdoor ambient temperature	A.6	Unit A coil temperature
P.8	Outdoor coil temperature	A.7	Unit A ambient temperature
P.9	Outdoor defrosting temperature	A.8	Unit A set temperature
P.10	IPM module temperature	A.9	Unit A capacity
P.11	Outdoor capacity requirement	A.10	Unit A set fan speed
P.12	IPM fault codes	A.11	Unit A actual suction overheating (cooling)
P.13	Outdoor DC Motor 1 target speed		
P.14	AC input current		
P.15	AC input voltage		
P.16	DC bus voltage		
P.17	Compressor phase current		
P.18	Frequency limit code		
P.20	Target suction overheating		
P.21	Target exhaust overheaingt		
P.22	Actual suction overheating (heating)		
P.23	Actual exhaust overheating (heating)		

NOTES:
P11 is expressed as a coeffficient and is only used for developmental purposes or R&D. This code is not for trouble-shooting.
P12 is the Driver Fault. Code will first dhow up as 45 fault code. Then when you call up the P12, it will show the sub fault code.

TROUBLESHOOTING

Outdoor Unit

Diagnostic Codes _Main PCB

Fault code	Fault description	Possible reasons for abnormality	How to deal with
1	Outdoor ambient temperature sensor fault	1. The outdoor ambient temperature sensor is connected loosely. 2. The outdoor ambient temperature sensor fails to work. 3. The Main PCB sampling circuit fails.	1. Reconnect the outdoor ambient temperature sensor. 2. Replace the outdoor ambient temperature sensor components. 3. Replace the Main PCB.
2	Outdoor coil temperature sensor fault	1. The outdoor ambient temperature sensor is connected loosely;. 2. The outdoor ambient temperature sensor fails to work;. 3. The Main PCB sampling circuit fails.	1. Reconnect the outdoor ambient temperature sensor. 2. Replace the outdoor ambient temperature sensor components. 3. Replace the Main PCB.
3	The unit over-current shut down fault	1. Main PCB current sampling circuit fails; 2. The current is exceeding maximum limits high because the supply voltage is too low. 3. The compressor is blocked. 4. Overload in cooling mode; 5. Overload in heating mode."	1. Replace the Main PCB. 2. Normal protection, Check supply power. 3. Replace the compressor. 4. Please see Table 702 5. Please see Table 703.
4	EEprom Data error	1. EE components fails; 2. EE components control circuit fails; 3. EE components are inserted incorrectly."	1. Replace the Main PCB.
5	Cooling freezing protection (the indoor coil temperature is too low) or heating overload (indoor coil temperature is too high)	1. The indoor unit airflow abnormal. 2. The room temperature is too low in cooling mode or the room temperature is too high in heating. 3. The filter is dirty. 4. The duct resistance is too high to result in low air flow. 5. The fan speed setting is too low. 6. The indoor unit is not installed in accordance with the installation standards, and the air inlet is too close to the air outlet .	1. Check whether the indoor fan, indoor fan motor and evaporator work normally. 2. Normal protection. 3. Clean the filter. 4. Check the volume control valve, duct length etc. 5. Set the fan speed to high. 6. Reinstall the indoor unit referring to the user manual to change the distance between the indoor unit and the wall or ceiling.
7	The communication fault between the indoor unit and outdoor unit	1. The communication cable is connected improperly between the indoor unit and outdoor unit. 2. The communication cable is connected loosely. 3. The communication cable fails. 4. The indoor control board fails. 5. The outdoor control board fails;. 6. Communication circuit fuse open. 7. The specification of communication cable is incorrect.	1. Reconnect the communication cable referring to the wiring diagram. 2. Reconnect the communication cable. 3. Replace the communication cable. 4. Replace the indoor control board;. 5. Replace the outdoor control board. 6. Check the communication circuit, adjust the DIP switch and the short-circuit fuse. 7. Ensure communication cable is 4 X 14 AWG 600v Stranded wire.
13	Compressor overheat protector device	1. The wiring of the overload protector is connected loosely. 2. The overload protector fails . 3. The refrigerant is low. 4. The installation pipe is much longer than the normal one, but extra refrigerant is not added ; 5. The expansion valve fails; 6. The outdoor Main PCB has failed.	1. Reconnect the wiring of the overload protector;. 2. Replace the overload protector. 3. Using an A2L approved leak detector, Check the braze points of the unit to confirm there are no leaks, then recharge the refrigerant;. 4. Add the refrigerant, refer to refrigerant Charging methods. 5. Replace expansion valve. 6. Replace the outdoor Main PCB.
14	The high pressure switch operation or the unit is turned off for high pressure protection	1. The wiring of the high pressure protector is connected loosely. 2. The high pressure protector fails; 3. The outdoor Main PCB has malfunctioned. 4. Overload in cooling; 5. Overload in heating."	1. Reconnect the wiring of the high pressure protector. 2. Replace the high pressure protector. 3. Replace the Main PCB. 4. Please refer to NOTE 3. 5. Please refer to NOTE 4.
15	The low pressure switch protection or the unit is turned off for low pressure protection	1. The wiring of the low pressure switch is connected loosely. 2. The low pressure switch fails. 3. The refrigerant is not enough. 4. The expansion valve fails in heating mode. 5. The Outdoor Unit Main PCB has malfunctioned.	1. Reconnect the wiring of the low pressure switch. 2. Replace the low pressure switch. 3. Check the welding point to confirm whether the unit leaks, and then add some refrigerant. 4. Replace the expansion valve. 5. Replace the outdoor control board.

Table 502

TROUBLESHOOTING

Outdoor Unit
Diagnostic Codes _Main PCB

Fault code	Fault description	Possible reasons for abnormality	How to deal with
16	Overload protection in cooling mode	1. The refrigerant is excessive. 2. The outdoor ambient temperature is too high. 3. Short-circuit occurs in the air outlet and air inlet of the outdoor unit. 4. The condenser coil is dirty. 5. The speed of the outdoor fan motor is too low. 6. The outdoor fan is broken or the outdoor fan is blocked. 7. The air inlet and outlet have been blocked. 8. The expansion valve fails.	1. Discharge the refrigerant, and recharge the refrigerant referring to the rating label. 2. Please use it within allowable temperature range. 3. Adjust the installation of the outdoor unit referring to the user manual. 4. Clean the condenser. 5. Check the outdoor fan motor and fan capacitor. 6. Check the outdoor fan. 7. Remove the obstacles. 8. Replace the expansion valve.
17	Discharge temperature sensor fault	1. The wiring of the discharge temperature sensor is connected loosely. 2. The discharge temperature sensor fails; 3. The Main PCB sampling circuit is abnormal.	1. Reconnect the wiring of the discharge temperature sensor. 2. Replace the discharge temperature sensor. 3. Replace the outdoor Main PCB.
18	AC voltage is abnormal	1. The AC voltage>275V or <160V; 2. The AC voltage of sampling circuit on the driver board is abnormal.	1. Normal protection, please check the supply power; 2. Replace the Main PCB.
22	The defrosting sensor fault	1. The wiring of the suction temperature sensor is connected loosely. 2. The suction temperature sensor fails. 3. The Main PCB sampling circuit is abnormal.	1. Reconnect the wiring of the suction temperature sensor;. 2. Replace the suction temperature sensor; 3. Replace the outdoor Main PCB.
43	High pressure sensor fault	1. The wiring of the high-pressure pressure sensor connect is loose; 2. The high-pressure pressure sensor fails 3. The sampling circuit of the high pressure pressure sensor fails.	1. Reconnect the wiring of the high-pressure pressure sensor; 2. Replace the high-pressure pressure sensor; 3. Replace the outdoor Main PCB.
45	IPM fault	There are many reasons for this failure. You can check the driver board fault LED to further analyze the fault code of the drive board and to learn about what leads to the fault and how to operate it. Specific information can be seen in table 503.	See table 504
46	IPM and control board communication fault	There are many reasons for this failure. You can check the driver board fault LED to further analyze the fault code of the drive board and to learn about what leads to the fault and how to operate it. Specific information can be seen in table 503 and 504.	See table 504
47	Discharge temperature is too high	1. The refrigerant of the unit is low. 3. EEV has malfunctioned. 4. The outdoor ambient temperature is too high.	1. Check for refrigerant leak. 2. Repair leak - See Refrigerant evacuation and charging. 3. Replace EEV. 4. Normal protection.
48	The outdoor DC fan motor fault (upper fan motor)	1. Fan motor connections loose. 2. Fan motor wiring damaged. 3. The upper DC fan motor fails; 4. The drive circuit of the upper DC fan motor fails; 5. The outdoor fan has been blocked."	1. Reconnect the wiring of the up DC fan motor; 2. Repair or replace wiring. 3. Replace the upper DC fan motor; 4. Replace the Main PCB. 5. Check the outdoor fan and ensure the outdoor fan can run normally."
91	The unit turns off due the IPM board over heating fault	1. The outdoor ambient temp. is too high; 2. The speed of the out fan motor is too low if the fan motor is AC fan motor; 3. The outdoor unit is not installed in accordance with the standard; 4. The supply power is too low.	1. Normal protection; 2. Check the fan capacitor, and replace the fan capacitor if it is failure; 3. Reinstall the outdoor unit. Refer to the installation section of this manual; 4. Normal protection.

Table 502

TROUBLESHOOTING

Outdoor Unit
Diagnostic Codes _Main PCB

Fault code	Fault description	Possible reasons for abnormality	How to deal with
96	Refrigerant low	Refrigerant low	Discharge the refrigerant and charge the refrigerant referring to the Nameplate of the unit. See installation section of this manual.
96 - NOTE: DSH (Discharge Super Heat) = discharge temperature – condenser coil temperature 1. The opening of the outdoor electronic expansion valve > 450 steps; DSH >131°F (55°C) ; The temperature difference between indoor and outdoor coils is within 18°F (10°C); Indicates fault but does not stop; 1.1 The opening degree of the outdoor electronic expansion valve is above 450 steps DSH>131°F (55°C) 1.2 The temp difference between the pipe temp of Evaporator and Condenser is less than 18°F (10°C) AC will show E96 and AC can continue to run. 2. The opening of the outdoor electronic expansion valve > 450 steps; DSH>131°F (55°C); The temperature difference between indoor and outdoor coils is within 18°F (10°C); The temperature difference between the inner disk and the inner ring, the outer disk and the outer ring is within 2°C; stoppage 2.1 The opening degree of the outdoor electronic expansion valve is above 450 steps DSH>131°F (55°C) 2.2 The temp difference between the pipe temp of EVA and CON is less than 18°F (10°C) 2.3 At the same time, the temp difference between the pipe temp of CON and outdoor ambient temp is less than 3.6F (2°C), AC will show E96 and AC will stop.			
97	4-way valve commutation failure fault	1. The connecting wiring of the 4- way valve coil is loose; 2. The 4-way valve coil fails; 3. The 4-way valve fails; 4. The driver board of the 4-way valve fails.	1. Reconnect the wiring of the 4-way valve; 2. Replace the 4-way valve coil; 3. Replace the 4-way valve; 4. Replace the main pcb.
NOTE 3: Overload in cooling mode			
		THE ROOT CAUSE	**CORRECTIVE MEASURE**
1		The refrigerant is excessive.	Discharge the refrigerant, and recharge the refrigerant referring to the nameplate and the installation section of this manual.
2		The outdoor ambient temperature is too high.	Please use within allowable temperature range
3		Short-circuit occurs in the air outlet and air inlet of the outdoor unit.	Adjust the installation of the outdoor unit referring to the installation section of this manual.
4		The outdoor heat exchanger is dirty, such as condenser.	Clean the heat exchanger of the outdoor unit, such as condenser
5		The speed of the outdoor fan motor is too low.	Check the outdoor fan motor,
6		The outdoor fan is broken or the outdoor fan is blocked.	Check the outdoor fan.
7		The air inlet and outlet has been blocked.	Remove the blocked objects.
8		The expansion valve fails.	Replace the expansion valve.
NOTE 4: Over load in heating mode			
1		The refrigerant is excessive.	Discharge the refrigerant, and recharge the refrigerant referring to the nameplate and the installation section of this manual.
2		The outdoor ambient temperature is too high.	Please use within allowable temperature range
3		The indoor ambient temperature is too high.	Please use within allowable temperature range.
4		Short-circuit occurs in the air outlet and air inlet of the outdoor unit.	Adjust the installation of the outdoor unit referring to the installation section of this manual.
5		The indoor filter is dirty.	Clean the indoor filter.
6		The speed of the indoor fan motor is too low.	Check the indoor fan motor and fan capacitor.
7		The indoor fan is broken or the outdoor fan is blocked.	Check the indoor fan.
8		The air inlet and outlet has been blocked.	Remove the blocked objects.
9		The expansion valve fails.	Replace the expansion valve.

Table 502

TROUBLESHOOTING

Outdoor Unit

Diagnostic Codes _Driver Faults

Fault code	Fault description	Possible reasons for abnormality	How to deal with
1	Inverter DC voltage overload fault	1. Power supply input is too high or too low; 2. Control board fault.	1. Check the power supply; 2. Change the control board.
2	Inverter DC low voltage fault		
3	Inverter AC current overload fault		
4	Out-of-step detection	1. Compressor phase lost; 2. Bad control board components; 3. The compressor insulation fault.	1. Check the compressor wire connection 2. Change the main PCB. 3. Change the compressor.
5	Loss phase detection fault (speed pulsation)		
6	Loss phase detection fault (current imbalance)		
7	Inverter IPM fault (edge)	1. System overload or current overload; 2. Control board fault; 3. Compressor oil shortage, serious wear of crankshaft ; 4. The compressor insulation fault.	1. Check the system; 2. Change the control board; 3. Change the compressor; 4. Change the compressor.
8	Inverter IPM fault (level)		
9	PFC fault (edge)		
10	PFC fault (level)		
11	PFC power detection of failure	1. The power supply is not stable; 2. Instantaneous power failure; 3. Control board failure.	1. Check the power supply; 2. No need to deal with; 3. Change the main PCB.
12	PFC overload current detection of failure.	1. System overloads, and the current is too high. 2. Control board fails; 3. PFC fails.	1. Check the system; 2. Change the control board; 3. Change the Main PCB
13	DC voltage detected abnormal .	1. Input voltage is too high or too low; 2. control board fails.	1. Check the power supply; 2. Change the Main PCB.
14	PFC LOW voltage detected failure.		
15	AD offset abnormal detected failure.	Control board fails.	Change the Main PCB.
16	Inverter PWM logic set fault.		
17	Inverter PWM initialization failure		
18	PFC_PWM logic set fault.		
19	PFC_PWM initialization fault.		
20	Temperature abnormal.		
21	Shunt resistance unbalance adjustment fault		
22	Communication failure.	1. Communication wire connection is not proper; 2. Control board fails;	1. Check the wiring; 2. Change the Main PCB.
23	Motor parameters setting of failure	Initialization is abnormal.	Reset the power supply.
26	DC voltage mutation error	1. Power input changes suddenly; 2. control board fails.	1. Check the power supply, to provide stable power supply; 2. Change the Main PCB.
27	Compressor drive D axis current control error	1. System overload, phase current is too high; 2. Control board fails.	1. Check if the system is normal; 2. Check if the stop valve is open; 3. Change the control board.
28	Compressor drive Q axis current control error	1. System overload, phase current is too high; 2. Control board fails.	1. Check if the system is normal; 2. Check if the stop valve is open; 3. Change the Main PCB.

Table 504

TROUBLESHOOTING

Outdoor Unit
Diagnostic Codes _Driver Faults

Fault code	Fault description	Possible reasons for abnormality	How to deal with
29	Saturation error of D axis current control integral	1. System overloads suddenly; 2. Compressor parameter is not suitable; 3. Control board fails.	1. Check if the system is normal; 2. Check if the stop valve is open; 3. Change the Main PCB.
30	Saturation error of Q axis current control integral	1. System overloads suddenly; 2. Compressor parameter is not suitable; 3. Control board fails.	1. Check if the system is normal; 2. Check if the stop valve is open; 3. Change the Main PCB.
33	EE data abnormal	Control board EEPROM is abnormal.	1. Change EEPROM; 2. Change the Main PCB.
50	DC voltage detected abnormal	1. The fan motor system overloads. 2. Control board fails; 3. The fan motor is not insulated well;	1. Change the fan motor; 2. Change the Main PCB. 3. Change the fan motor.
51	Out-of-step detection	1. The wire is not connected well; 2. Bad control board components; 3. The fan motor starting overloads; 4. The fan motor is demagnetized; 5. The fan motor is not insulated well.	1. Check the fan motor wire connection; 2. Change the control board; 3. Change the fan motor; 4. Change the fan motor; 5. Change the fan motor;
52	Abnormal speed control	1. Bad control board components; 2. The fan motor shaft clamping; 3. The fan motor insulation fails.	1. Change the Main PCB. 2. Change the fan motor; 3. Change the fan motor;
53	Out of phase detection fault	1. Phase loss of the fan motor; 2. Bad control board components.	1. Change the Main PCB. 2. Change the fan motor; 3. Change the fan motor
54	IPM-FO hardware over-current (edge)	1. The fan motor overloads or over- current; 2. The control board fails; 3. The fan motor insulation fails.	1. Change the fan motor; 2. Change the Main PCB. 3. Change the fan motor
55	IPM-FO hardware over-current (level)	1. The fan motor overloads or over- current; 2. The control board fails; 3. The fan motor insulation fails.	1. Change the fan motor; 2. Change the Main PCB. 3. Change the fan motor
56	The fan motor -AD Offset abnormal detection fault	The control board circuit fails.	Change the Main PCB.
57	The fan motor speed control integral saturation	1. The fan motor overload mutation; 2. Parameters are inappropriate; 3. The control board fault.	1. Change the fan motor system; 2. Change the fan motor; 3. Change the Main PCB.
58	The fan motor D,Q axis current control error	1. The fan motor overloads, the phase current is large; 2. The control board fault.	1. Check the fan motor system; 2. Change the Main PCB.
59	The fan motor D,Q axis current control integral saturation	1. The fan motor overload mutation; 2. Parameters are inappropriate; 3. The control board fault.	1. Change the fan motor system; 2. Change the fan motor; 3. Change the Main PCB.
60	The fan motor reverse	1. Bad control board components; 2. Wiring problems	1. Change the Main PCB. 2. Check the wiring.
61	IPM-PWM initialization fault	1. EE logics error; 2. The control board fails.	1. Change the Main PCB. 2. Change the Main PCB.
70	Effective value protection of compressor phase current	1. Low power supply voltage; 2. control board fault.	1. Check the power supply voltage; 2. Replace the main PCB.
71	Start failure	1. System overload; 2. control board fault; 3. Compressor fault	1. Check if the system operates properly and if the shut-off valve is turned on; 2. Replace the main PCB. 3. Replace the compressor.

Table 504

TROUBLESHOOTING

Outdoor Unit
Diagnostic Codes _Driver Faults

Fault code	Fault description	Possible reasons for abnormality	How to deal with
72	IPM over- temperature fault	1. High outdoor ambient temperature; 2. Improper installation of outdoor units; 3. Low power supply voltage.	1. Protect properly; 2. Reinstall the outdoor unit according to the installation specifications. 3. Protect properly.
73	MCU error	control board fault	Replace the control board
74	Compressor speed estimation error	1. System overload; 2. control board fault; 3. Compressor fault	1. Check if the system operates properly and if the shut-off valve is turned on; 2. Replace the main PCB. 3. Replace the compressor.
75	Over-power	1. System overload; 2. control board fault; 3. Compressor fault	1. Check if the system operates properly and if the shut-off valve is turned on; 2. Replace the main PCB. 3. Replace the compressor.
76	High compressor speed	1. control board fault	1. Replace the control board. 2. Replace the compressor.
Codes 101-132 appear in the operation process and indicate some kind of normal operation state, instead of faults, so they do not need to be dealt with. DSH: Discharge Super Heat			
101	When overcurrent occurs, stop the frequency from increasing.	Current control	
102	When overcurrent occurs, reduce the frequency.	Current control	
103	When the temperature of IPM module is too high, stop the frequency from increasing.	Frequency control to keep appropriate temperature of IPM module.	
104	When the temperature of IPM module is too high, reduce the frequency.	Frequency control to keep appropriate temperature of IPM module.	
105	When the discharge temperature is too high, stop the frequency from increasing.	Frequency control to keep appropriate discharge temperature.	
106	When the discharge temperature is too high, reduce the frequency.	Frequency control to keep appropriate discharge temperature.	
107	In cooling mode, when the temperature of the outdoor unit coil is too high, stop the frequency from increasing.	Frequency control to keep appropriate temperature of the outdoor unit coil in cooling mode.	
108	In cooling mode, when the temperature of the outdoor unit coil is too high, reduce the frequency.	Frequency control to keep appropriate temperature of the outdoor unit coil in cooling mode.	
113	To prevent the indoor unit from being frozen or high temperature, stop the frequency from increasing.	Frequency control to keep appropriate temperature of the indoor unit coil.	
114	To prevent the indoor unit from being frozen or high temperature, reduce the frequency.	Frequency control to keep appropriate temperature of the indoor unit coil.	
119	When DSH exceeds the target value, the valve opening gets wider to adjust the flow.	Control on expansion valve based on DSH.	
120	When DSH exceeds the target value, the valve opening gets narrower to adjust the flow.	Control on expansion valve based on DSH.	
121	When DSH exceeds the target value, stop the valve opening from getting narrower.	Control on expansion valve based on DSH.	
122	When DSH exceeds the target value, stop the valve opening from getting wider.	Control on expansion valve based on DSH.	
131	When the temperature of IPM module is too high, stop the frequency from increasing.	Frequency control to keep appropriate temperature of IPM module.	
132	When the temperature of IPM module is too high, reduce the frequency.	Frequency control to keep appropriate temperature of IPM module.	

Table 504

Outdoor Unit

Diagnostic Codes _Driver Faults

Fault code	Fault description	Possible reasons for abnormality	How to deal with
134	When the discharge temperature is too high, stop the valve opening getting narrower.	Control on discharge temperature expansion valve.	
140	The compressor overloads.	Control on the compressor output.	
141	The compressor current overloads.	Control on the output torque of the compressor.	
NOTE: DSH: Discharge Super Heat These codes appearing in the operation process indicate some kind of normal operation state, instead of faults, so they do not need to be dealt with.			

Table 504

TROUBLESHOOTING

Indoor Unit Cassette and Ducted Diagnostic Codes

Fault code	Fault description	Possible reasons for abnormality	How to deal with
37	Humidity sensor failure	1. The cable of the humidity sensor connect loose. 2. The humidity sensor is failure. 3. The indoor control board is failure.	1. Reconnect the cable of the humidity sensor. 2. Replace the humidity sensor. 3. Replace the indoor control board.
51	Drainage protection	1. Defective drain pump. 2. Improper drain piping work. 3. Drain piping clogging. 4. Defective float switch. 5. Defective indoor unit PCB. 6. Defective short circuit connector on PCB.	1. Replace the drain pump. 2. Replace the drain piping. 3. Dredge the drain piping. 4. Replace the float switch. 5. Replace the indoor unit PCB. 6. Replace the short circuit connector.
55	Mode conflict fault	The user sets the conflicting mode for more than two indoor units.	Reset the operation mode for the indoor unit, for with one outdoor unit, the user should avoid setting the conflicting operation mode with the indoor units.
56	Refrigerant leakage	1. The refrigerant sensor detects that the concentration of refrigerant in the air exceeds the threshold.	Check and repair problematic pipes and add refrigerant.
57	Refrigerant sensor communication fault or refrigerant sensor fault	1. The refrigerant sensor fails to communicate with the indoor unit for a long time. 2. The refrigerant sensor reports the fault message such as life loss.	1. Replace the refrigerant sensor. 2. Reconnect the connection cable between the refrigerant sensor and the indoor unit board.
64	Communication between Indoor & Outdoor unit Fault	1. The indoor unit and the outdoor unit are not connected properly. 2. The communication cable is connected loosely. 3. The communication cable between the indoor unit and the outdoor unit fails or the cable between the indoor control board to terminal fails or the cable between the outdoor control board to the terminal fails. 4. The indoor control board fails. 5. The outdoor control board fails.	1. Reconnect the connection cable referring to the indoor and outdoor wiring diagram. 2. Reconnect the communication cable referring to the indoor and outdoor wiring diagram. 3. Replace the communication cable referring to the indoor and outdoor wiring diagram. 4. Replace the indoor control board; 5. Replace the outdoor control board.
72	Indoor fan motor fault	1. The cable of the indoor fan motor is connected loosely. 2. The cable of the indoor fan motor fails; 3. The indoor fan motor fails; 4. The indoor control board fails; 5. The outdoor fan has been blocked.	1. Reconnect the cable of the fan motor. 2. Replace the cable of the fan motor. 3. Replace the fan motor. 4. Replace the indoor control board. 5. Check the indoor fan and ensure the indoor fan can run normally.
73	Indoor EEPROM Data fault	1. Indoor EE components fail. 2. The control circuit of the EE components fails. 3. The EE components has been inserted in opposite direction.	1. Replace the EE components. 2. Replace the indoor control board. 3. Reassemble the EE components of the indoor control board.
81	Indoor ambient Temperature Sensor Fault	1. Disconnection or contact failure of connectors on the outdoor controller circuit board 2. Defective thermistor. 3. Defective outdoor controller circuit board.	1. Check connection of connector on the indoor controller circuit board. 2. Check resistance value of thermistor or replace the outdoor temperature sensor. 3. Replace outdoor controller circuit board.
83	Evaporator Middle Temperature Sensor Fault	1. The cable of the coil temperature sensor of the evaporator fails; 2. The coil temperature sensor of the evaporator fails; 3. The sampling circuit is abnormal.	1. Reconnect the cable of the coil temperature sensor of the evaporator; 2. Replace the coil temperature sensor of the evaporator; 3. Replace the indoor control board.
FE	Communication between main control board & Wired controller Fault (display on wired controller)	1. The wired controller and the indoor control board are connected loosely. 2. The sequence of the wiring between the wired controller to the indoor control board is wrong. 3. The wiring between the wired controller to the indoor control board fails. 4. The wired controller fails. 5. The indoor control board is abnormal.	1. Reconnect the wiring between the wired controller to the indoor control board. 2. Replace the wiring between the wired controller to the indoor control board. 3. Replace the wiring between the wired controller to the indoor control board. 4. Replace the wired controller. 5. Replace the indoor control board.

Figure 513

TROUBLESHOOTING

Indoor Unit Cassette and Ducted Diagnostic Codes

ER	Communication between main control board & display board Fault (displays on display board)	1. The wiring between the display board to the indoor control board is connected loosely. 2. The sequence of the wiring between the display board to the indoor control board is wrong. 3. The wiring between the display board to the indoor control board fails. 4. The display board fails. 5. The indoor control board fails.	1. Reconnect the wiring between the display board to the indoor control board. 2. Replace the wiring between the display board to the indoor control board. 3. Replace the wiring between the display board to the indoor control board. 4. Replace the display board. 5. Replace the indoor control board.
NOTE 1: When the unit encounters refrigerant leakage faults, refrigerant sensor communication faults with indoor units, or refrigerant sensor hardware faults, corresponding fault codes (56, 57 in the table above) will be displayed on the indoor unit's wall-mounted controller and display panel If the indoor unit can not start or the indoor unit stops itself after 30s, at the same time the unit do not display the fault code, please check the pin and the socket of the control board.			
NOTE 2: For Fault Code 57: Upon detection of a sensor hardware fault or communication failure, the indoor unit display and controller will display the fault code. The indoor fan will operate at maximum speed, while the outdoor unit will shut down. Subsequent control commands to the unit will be acknowledged but not executed.			
NOTE 3 Fault Clearance Procedures **Fault Code 56:** Clearance Condition: After repairing the leak, power-cycle the unit. The fault will reset if the system continuously detects refrigerant concentration below the alarm threshold or confirms no leakage via sensor data. Post-Clearance Action: The unit will enforce a 5-minute high-speed fan operation to stabilize the system. **Fault Code 57:** Clearance Condition: The fault auto-clears when communication with the refrigerant sensor is re-established or the sensor ceases to report intrinsic faults. No manual intervention required post-recovery			
NOTE 4: If the indoor unit can not start or the indoor unit stops itself after 30s, at the same time the unit do not display the fault code, please check the pin and the socket of the control board.			
NOTE 5: If the indoor unit displays the 75,76,77,78 fault code after you turn on the unit, please check the TEST seat of the indoor control board or the TEST detection circuit to see whether short circuit occurs.			
NOTE 6: Overload in cooling mode			
3		Short-circuit occurs in the air outlet and air inlet of the outdoor unit.	Adjust the installation of the outdoor unit referring to the installation section of this manual.
4		The outdoor heat exchanger is dirty, such as condenser.	Clean the heat exchanger of the outdoor unit, such as condenser
5		The speed of the outdoor fan motor is too low.	Check the outdoor fan motor,
6		The outdoor fan is broken or the outdoor fan is blocked.	Check the outdoor fan.
7		The air inlet and outlet has been blocked.	Remove the blocked objects.
8		The expansion valve fails.	Replace the expansion valve.
NOTE 4: Over load in heating mode			
1		The refrigerant is excessive.	Discharge the refrigerant, and recharge the refrigerant referring to the nameplate and the installation section of this manual.
2		The outdoor ambient temperature is too high.	Please use within allowable temperature range
3		The indoor ambient temperature is too high.	Please use within allowable temperature range.
4		Short-circuit occurs in the air outlet and air inlet of the outdoor unit.	Adjust the installation of the outdoor unit referring to the installation section of this manual.
5		The indoor filter is dirty.	Clean the indoor filter.
6		The speed of the indoor fan motor is too low.	Check the indoor fan motor and fan capacitor.
7		The indoor fan is broken or the outdoor fan is blocked.	Check the indoor fan.
8		The air inlet and outlet has been blocked.	Remove the blocked objects.
9		The expansion valve fails.	Replace the expansion valve.

Figure 513

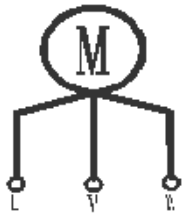
COMPONENTS TESTING

1. DC Motor (Indoor unit)

a. External drive

Use the multimeter to test resistance between two terminals at 77℉(25℃).

Model	Air Handler type Normal test results	Deviation range
18K	U-V: 6.4Ω U-W: 6.4Ω V-W: 6.4Ω	±7%
24K	U-V: 6.4Ω U-W: 6.4Ω V-W: 6.4Ω	±7%
36K/48K	U-V: 2.9Ω U-W: 2.9Ω V-W: 2.9Ω	±7%

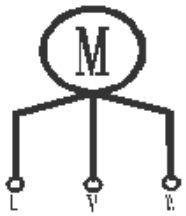


2. DC Motor (Outdoor unit)

External drive

Use the multimeter to test resistance between two terminals at 77℉(25℃).

Model	Test condition (Ambient temperature)	Normal test results	Deviation range
18K	68℉(20℃)	U-V: 44Ω U-W: 44Ω V-W: 44Ω	±7%
24K	68℉(20℃)	U-V: 38.75Ω U-W: 38.75Ω V-W: 38.75Ω	±7%
36K	68℉(20℃)	U-V: 7.1Ω U-W: 7.1Ω V-W: 7.1Ω	±7%
48K	68℉(20℃)	U-V: 34.5Ω U-W: 34.5Ω V-W: 34.5Ω	±10%



3. Compressor

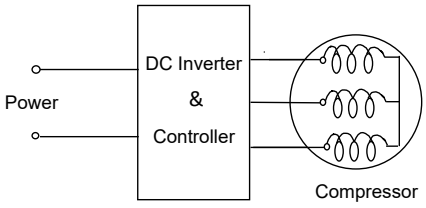
Test in resistance.

TOOL:Multi-meter.

Test the resistance of the winding. The compressor fails if the resistance of winding is 0 (short circuit)or∞(open circuit).

Familiar error:

1) Compressor motor lock.
2) Discharge pressure value approaches static pressure value.
3) Compressor motor winding abnormality.



COMPONENTS TESTING

Notes：

1) Don’t put a compressor on its side or turn over.
2) Please assemble the compressor in your air conditioner rapidly after removing the plugs. Don’t place the comp. in air for a long time.
3) Avoid compressor running in reverse caused by connecting electrical wire incorrectly.
4) Warning! In case AC voltage is impressed to compressor, the compressor performance will decrease because of its rotor magnetic force decreasing.

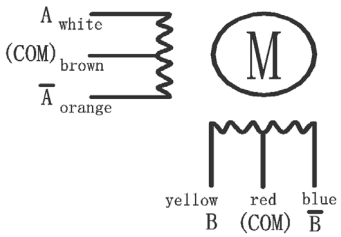
Use the multimeter to test resistance between two terminals at 68℉(20℃)
Test results:

Model		Normal test results	Deviation range
18K		U-V: 0.986Ω U-W: 0.986Ω V-W: 0.986Ω	±5%
24K		U-V: 0.560Ω U-W: 0.560Ω V-W: 0.560Ω	±5%
36K		U-V: 0.426Ω U-W: 0.426Ω V-W: 0.426Ω	±5%
48K		U-V: 0.328Ω U-W: 0.328Ω V-W: 0.328Ω	±5%

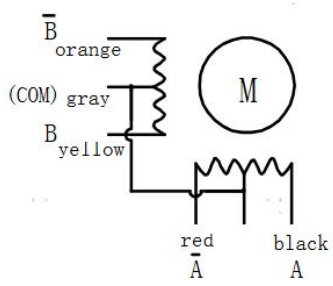
4. EEV coil

Use the multimeter to test resistance between two terminals at 68℉(20℃).
Test results:

Model	Normal test results	
18K~24K	Brown（com）-White Brown（com）-Orange Red（com）-Yellow Red（com）-Blue	46Ω±3.7Ω
36K/48K/60K	Grey(COM)-Black: 46Ω Grey(COM)-Red: 46Ω Grey(COM)-Orange: 46Ω Grey(COM)-Yellow: 46Ω	



18K~24K



36K-48K

5. 4-Way valve coil

Use the multimeter to test resistance between two terminals at 68℉(20℃).

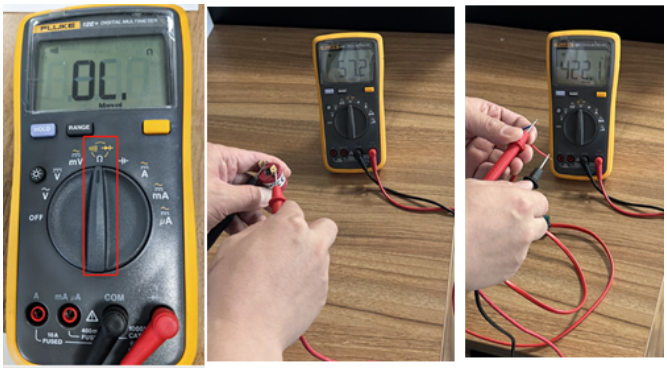
Test results:

Model	Normal test results
18K~48K	2085Ω±208Ω

COMPONENTS TESTING

8. Pressure switch

The pressure switch is divided into normally closed and normally open types (under atmospheric pressure), the high pressure switch is normally closed, and the low pressure switch is normally open.



Normally closed switch detection:
With no pressure in the pipeline, you can turn a multimeter to the ohm range and connect the red and black probes with a pin (lead) respectively to detect whether the switch is in the "ON" state.

Normally open switch detection:
With the pressure in the pipeline higher than the switching-on pressure, you can turn a multimeter to the ohm range and connect the red and black probes with a pin (lead) respectively to detect whether the switch is in the "ON" state

COMPONENT TESTING

Reversing Valve

A reversing valve is a component of a heat pump that changes the direction of refrigerant flow, allowing the system to function in both heating and cooling modes.

It consists of a pressure-operated, main valve and a pilot valve actuated by a solenoid plunger. The solenoid is energized by 24 vac during the heating cycle only.

The single tube on one side of the main valve body is the high-pressure inlet to the valve from the compressor. The center tube on the opposite side is connected to the low pressure (suction) side of the system. The other two are connected to the indoor and outdoor coils. Small capillary tubes connect each end of the main valve cylinder to the "A" and "B" ports of the pilot valve. A third capillary is a common return line from these ports to the suction tube on the main valve body. Four-way reversing valves also have a capillary tube from the compressor discharge tube to the pilot valve.

The plunger assembly in the main valve can only be shifted by the pressure differential between the high and low sides of the system. The pilot section of the valve opens and closes ports for the small capillary tubes to the main valve to cause it to shift.

⚠ WARNING



ELECTRIC SHOCK HAZARD

Disconnect power to the unit before servicing. Failure to follow this warning could result in serious injury or death.

⚠ WARNING



HIGH PRESSURE HAZARD

Sealed Refrigeration System contains refrigerant and oil under high pressure.

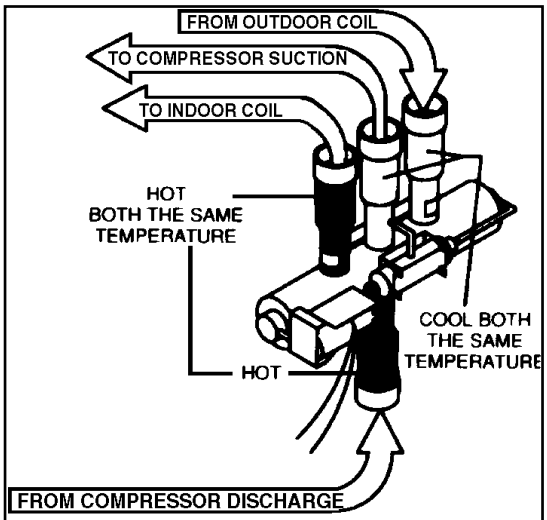
Proper safety procedures must be followed, and PPE must be utilized when working with refrigerants.

Failure to follow these procedures could result in serious injury or death.

Checking the Reversing Valve

NOTE: System operating pressures must be near normal before valve can shift. NOTE: You must have normal operating pressures before the reversing valve can shift.

Run the unit in the heating mode then disconnect connector X 800 from the ODU main PCB and the valve should shift to cooling mode. If valve does not shift - replace the valve(verify the unit is properly charged before replacing valve.) For a stuck valve diagnosis run in the cooling mode and check the temp difference between the suction line from the evaporator and the common suction line at the compressor, if there is more than a 3 °F difference then change the valve.

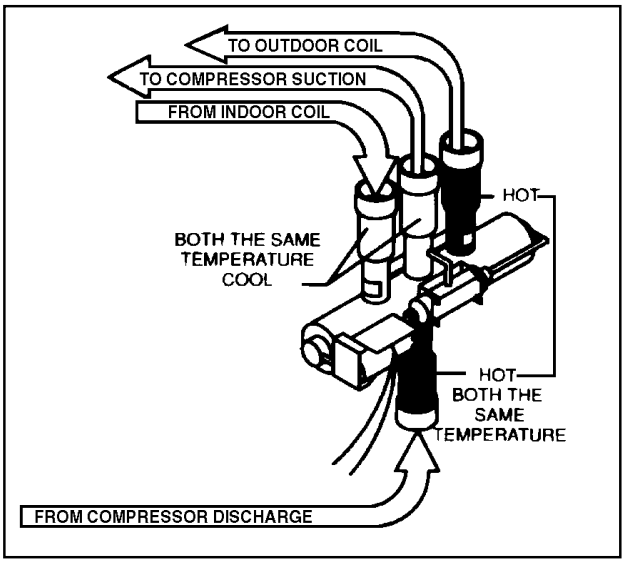


Reversing Valve in Heating Mode

Checking The Reversing Valve Solenoid

The solenoid coil is an electromagnetic type coil mounted on the reversing valve and is energized during the operation of the compressor in the heating cycle.

1. Turn off high voltage electrical power to unit.
2. Unplug line voltage lead from reversing valve coil.
3. Check for electrical resistance through the coil. If the coil is open replace the coil.
4. Check from each lead of coil to the copper liquid line as it leaves the unit or the ground lug. There should be no continuity between either of the coil leads and ground; if there is, coil is grounded and must be replaced.
5. If coil tests okay, reconnect the electrical leads.
6. Make sure coil has been assembled correctly.

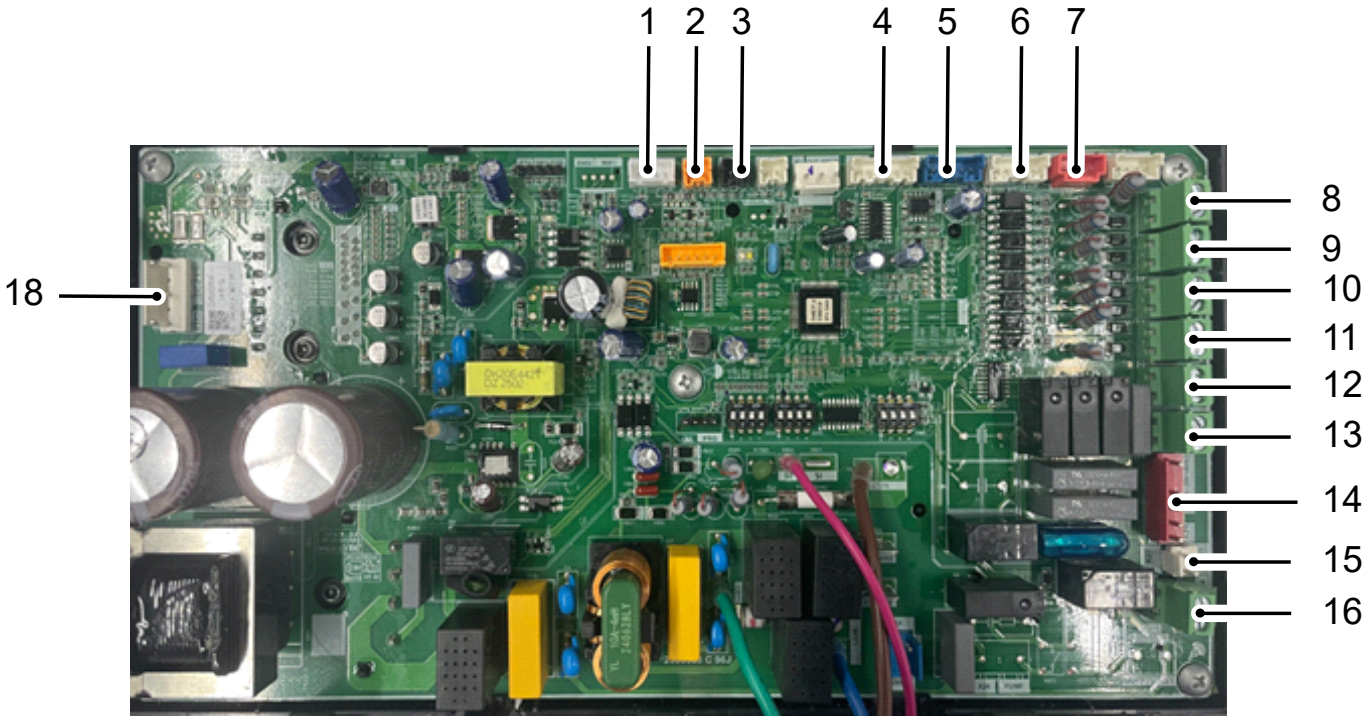


NOTE: Do not start unit with solenoid coil removed from valve, or do not remove coil after unit is in operation. This will cause the coil to burn out.

7. With the unit in heat mode, verify that unit has 24 vac on the solenoid terminals of the Outdoor Unit Main PCB.

COMPONENTS TESTING

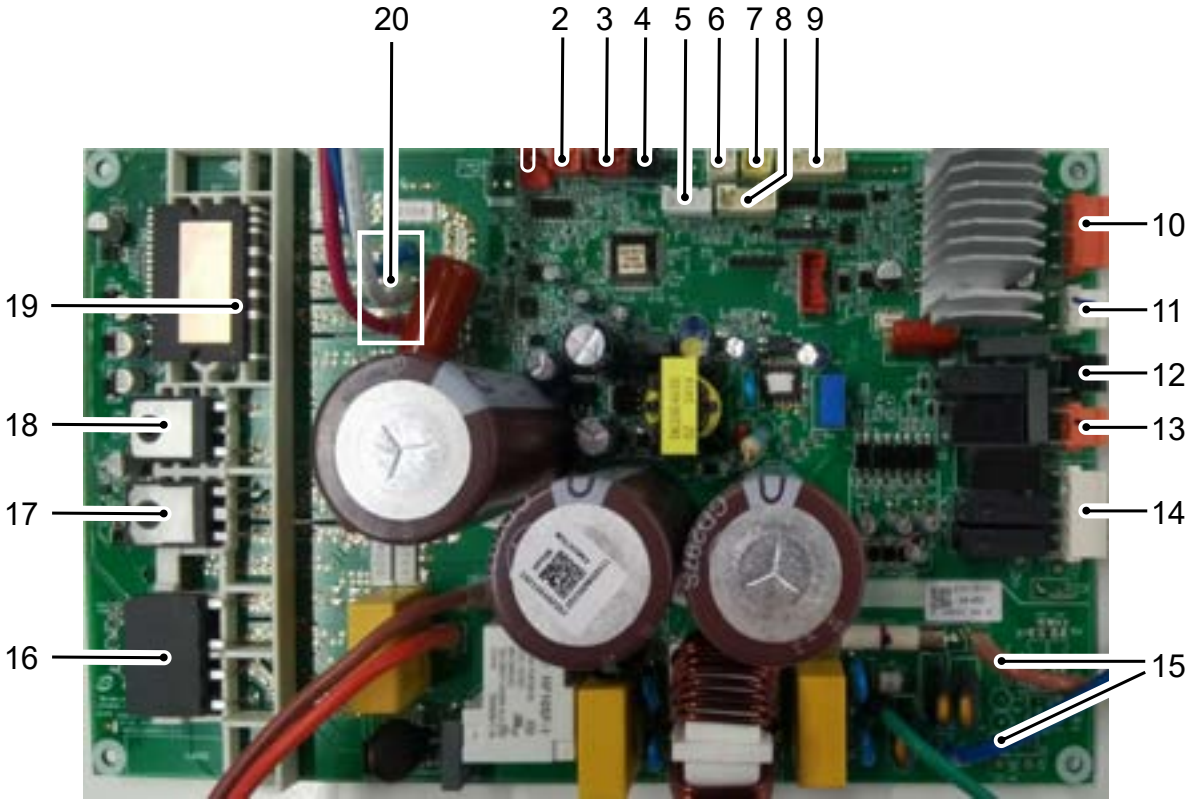
AHU 18k-48k BTU Main PCB ID



NO.	Description	NO.	Description
1	Wired controller Interface	10	W1, W2 Signal Interface
2	Room Temperature Sensor Interface	11	L, G Signal Interface
3	Coil Temperature Sensor Interface	12	R, C Signal Interface
4	EEV Interface	13	AC24V Interface
5	Refrigerant leak Sensor Interface	14	Electric Heater Interface
6	CHECKER Interface	15	Trans Interface
7	Humidity Sensor Interface	16	ALARM Signal Interface
8	Y1, Y/Y2 Signal Interface		
9	DH, O Signal Interface	18	DC-FAN Interface

COMPONENTS TESTING

Outdoor Unit - 18k-24k BTU Main PCB ID

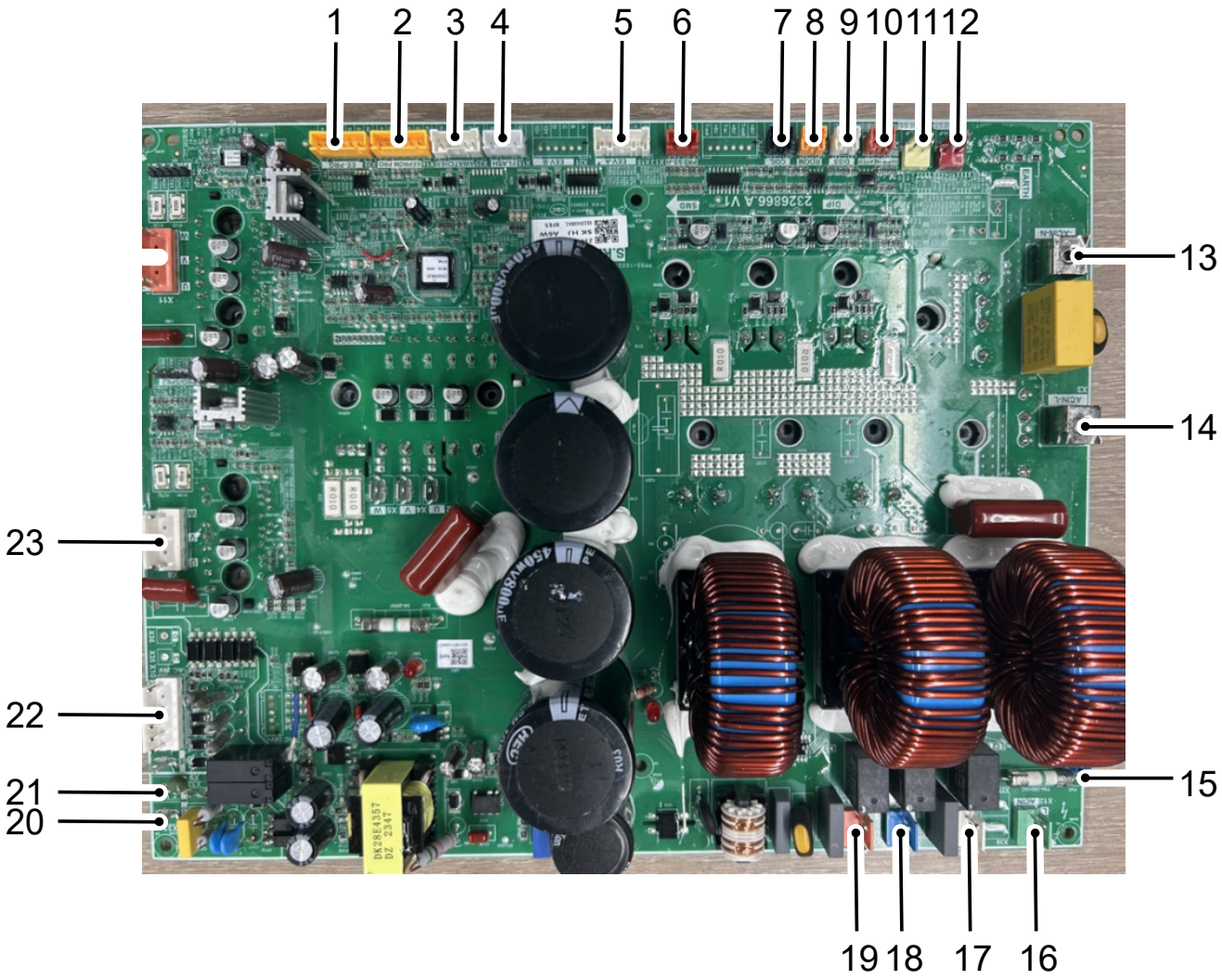


NO.	Description	NO.	Description
		11	Crankcase Heater
2	Overheat Protector	12	4-way Valve
3	Press Sensor	13	Base Heater
4	Coil Temperature Sensor	14	Communication Signal between IDU&ODU
5	EEPROM	15	AC Power Lin / AC Power Nin
6	Discharge Temperature Sensor	16	Rectification Module
7	Ambient Temperature Sensor	17	IGBT
8	Computer/Checker	18	Freewheel Diode
9	Electronic Expansion Valve	19	IPM Module
10	DC Fan Motor	20	Compressor

Figure 608

COMPONENTS TESTING

Outdoor Unit - 36k - 48k BTU Main PCB ID



NO.	Description	NO.	Description
1	EE-PRG	13	N Power input
2	EEPROM PRO	14	L Power input
3	Watcher	15	PTC signal
4	EEPROM Flashing	16	L/N Power input
5	Electronic Expansion Valve	17	Heating Belt Interface
6	Pressure Sensor	18	Base Heater Interface
7	Coil Temperature Sensor	19	4-Way Valve Circuit and Interface
8	Ambient Temperature Sensor	20	TO PAC Indoor
9	Discharge Temperature Sensor	21	24V Communication signal-W
10	Compressor Overheat Protector	22	24V Communication signal-C/G/B/Y1/Y2
11	Low Voltage Switch	23	DC Fan Motor1
12	high voltage switch		

Figure 609

COMPONENTS TESTING

Outdoor Unit - Segment Display Board (Checker Board)



NO.	Description	NO.	Description
1	Computer/Checker to Outdoor Control Board	4	S1-Select Button
2	7-Segment Display	5	S2-Increase Button
3	DIP Switch	6	S3-Decrease Button

Checker Box (Only for 36K)

For 36K, during installation, please connect the Checker box supplied in the accessories to the electrical box as shown in the figure below.

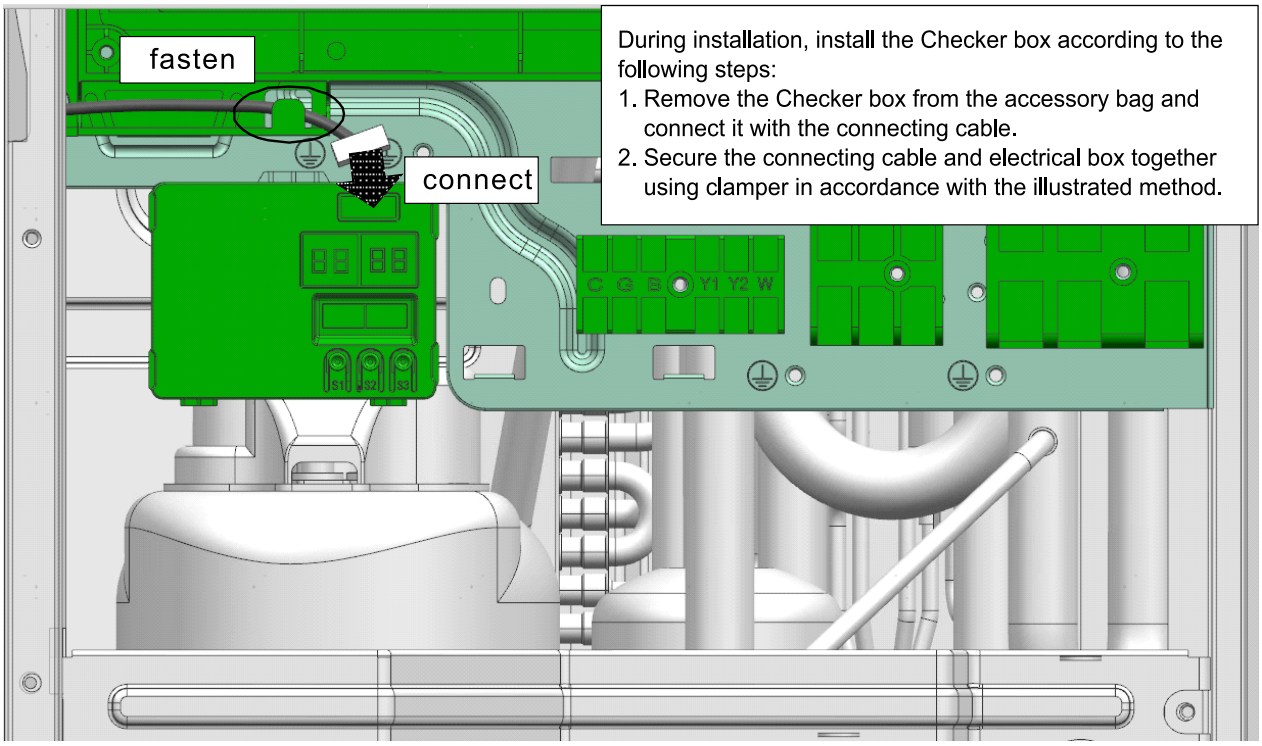
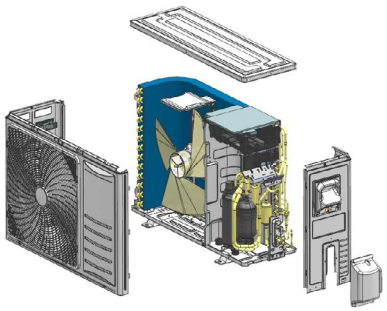
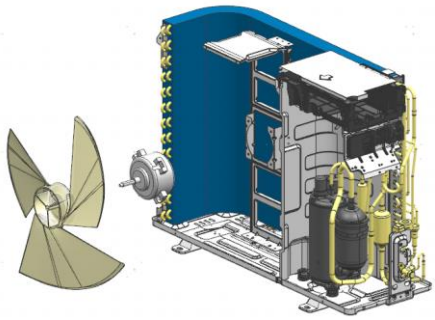
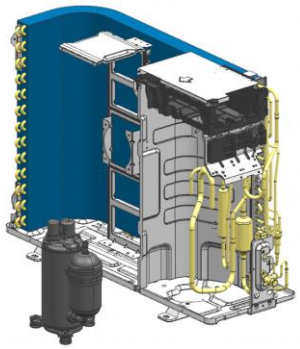
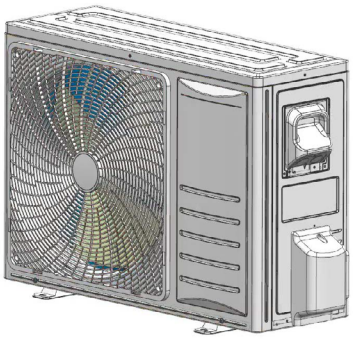


Figure 6

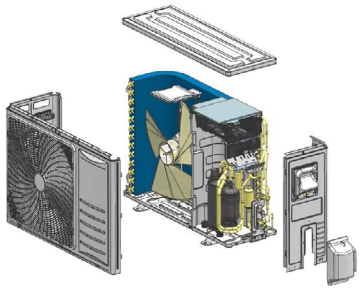
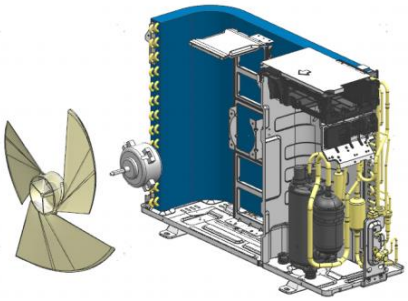
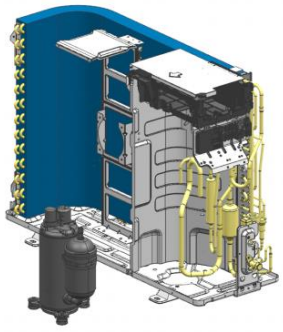
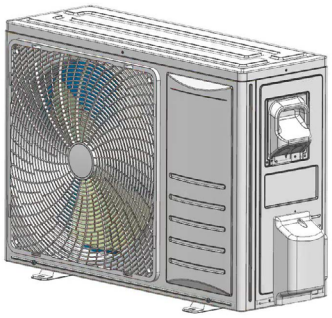
DISASSEMBLY

Outdoor Unit (18k)

Important: Before disassembly and assembly, make sure that the power to the system has been disconnected and verified as voltage free.		
Step	Illustration	Handling Instruction
1.Remove external casing		1.Remove the top cover and handle; 2.Remove the outer case and valve mounting plate.
2.Remove motor		1.Remove the blade nut and then remove the blade; 2.Remove the motor from motor supporter;
3.Remove compressor		1. Unsolder the 4-way valve piping assy from compressor; 2. Remove the compressor mounting bolts; 3. Carefully remove the compressor from chassis.
4.Assemble unit		Assemble the unit in the reverse order of disassembly.

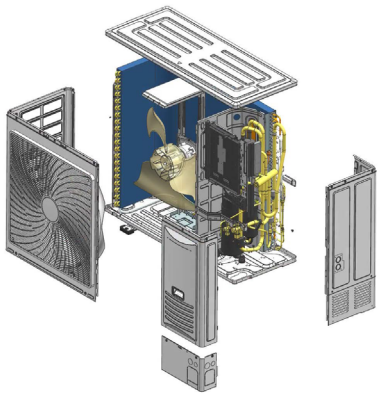
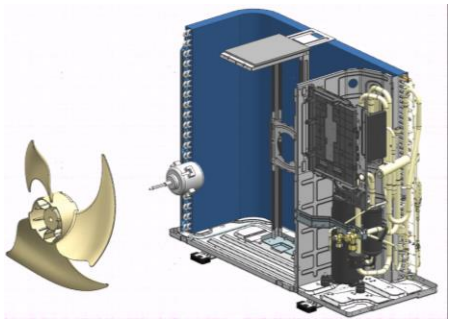
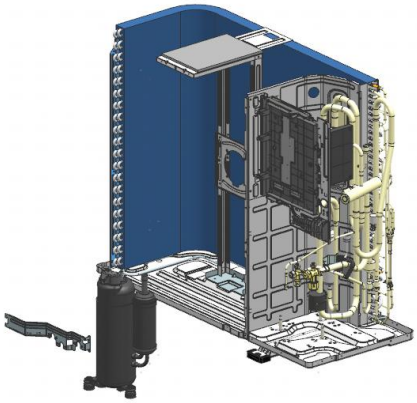
DISASSEMBLY

Outdoor Unit (24k)

Important: Before disassembly and assembly, make sure that the power to the system has been disconnected and verified as voltage free.		
Step	Illustration	Handling Instruction
1.Remove external casing		1.Remove the top cover and handle; 2.Remove the outer case and valve mounting plate.
2.Remove motor		1.Remove the blade nut and then remove the blade; 2.Remove the motor from motor supporter;
3.Remove compressor		1. Remove all refrigerant from system. Refer to Sealed System Repairs. 2. Cut out the 4-way valve piping assy from compressor 3. Remove the compressor mounting bolts; 4. Carefully remove the compressor from chassis.
4.Assemble unit		Assemble the unit in the reverse order of disassembly.

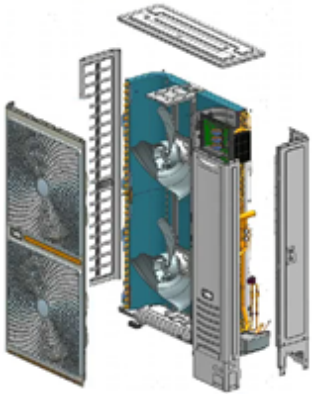
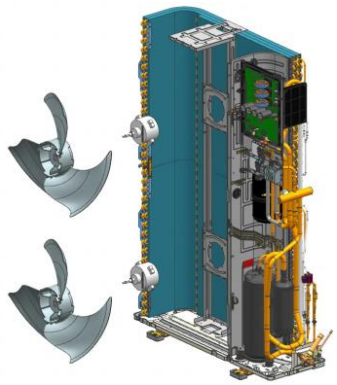
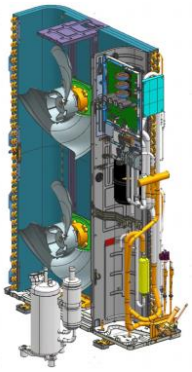
DISASSEMBLY

Outdoor Unit (36k)

Important: Before disassembly and assembly, make sure that the power to the system has been disconnected and verified as voltage free.		
Step	Illustration	Handling Instruction
1.Remove external casing		1.Remove the top cover and handle; 2.Remove the outer case and valve mounting plate.
2.Remove motor		1.Remove the blade nut and then remove the blade; 2.Remove the motor from motor supporter;
3.Remove compressor		1. Remove all refrigerant from system. Refer to Sealed System Repairs. 2. Cut out the 4-way valve piping assy from compressor 3. Remove the compressor mounting bolts; 4. Carefully remove the compressor from chassis.
4.Assemble unit		Assemble the unit in the reverse order of disassembly.

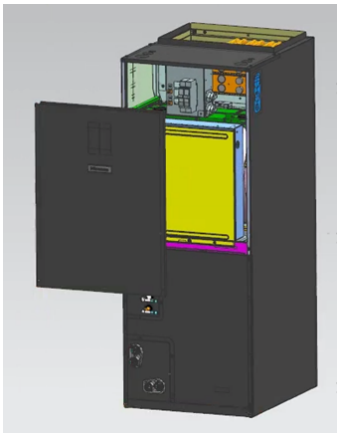
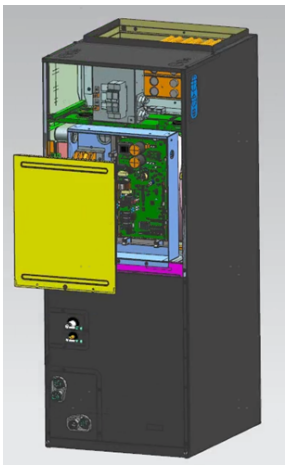
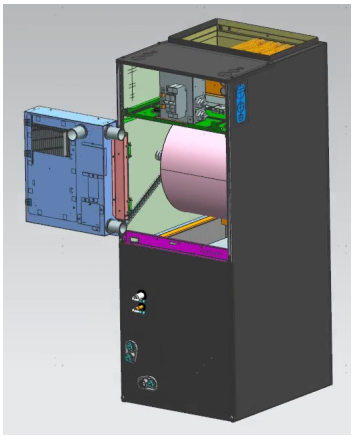
DISASSEMBLY

Outdoor Unit (48k)

Important: Before disassembly and assembly, make sure that the power to the system has been disconnected and verified as voltage free.		
Step	Illustration	Handling Instruction
1.Remove external casing		1.Remove the top cover, handle and valve cover; 2.Remove the outer case and right side plate.
2.Remove motor		1.Remove the blade nut and then remove the blade; 2.Remove the motor from motor supporter
3.Remove compressor		1. Unsolder the 4-way valve piping assy from compressor; 2. Remove the compressor mounting bolts; 3. Carefully remove the compressor from chassis.
4.Assemble unit		Assemble the unit in the reverse order of disassembly.

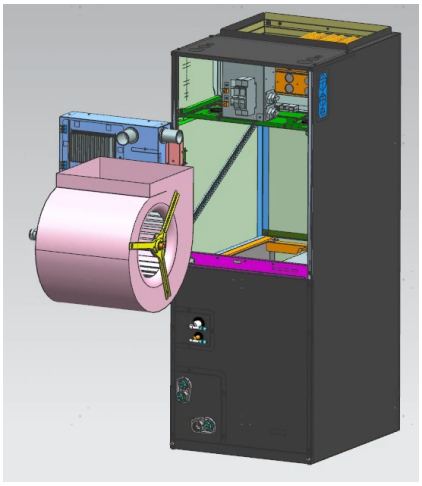
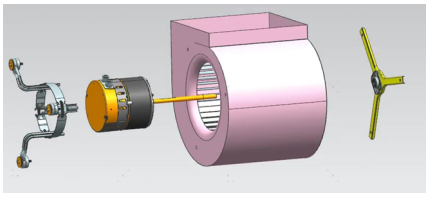
DISASSEMBLY

AHU

Important: Before disassembly and assembly, make sure that the power to the system has been disconnected and verified as voltage free.		
Step	**Illustration**	**Handling Instruction**
1. Remove the upper panel part.		Use a screwdriver to remove the screws that hold the upper panel in place and remove the upper panel parts.
2. Remove the lid of the appliance box		Use a screwdriver to remove the screws that hold the lid of the electrical box and remove the lid of the electrical box.
3. Turn the electrical box parts 180°		Use a screwdriver to remove the screws that fix the parts of the electrical box, and turn the parts of the box by 180°;

DISASSEMBLY

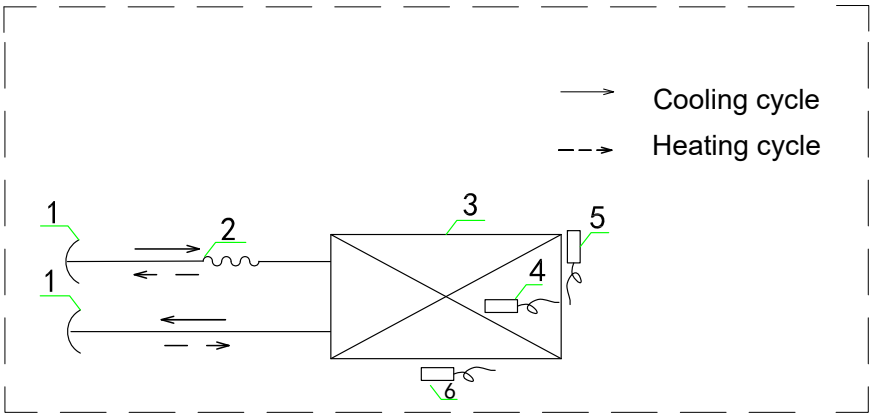
AHU

Important: Before disassembly and assembly, make sure that the power to the system has been disconnected and verified as voltage free.		
Step	**Illustration**	**Handling Instruction**
1. Pull the fan system out of the cabinet		Unplug the motor wire terminals, use a screwdriver to remove the screws that hold the fan volute in place, and pull the fan parts out of the case.
3. Remove the motor and the motor mount.		Use wrench to unscrew three bolts from the side of shell.
4. Reassembly of the unit. Assemble the unit		Reassemble the unit in the reverse order of disassembly and test operation.

R-454B SEALED SYSTEM REPAIR

Refrigerant Cycle

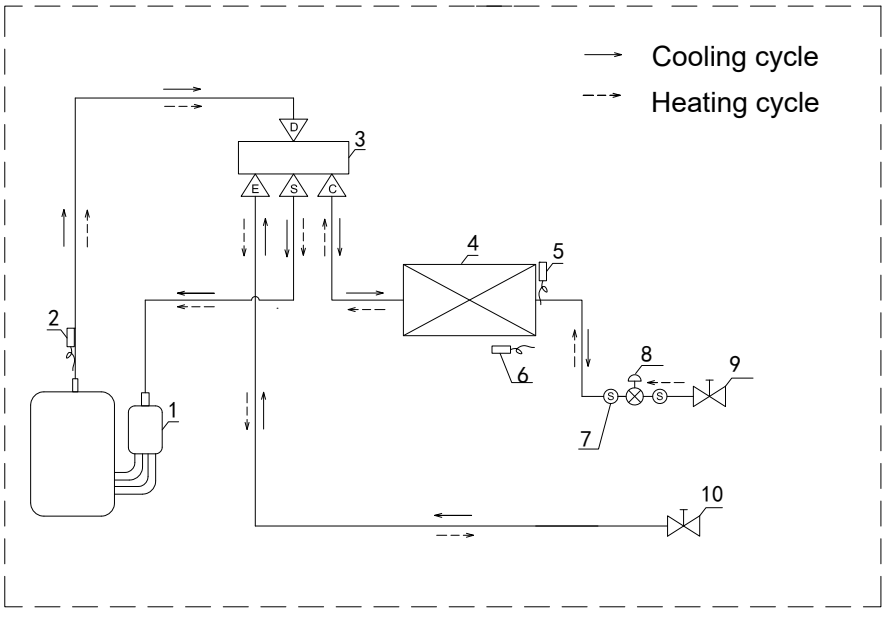
INDOOR UNIT



List of component

No.	Apellation
1	Hexagon nut
2	Split capillary
3	Indoor heat exchanger
4	Coil temperature sensor
5	Ambient temperature sensor
6	Refrigerant leakage sensor

OUTDOOR UNIT



List of component

No.	Apellation
1	Compressor
2	Discharge temperature sensor
3	4-Way valve
4	Outdoor heat exchanger
5	Coil temperature sensor
6	Ambient temperature sensor
7	Strainer
8	Electronic expansion value
9	Stop valve(Liquid)
10	Stop valve(Gas)

Figure 701

R-454B SEALED SYSTEM REPAIR

General Information

⚠WARNING: Electrical Shock Hazard



Disconnect all power to the unit before starting maintenance. All electrical connections and wiring MUST be installed by a qualified electrician and conform to all codes which have jurisdiction. Failure to do so can result in property damage, severe electrical shock or death.

⚠WARNING: This Product uses R-454B Refrigerant

Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.

When not installed, the appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater.

Do not pierce or burn.

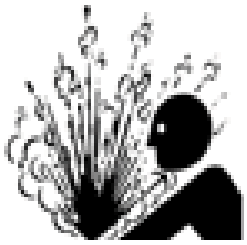
Be aware that refrigerants may not contain an odor.



Refrigerant Safety Group A2L

⚠WARNING: Refrigeration System under High pressure

Do not puncture, heat, expose to flame or incinerate. Only certified refrigeration technicians should service this equipment. R-454B systems operate at higher pressures than R22 equipment. Appropriate safe service and handling practices must be used.



⚠ **Warning:** Prior to beginning work on systems containing FLAMMABLE REFRIGERANTS, safety checks are necessary to ensure that the risk of ignition is minimized.

NOTICE: Individuals working on these units must be EPA 608 Certified along with A2L Refrigerant Training.

⚠ **Warning:** Refrigerant 32 cannot be used as a retrofit for R-410A refrigerant. The mixing of refrigerant across classes is prohibited. R-454B Is not a drop in replacement for R-410A.

General Work Area: All maintenance staff and others working in the installation area shall be instructed on the nature of work being carried out. Work in confined spaces as defined by the Occupational Safety And Health Administration shall be avoided.

⚠ **Warning:** Job site should be examined for safety hazards such as flammable vapors, ignition sources, ventilation and confined spaces. Create a safe perimeter with barriers and signs designating a flammable area.

⚠ **Warning:** Work shall be undertaken under a controlled procedure so as to minimise the risk of a flammable gas or vapor being present while the work is being performed.

Check 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.
- 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:

  1. 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. 2. 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.

  If a leak is suspected, all flame sources shall be removed/extinguished.

  If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system per EPA guidelines.

Presence of fire extinguisher: If any hot work is to be conducted on the refrigerating equipment or any associated parts, a class ABC Rated fire extinguishing equipment shall be available to hand. Have a class ABC Rated fire extinguisher adjacent to the charging area.

R-454B SEALED SYSTEM REPAIR

General Information

⚠ Warning:

No ignition sources: No person carrying out work in relation to a REFRIGERATING 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.

Ventilated Area: Ensure that the area is in the open or that it is adequately ventilated before accessing the refrigerant in the system or conducting any hot work. A mechanical ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant away from the work area or external to building envelope.

During Repairs To Sealed Components: All power must be removed from the equipment being worked on prior to any removal of sealed covers, etc. If it is absolutely necessary to have an electrical supply to equipment during servicing, then a constant leak detector shall be located at the most critical point to warn of a potentially hazardous situation.

Checks And Repairs 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 remove power supply to unit. **DO NOT OPERATE.**
- Initial safety checks shall include:
  - ·Ensure that power has completed dissipated from the unit by checking that all LEDs have gone out on all PCBs.
  - ·That no live electrical components and wiring are exposed while charging, recovering or purging the system;
  - ·Verify unit is properly grounded.
- Particular attention shall be paid to the following to ensure that by working on electrical components, the casing is not altered in such a way that the level of protection is affected. This shall include damage to cables, excessive number of connections, terminals not made to original specification, damage to seals, incorrect fitting of glands, etc.
- Ensure that the apparatus is mounted securely.
- Ensure that seals or sealing materials have not degraded to the point that they no longer serve the purpose of preventing the ingress of flammable atmospheres. Replacement parts shall be in accordance with the manufacturer's specifications.
-

The following is a list of important considerations when working with R-454B equipment:

- R-454B pressure is similar to R-410A and approximately 60% higher than R-22 pressure.
- R-454B cylinders must not be allowed to exceed 125˚F, they may leak or rupture.
- R-454B must never be pressurized with a mixture of compressed air, it may become MORE flammable.
- Servicing equipment and components must be specifically designed for use with R-454B and dedicated to prevent contamination.
- Manifold sets must be equipped with gauges capable of reading 750 psig (high side) and 200 psig (low side), with a 500-psig low-side retard.
- Gauge hoses must have a minimum 750-psig service pressure rating.
- Recovery cylinders must have a minimum service pressure rating of 400 psig, (DOT 4BA400 and DOT BW400 approved cylinders).
- POE (Polyol-Ester) lubricants must be used with R-454B equipment.
- To prevent moisture absorption and lubricant contamination, do not leave the refrigeration system open to the atmosphere for extended periods of time.
- If unit refrigerant is low, recover the refrigerant, evacuate, and recharge unit to nameplate amount.
- Always charge by liquid inverted.

Verify with tool manufacturers that all tools used during this repair are non-sparking and can be used with A2L Refrigerants.
No halide torches for leak testing.
Refrigerant monitors or detectors must be used to detect refrigerant in the work area.

- R-454B A2L Refrigerant Recovery System.
- Vacuum Pump rated for A2L refrigerant (capable of 300 microns or less vacuum.)
- Nitrogen bottle with purging and pressurizing capabilities up to 550 psi.
- Oxy/ Acetylene torch or similar equipment utilized for brazing.
- Non-Sparking (Not Halide)Electronic Leak Detector rated for detecting A2L refrigerant.
- Digital refrigerant scale
- Refrigeration Gauges rated for A2L Refrigerants with temp scales for R-454B refrigerant.
- Gauge Manifold (Right handed threads).
- A2L compatible Vacuum Gauge capable of 300 microns or less.
- Nitrogen regulator for purging and testing, rated to 800 psi. (Capable of low psi flow)
- Pipe tubing cutter.
- Refrigerant recovery cylinder. (Flammable A2L label)
- Ventilation fan.
- Class ABC fire extinguisher.
- Recovery access tool.
- Purge hose fittings

R-454B SEALED SYSTEM REPAIR

Required Equipment



ABC Fire Extinguisher



Recovery Machine



Vaccum Pump



Nitrogen



Guage Manifold



Nitrogen Regulator



Vaccum Guage

R-454B SEALED SYSTEM REPAIR

Refrigerant Removal, Recovery, and Evacuation

NOTE: When accessing the refrigerant in the system to make repairs or for any other purpose, conventional procedures shall be used. However, for FLAMMABLE REFRIGERANTS (R-454B is classified in the A2L group for mildly flammable refrigerants) it is important that best practice is followed since flammability is a consideration. Follow all EPA 608 regulations and procedures along with AHRI 15 Best Practices for A2L refrigerants.

⚠ **Warning:** Ensure sufficient ventilation at the repair place.

⚠ **Warning:** Ensure there are no open flame sources or hot surfaces that exceed 1200˚F in the work area.

⚠ **Warning: DO NOT** Discharge capacitors. The standard procedure to short circuit the capacitor terminals usually creates sparks.

NOTICE: Ensure that the following precautions are taken prior to opening the sealed system.

- Verify Recovery machine is rated for A2L refrigerants.
- Mark the Job site inspection area as flammable work zone using appropriate signs.
- Utilize a Refrigerant leak detector or refrigerant monitor to sense the area for the presence of refrigerants.
- Disconnect all power supply to unit.
- Properly ground all equipment and hoses along with tank to prevent a static build up .
- Ensure adequate ventilation is provided for the job site.
- Do not mix A2L refrigerant Gages and hoses with other refrigerants.
- Keep exposure of refrigerant to Air to as minimum as possible (creates a dangerous condition).
- Under no circumstances is the mixing of refrigerants in the recovery cylinders allowed and should be strictly avoided at all times. Do not introduce oxygen into any recovery cylinders.
- Verify power is removed from the unit by checking that LEDs on PCBs have gone out.

1. Recover refrigerant to EPA sec. 608 standards. If a low charge is suspected weigh recovered refrigerant and compare to unit nameplate. Refer to Figure G.3

NOTE: DO NOT RECOVER TO A VACUUM PRIOR TO FLUSHING WITH NITROGEN. STOP RECOVERY AT 0-5 PSI.

3. Purge system with dry nitrogen.(3-5 minutes).

4. Perform an evacuation to 500 microns and break vacuum with Dry Nitrogen.
5. Re-purge the unit for 3-5 minutes or until the nitrogen flows out both process tubes.
6. Re-evacuate unit to 500 microns and break vacuum with Dry Nitrogen.
8. Open the refrigerant circuit by cutting out components.

Transportation

Be aware that local, state, and national codes exist that regulate the transportation of flammable gases. Be sure to become informed of the regulations and always stay compliant.

R-454B SEALED SYSTEM REPAIR

Component Replacement/Brazing

Warning: Ensure sufficient ventilation at the repair place.

Warning: Presence of fire extinguisher. If any hot work is to be conducted on the refrigerating equipment or any associated parts, have a ABC class fire extinguisher available to hand.

Warning: No person carrying out work in relation to a REFRIGERATING 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.

Warning: Ensure there are no open flame sources or hot surfaces that exceed 1200˚F in the work area.

NOTE: When brazing is required, the following procedures shall be carried out in the right order:

1. Remove and recover refrigerant, and evacuate the system. Refer to the refrigerant removal, recovery, and evacuation section of this manual.

Warning: 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.
2. Perform a check of the work area for the presence of flammable refrigerant prior to brazing or performing any hot work. Use a non-Sparking (Not Halide) A2L certified Electronic Leak Detector rated for detecting R-454B refrigerant.
3. Re-pipe all repairs and install all components to sealed system.

4. Purge nitrogen through the unit. at approximately 3-5 CF/H psi through the duration of the brazing process. (Nitrogen must be purging through the unit while any brazing is being performed.)
5. Pressure test unit to 550 psi minimum and hold pressure for 30 minutes minimum. Inspect for any leaks with a leak detection fluid and repair as required. Repeat as required until system passes leak test.
6. Triple evacuate the unit to achieve a 500 micron level.
7. Reassemble sealed enclosures accurately. If seals are worn, replace them.
8. Charge the system with the amount of refrigerant specified on the model nameplate. Refer to the refrigerant charging section of this manual for charging procedures.

R-454B SEALED SYSTEM REPAIRS

Refrigerant Charging

⚠WARNING: Electrical Shock Hazard



Disconnect all power to the unit before starting maintenance. All electrical connections and wiring MUST be installed by a qualified electrician and conform to all codes which have jurisdiction. Failure to do so can result in property damage, severe electrical shock or death.

⚠WARNING: This Product uses R-454B Refrigerant





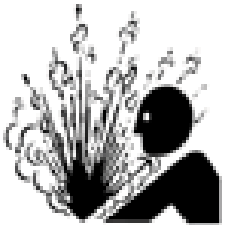
Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.

When not installed, the appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater.

Do not pierce or burn.

Be aware that refrigerants may not contain an odor.

⚠WARNING: Refrigeration System under High pressure



Do not puncture, heat, expose to flame or incinerate. Only certified refrigeration technicians should service this equipment. R-454B systems operate at higher pressures than R22 equipment. Appropriate safe service and handling practices must be used.

⚠WARNING: Freeze Hazard



Proper safety procedures must be followed, and all PPE must be utilized when working with liquid refrigerant. Failure to comply could result in minor to moderate injury.

NOTE: Always weigh in refrigerant based on the model nameplate.

⚠Warning:

- Ensure that contamination of different refrigerants does not occur when using charging equipment.
- Hoses or lines shall be as short as possible to minimise the amount of refrigerant contained in them.
- Charge unit with refrigerant cylinder in the inverted position to obtain liquid refrigerant.
- Charge the unit according to the amount on the name plate matching the unit.
- Extreme care shall be taken not to overfill the REFRIGERATING SYSTEM.
- Prior to recharging a system, it shall be pressure-tested with the dry nitrogen.

The acceptable method for charging the sealed system is the Weighed in Charge Method. The weighed in charge method is applicable to all units. It is the preferred method to use, as it is the most accurate.

The weighed in method should always be used whenever a charge is removed from a unit such as for a leak repair, compressor replacement, or when there is no refrigerant charge left in the unit. To charge by this method, requires the following steps:

- ⚠**Warning:** Ensure sufficient ventilation at the repair place.

⚠**Warning:** Ensure there are no open flame sources or hot surfaces that exceed 1200˚F in the work area.

1. Recover Refrigerant in accordance with EPA regulations. (Refer to Refrigerant Removal, Recovery, and Evacuation Section).

NOTE: If a low charge is suspected weigh recovered refrigerant and compare to unit nameplate.
NOTE: Service ports are located on the side of the unit. See figure G.3.

2. Weigh in the refrigerant charge with the proper quantity of R-454B refrigerant per model nameplate.

3. Perform triple evacuation.

R-454B SEALED SYSTEM REPAIRS

Refrigerant Charging

Triple Evacuation

Friedrich requires all installations are Leak Checked and Evacuated in accordance to the "triple evacuation" process. This process promotes a dry tight refrigeration system before opening the service valves. It recommended that a single port refrigeration manifold and hoses rated over 31.5 psi be used. Refrigeration hose valves, along with a vacuum pump and micron gauge, must be used to ensure the system can be vacuumed and held under 500 microns. Check all equipment and hoses for proper usage and leaks before beginning.

1. 1st Nitrogen Pressure Test:
Ensure all refrigeration connections are properly flared, secured, and torqued to their respective settings.
Pressurize the system with nitrogen to 550 psi. Soap all connections with an approved refrigerant leak detection solution.
The pressure in the system must hold for one hour respective to the environmental conditions and should not drop more than 10 psi. If pressure can not be adequately held, check integrity of flares and torque specifications. Once pressure is held adequately, purge the nitrogen charge to system pressure of 5-10 psi. DO NOT RETURN TO ATMOSPHERIC PRESSURE.
2. 1st Vacuum Micron Test:
Connect hoses and vacuum pump to the outdoor unit as shown in Fig. 436. Start the vacuum pump and vacuum to 1000 microns. Close the valve to the vacuum pump and check for micron rise for 15 minutes. If microns rise to near atmospheric pressure, there is a potential leak; repeat step 1. If microns rise over 5000, the system is very wet and will require further nitrogen purges.
3. 2nd Nitrogen Break:
Once the system holds below 5000 microns, reconnect the nitrogen tank break the system vacuum with 30-50 psi of nitrogen. Wait 5 minutes, then purge to 5-10 psi. DO NOT RETURN TO ATMOSPHERIC PRESSURE.
4. 2nd Vacuum Micron Test:
Reconnect vacuum pump and gauge and begin evacuation. Vacuum system to 500 microns. Close vacuum valve and check for micron rise. Vacuum should hold under 1000 microns. Repeat steps 3 and 4 until achieved.
5. 3rd Nitrogen Break:
Once the system holds below 1000 microns, reconnect the nitrogen tank break the system vacuum with 30-50 psi of nitrogen. Wait 5 minutes, then purge to 5-10 psi. DO NOT RETURN TO ATMOSPHERIC PRESSURE.
6. 3rd Final Vacuum Micron Test:
Reconnect vacuum pump and gauge and begin evacuation. Vacuum system to 300 microns. Close vacuum valve and check for micron rise. Vacuum should hold under 500 microns. Repeat steps 3 and 4 until achieved. Once held under 500 microns, the system is considered dry and tight.
7. Charging the system:
Unscrew Service Valve Caps to expose the inner hexagon head. Use an allen-head spanner or service wrench with appropriate adapter to release the refrigerant into the system. If the calculated line set length is over 25 ft, weight in the additional charge with an approved refrigerant scale as needed. Refer to installation section of this manual.

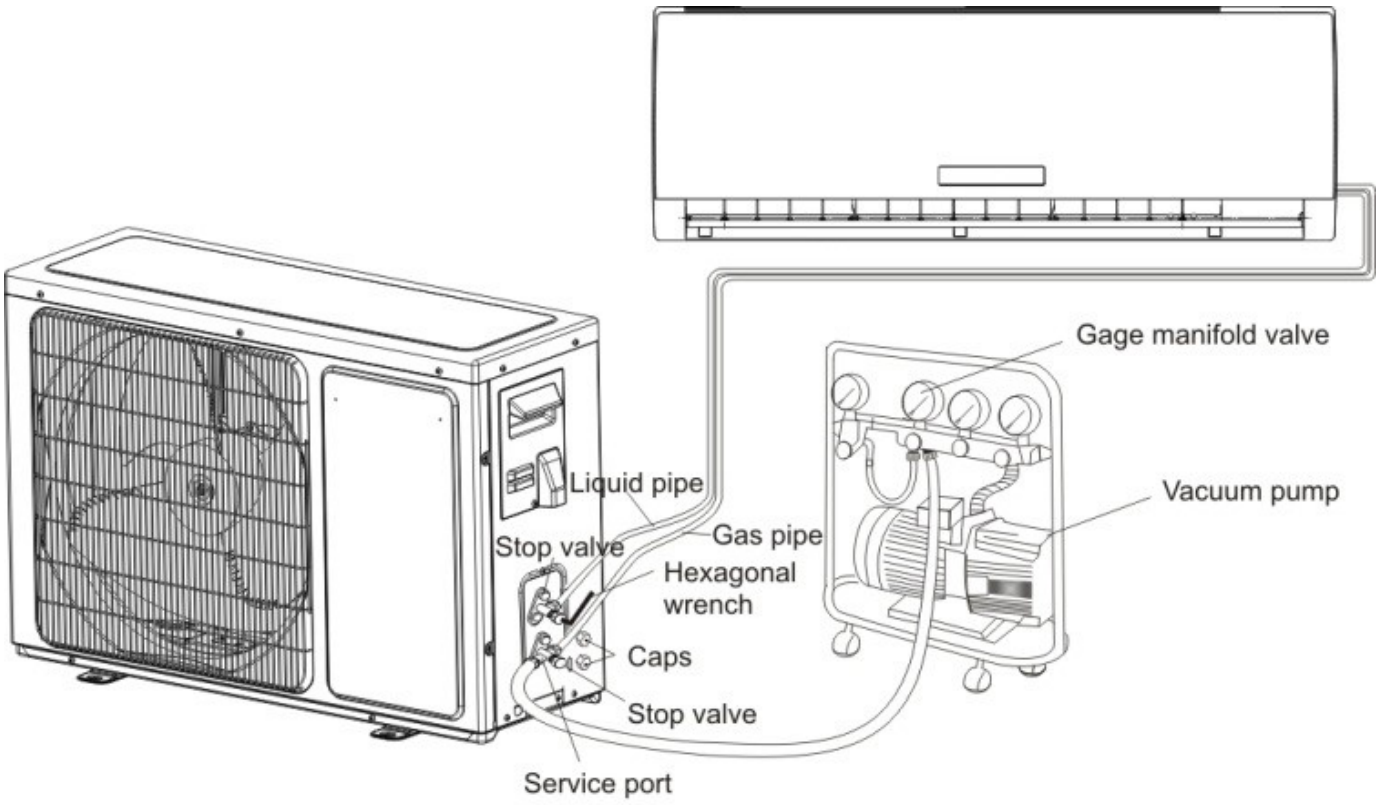


Figure 705

R-454B SEALED SYSTEM REPAIRS

Compressor Replacement

⚠ WARNING



ELECTRIC SHOCK HAZARD
Turn off electric power before service or installation. Extreme care must be used, if it becomes necessary to work on equipment with power applied.

Failure to do so could result in serious injury or death.

⚠ WARNING



HIGH PRESSURE HAZARD
Sealed Refrigeration System contains refrigerant and oil under high pressure.

Proper safety procedures must be followed, and PPE must be utilized
when working with refrigerants.

Failure to follow these procedures could result in serious injury or death.

⚠ WARNING



EXPLOSION HAZARD
The use of nitrogen requires a pressure regulator. Follow all safety procedures and wear protective safety clothing etc.

Failure to follow proper safety procedures could result in serious injury or death.

⚠ CAUTION



FREEZE HAZARD
Proper safety procedures must be followed, and proper protective clothing must be worn when working with liquid refrigerant.

Failure to follow these procedures could result in minor to moderate injury.

⚠ WARNING



NEVER, under any circumstances, liquid charge a rotary-compressor through the LOW side. Doing so would cause permanent damage to the new compressor. Use a charging adapter.

1. Be certain to perform all necessary electrical and refrigeration tests to be sure the compressor is actually defective before replacing.

2. Recover all refrigerant from the system though the service valves. Refer to Refrigerant Removal, Recovery, and Evacuation Section of this manual).

PROPER HANDLING OF RECOVERED REFRIGERANT ACCORDING TO EPA REGULATIONS IS REQUIRED.

3. After all refrigerant has been recovered, cut and remove compressor. Be certain to have both suction and discharge process tubes open to atmosphere.

4. Install the replacement compressor.

CAUTION: Seal all openings on the defective compressor immediately. Compressor manufacturers will void warranties on units received not properly sealed. Do not distort the manufacturers tube connections.

5. Braze all connections. Refer to the Component Replacement/Brazing section of this manual.

6. Charge system with proper amount of refrigerant per the model nameplate. Refer to the Refrigerant charging section of this manual.

R-454B SEALED SYSTEM REPAIR

Replace The Reversing Valve

⚠ WARNING



HIGH PRESSURE HAZARD

Sealed Refrigeration System contains refrigerant and oil under high pressure.

Proper safety procedures must be followed, and PPE must be utilized when working with refrigerants.

Failure to follow these procedures could result in serious injury or death.

⚠ WARNING



EXPLOSION HAZARD

The use of nitrogen requires a pressure regulator. Follow all safety procedures and wear protective safety clothing etc.

Failure to follow proper safety procedures could result in serious injury or death.

NOTICE

FIRE HAZARD

The use of a torch requires extreme care and proper judgment. Follow all safety recommended precautions and protect surrounding areas with fire proof materials. Have a fire extinguisher readily available. Failure to follow this notice could result in moderate to serious property damage.

1. Recover all refrigerant from the system though the service valves. Refer to Refrigerant Removal, Recovery, and Evacuation Section of this manual).

PROPER HANDLING OF RECOVERED REFRIGERANT ACCORDING TO EPA REGULATIONS IS REQUIRED.

2. Remove solenoid coil from reversing valve. If coil is to be reused, protect from heat while changing valve.

NOTE: When brazing a reversing valve into the system, it is of extreme importance that the temperature of the valve does not exceed 250°F at any time.

Wrap the reversing valve with a large rag saturated with water. "Re-wet" the rag and thoroughly cool the valve after each brazing operation of the four joints involved.

The wet rag around the reversing valve will eliminate conduction of heat to the valve body when brazing the line connection.

3. Cut all lines from reversing valve. Refer to the Brazing section of this manual.

4. Clean all excess braze from all tubing so that they will slip into fittings on new valve.

5. Remove solenoid coil from new valve.

6. Protect new valve body from heat while brazing with plastic heat sink (Thermo Trap) or wrap valve body with wet rag.

7. Fit all lines into new valve and braze lines into new valve.

8. Braze all connections. Refer to the Brazing section of this manual.

9. Pressurize with nitrogen to 550 psi and leak test all connections with a leak detection fluid. Repair any leaks found.

10. Once the sealed system is leak free, install solenoid coil on new valve.

11. Charge system with proper amount of refrigerant per the model nameplate. Refer to the refrigerant charging section of this manual.

WIRING DIAGRAMS

AHU 18K-48K BTU

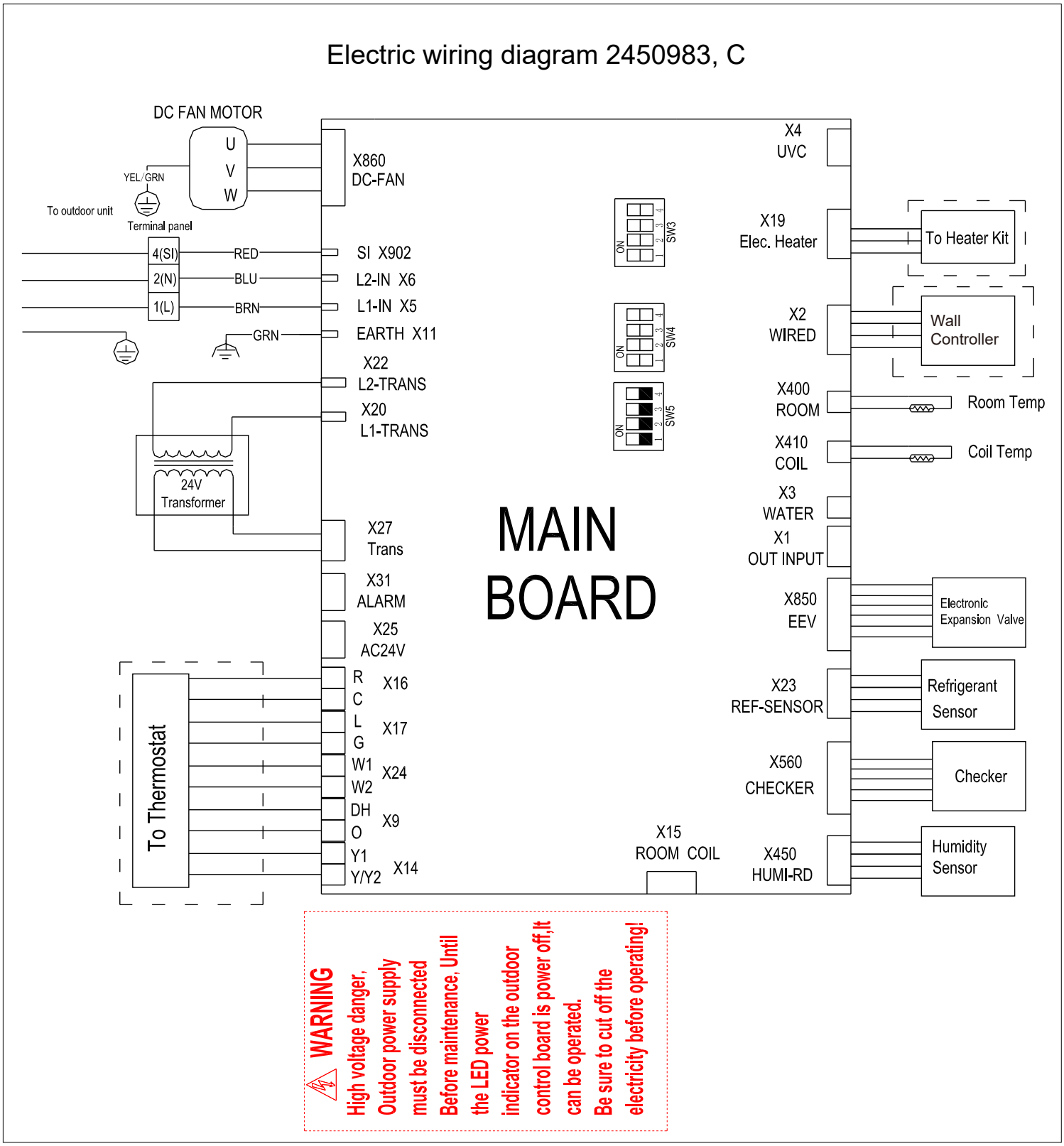
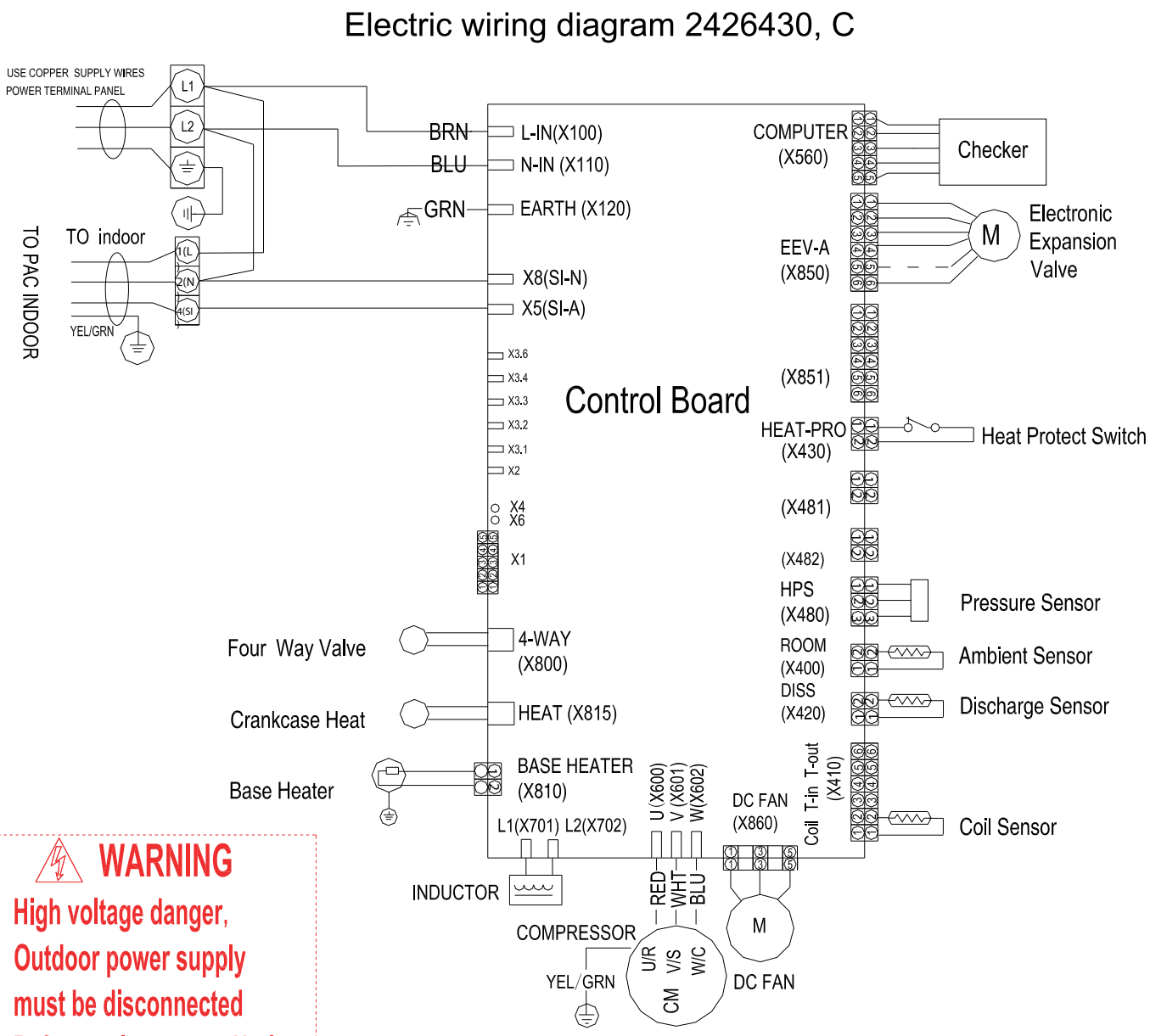


Figure 801

WIRING DIAGRAMS

Outdoor Unit 24k BTU



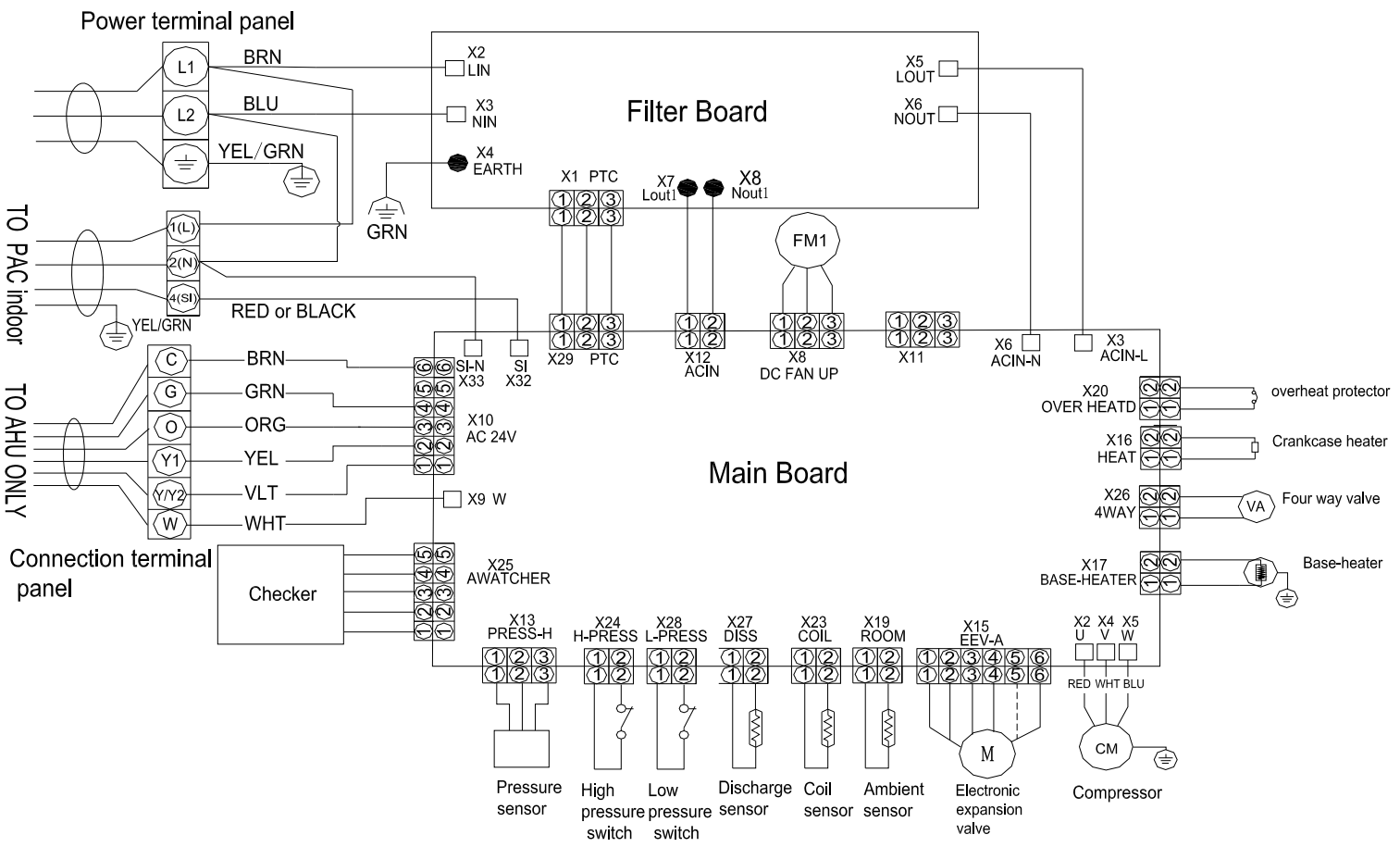
WARNING

High voltage danger,
Outdoor power supply must be disconnected Before maintenance, Until the LED power indicator on the outdoor control board is power off,It can be operated.
Be sure to cut off the electricity before operating!

WIRING DIAGRAMS

Outdoor Unit 36k and 48k BTU

Electric wiring diagram 2414330.E



WARNING

High voltage danger,
Outdoor power supply must be disconnected Before maintenance, Until the LED power indicator on the outdoor control board is power off,It can be operated.
Be sure to cut off the electricity before operating!

APPENDIX

Interactive Parts Viewer

All Friedrich Service Parts can be found on our online interactive parts viewer.

Please click on the link below:

Interactive Parts Viewer

For Further Assistance contact Friedrich customer service at **(1-800-541-6645)**.

Limited Warranty

Current warranty information can be obtained by referring to https://www.friedrich.com/professional/support/product-resources

APPENDIX

Compressor Discharge Temp Sensor Resistance Values

4.3 Sensor Parameter

1. THE PARAMETER OF OUTDOOR COMPRESSOR DISCHARGE TEMPERATURE SENSOR:

R_0=187.25K±6.3% R_{100}=3.77K±2.5% B0/100=3979K±1%

T [°C]	T [°F]	Rmin [KΩ]	Rnom [KΩ]	Rmax [KΩ]	DR(MIN)%	DR(MAX)%
-30	-22	908.2603	985.5274	1065.121	-7.84	7.47
-29	-20.2	855.3955	927.6043	1001.915	-7.78	7.42
-28	-18.4	805.9244	873.4324	924.8368	-7.73	5.56
-27	-16.6	759.6097	822.7471	887.5944	-7.67	7.31
-26	-14.8	716.232	775.3041	835.9165	-7.62	7.25
-25	-13	675.5881	730.8775	787.5529	-7.56	7.2
-24	-11.2	637.4902	689.2583	742.272	-7.51	7.14
-23	-9.4	601.7645	650.2533	699.8601	-7.46	7.09
-22	-7.6	568.2499	613.6835	660.1191	-7.4	7.03
-21	-5.8	536.797	579.3832	622.8658	-7.35	6.98
-20	-4	507.2676	547.1989	587.9307	-7.3	6.93
-19	-2.2	497.5332	516.9882	555.1565	-3.76	6.88
-18	-0.4	453.4748	488.6192	524.3977	-7.19	6.82
-17	1.4	428.9819	461.9693	495.5191	-7.14	6.77
-16	3.2	405.9517	436.9251	486.3954	-7.09	10.17
-15	5	384.2888	413.3808	442.9105	-7.04	6.67
-14	6.8	363.9047	391.2386	418.9563	-6.99	6.62
-13	8.6	344.7169	370.4072	396.4325	-6.94	6.56
-12	10.4	326.6497	350.8019	375.2461	-6.88	6.51
-11	12.2	309.6286	332.3441	355.3104	-6.83	6.46
-10	14	293.5903	314.962	336.5448	-6.79	6.41
-9	15.8	278.4719	298.5822	318.3744	-6.74	6.22
-8	17.6	264.2156	283.1464	302.2294	-6.69	6.31
-7	19.4	250.7678	268.5936	286.5448	-6.64	6.26
-6	21.2	238.0783	254.8686	271.7603	-6.59	6.22
-5	23	226.1003	241.92	257.8193	-6.54	6.17
-4	24.8	214.7903	229.6997	244.6593	-6.49	6.11
-3	26.6	204.1073	218.163	232.2612	-6.44	6.07
-2	28.4	194.0135	207.2681	220.5495	-6.39	6.02
-1	30.2	184.4732	196.9759	209.4913	-6.35	5.97
0	32	175.4533	187.25	199.0468	-6.3	5.93
1	33.8	166.8952	178.0255	189.1529	-6.25	5.88
2	35.6	158.8023	169.3067	179.8058	-6.2	5.84
3	37.4	151.1467	161.0633	170.9724	-6.16	5.8
4	39.2	143.9026	153.2667	162.6216	-6.11	5.75
5	41	137.0455	145.8905	154.7246	-6.06	5.71
6	42.8	130.5528	138.9097	147.2544	-6.02	5.67
7	44.6	124.4033	132.3011	140.1856	-5.97	5.62
8	46.4	118.5769	126.0429	133.4946	-5.92	5.58
9	48.2	113.055	120.1146	127.1591	-5.88	5.54
10	50	107.8202	114.4973	121.1586	-5.83	5.5
11	51.8	102.856	109.1728	115.4734	-5.79	5.46
12	53.6	98.147	104.1246	110.0855	-5.74	5.41
13	55.4	93.6787	99.3367	104.9778	-5.7	5.37
14	57.2	89.4378	94.7946	100.1342	-5.65	5.33
15	59	85.4114	90.4842	95.5398	-5.61	5.29

APPENDIX

Compressor Discharge Temp Sensor Resistance Values

4.3 Sensor Parameter

1. THE PARAMETER OF OUTDOOR COMPRESSOR DISCHARGE TEMPERATURE SENSOR:

R_0=187.25K±6.3% R_{100}=3.77K±2.5% B0/100=3979K±1%

T [°C]	T [°F]	Rmin [KΩ]	Rnom [KΩ]	Rmax [KΩ]	DR(MIN)%	DR(MAX)%
16	60.8	81.5875	86.3926	91.1805	-5.56	5.25
17	62.6	77.9551	82.5076	87.043	-5.52	5.21
18	64.4	74.5034	78.8177	83.115	-5.47	5.17
19	66.2	71.2227	75.3122	79.3848	-5.43	5.13
20	68	68.1036	71.9808	75.8414	-5.39	5.09
21	69.8	65.1373	68.8141	72.4746	-5.34	5.05
22	71.6	62.3155	65.8032	69.2746	-5.3	5.01
23	73.4	59.6306	62.9395	66.2324	-5.26	4.97
24	75.2	57.0752	60.2152	63.3395	-5.21	4.93
25	77	54.6424	57.6227	60.5877	-5.17	4.89
26	78.8	52.3258	55.1551	57.9695	-5.13	4.85
27	80.6	50.1192	52.8058	55.4778	-5.09	4.82
28	82.4	48.0168	50.5684	53.1058	-5.05	4.78
29	84.2	46.0133	48.4371	50.8472	-5	4.74
30	86	44.1034	46.4046	48.696	-4.96	4.71
31	87.8	42.2825	44.4711	46.6466	-4.92	4.66
32	89.6	40.5458	42.6261	44.6937	-4.88	4.63
33	91.4	38.8891	40.8668	42.8323	-4.84	4.59
34	93.2	37.3084	39.189	41.0576	-4.8	4.55
35	95	35.7998	37.5883	39.3653	-4.76	4.51
36	96.8	34.3596	36.0609	37.7511	-4.72	4.48
37	98.6	32.9844	34.603	36.2109	-4.68	4.44
38	100.4	31.671	33.2113	34.7412	-4.64	4.4
39	102.2	30.4164	31.8823	33.3383	-4.6	4.37
40	104	29.2176	30.613	31.9988	-4.56	4.33
41	105.8	28.0718	29.4004	30.7197	-4.52	4.29
42	107.6	26.9765	28.2417	29.4979	-4.48	4.26
43	109.4	25.9293	27.1342	28.3306	-4.44	4.22
44	111.2	24.9277	26.0755	27.215	-4.4	4.19
45	113	23.9697	25.0632	26.1488	-4.36	4.15
46	114.8	23.053	24.095	25.1293	-4.32	4.12
47	116.6	22.1757	23.1688	24.1545	-4.29	4.08
48	118.4	21.336	22.2826	23.2221	-4.25	4.05
49	120.2	20.5321	21.4345	22.3301	-4.21	4.01
50	122	19.7623	20.6226	21.4766	-4.17	3.98
51	123.8	19.0261	19.8468	20.6612	-4.14	3.94
52	125.6	18.3211	19.104	19.8808	-4.1	3.91
53	127.4	17.6458	18.3926	19.1338	-4.06	3.87
54	129.2	16.9986	17.7113	18.4185	-4.02	3.84
55	131	16.3784	17.0537	17.7335	-3.96	3.83
56	132.8	15.7839	16.4332	17.0774	-3.95	3.77
57	134.6	15.2139	15.8338	16.4488	-3.92	3.74
58	136.4	14.6673	15.2592	15.8464	-3.88	3.71
59	138.2	14.143	14.7083	15.269	-3.84	3.67
60	140	13.64	14.1799	14.7154	-3.81	3.64

APPENDIX

Compressor Discharge Temp Sensor Resistance Values

4.3 Sensor Parameter

1. THE PARAMETER OF OUTDOOR COMPRESSOR DISCHARGE TEMPERATURE SENSOR:

R_0=187.25K±6.3% R_{100}=3.77K±2.5% B0/100=3979K±1%

T [°C]	T [°F]	Rmin [KΩ]	Rnom [KΩ]	Rmax [KΩ]	DR(MIN)%	DR(MAX)%
61	141.8	13.1573	13.673	14.1846	-3.77	3.61
62	143.6	12.6941	13.1868	13.6756	-3.74	3.57
63	145.4	12.2494	12.7202	13.1872	-3.7	3.54
64	147.2	11.8224	12.2723	12.7186	-3.67	3.51
65	149	11.4124	11.8424	12.269	-3.63	3.48
66	150.8	11.0185	11.4295	11.8373	-3.6	3.45
67	152.6	10.6401	11.0331	11.423	-3.56	3.41
68	154.4	10.2765	10.6522	11.0251	-3.53	3.38
69	156.2	9.9271	10.2863	10.6429	-3.49	3.35
70	158	9.5912	9.9348	10.2756	-3.46	3.32
71	159.8	9.2682	9.5968	9.9231	-3.42	3.29
72	161.6	8.9576	9.272	9.5841	-3.39	3.26
73	163.4	8.6589	8.9597	9.2583	-3.36	3.23
74	165.2	8.3716	8.6594	8.9451	-3.32	3.19
75	167	8.1	8.4	8.6	-3.3	3.2
76	168.8	7.8	8.1	8.4	-3.3	3.1
77	170.6	7.6	7.8	8.1	-3.2	3.1
78	172.4	7.3	7.6	7.8	-3.2	3.1
79	174.2	7.1	7.3	7.5	-3.2	3.0
80	176	6.9	7.1	7.3	-3.1	3.0
81	177.8	6.6	6.9	7.1	-3.1	3.0
82	179.6	6.4	6.6	6.8	-3.1	3.0
83	181.4	6.2	6.4	6.6	-3.0	2.9
84	183.2	6.0	6.2	6.4	-3.0	2.9
85	185	5.8	6.0	6.2	-3.0	2.9
86	186.8	5.7	5.8	6.0	-2.9	2.8
87	188.6	5.5	5.6	5.8	-2.9	2.8
88	190.4	5.3	5.5	5.6	-2.9	2.8
89	192.2	5.1	5.3	5.4	-2.8	2.8
90	194	5.0	5.1	5.3	-2.8	2.7
91	195.8	4.8	5.0	5.1	-2.8	2.7
92	197.6	4.7	4.8	4.9	-2.7	2.7
93	199.4	4.5	4.7	4.8	-2.7	2.6
94	201.2	4.4	4.5	4.6	-2.7	2.6
95	203	4.3	4.4	4.5	-2.7	2.6
96	204.8	4.1	4.3	4.4	-2.6	2.6
97	206.6	4.0	4.1	4.2	-2.6	2.5
98	208.4	3.9	4.0	4.1	-2.6	2.5
99	210.2	3.8	3.9	4.0	-2.5	2.5
100	212	3.7	3.8	3.9	-2.5	2.4
101	213.8	3.6	3.7	3.8	-2.5	2.5
102	215.6	3.5	3.6	3.6	-2.6	2.5
103	217.4	3.4	3.4	3.5	-2.6	2.5
104	219.2	3.3	3.3	3.4	-2.6	2.6
105	221	3.2	3.2	3.3	-2.6	2.6
106	222.8	3.1	3.2	3.2	-2.7	2.6

APPENDIX

Compressor Discharge Temp Sensor Resistance Values

4.3 Sensor Parameter

1. THE PARAMETER OF OUTDOOR COMPRESSOR DISCHARGE TEMPERATURE SENSOR:

R_0=187.25K±6.3% R_{100}=3.77K±2.5% B0/100=3979K±1%

T [°C]	T [°F]	Rmin [KΩ]	Rnom [KΩ]	Rmax [KΩ]	DR(MIN)%	DR(MAX)%
107	224.6	3.0	3.1	3.1	-2.7	2.6
108	226.4	2.9	3.0	3.1	-2.7	2.7
109	228.2	2.8	2.9	3.0	-2.8	2.7
110	230	2.7	2.8	2.9	-2.8	2.7
111	231.8	2.7	2.7	2.8	-2.8	2.8
112	233.6	2.6	2.7	2.7	-2.8	2.8
113	235.4	2.5	2.6	2.7	-2.9	2.8
114	237.2	2.4	2.5	2.6	-2.9	2.8
115	239	2.4	2.4	2.5	-2.9	2.9
116	240.8	2.3	2.4	2.4	-3.0	2.9
117	242.6	2.2	2.3	2.4	-3.0	2.9
118	244.4	2.2	2.2	2.3	-3.0	3.0
119	246.2	2.1	2.2	2.2	-3.0	3.0
120	248	2.1	2.1	2.2	-3.1	3.0
121	249.8	2.0	2.1	2.1	-3.1	3.0
122	251.6	1.9	2.0	2.1	-3.1	3.1
123	253.4	1.9	2.0	2.0	-3.1	3.1
124	255.2	1.8	1.9	2.0	-3.2	3.1
125	257	1.8	1.9	1.9	-3.2	3.1
126	258.8	1.7	1.8	1.9	-3.2	3.2
127	260.6	1.7	1.8	1.8	-3.2	3.2
128	262.4	1.7	1.7	1.8	-3.3	3.2
129	264.2	1.6	1.7	1.7	-3.3	3.2
130	266	1.6	1.6	1.7	-3.3	3.3

APPENDIX

Coil and Ambient Temp Sensor Resistance Values

2. THE PARAMETER OF THE OTHER SENSOR (R0=15K±2% B0/100=3450K±2%)						
T [°C]	T [°F]	Rmin [KΩ]	Rnom [KΩ]	Rmax [KΩ]	DR(MIN)%	DR(MAX)%
-30	-22	60.8	64.8	69.0	-6.2	6.1
-29	-20.2	57.8	61.4	65.2	-5.9	5.8
-28	-18.4	54.9	58.2	61.6	-5.6	5.6
-27	-16.6	52.2	55.1	58.2	-5.4	5.3
-26	-14.8	49.6	52.3	55.1	-5.1	5.1
-25	-13	47.2	49.6	52.1	-4.9	4.8
-24	-11.2	44.9	47.1	49.4	-4.6	4.6
-23	-9.4	42.8	44.7	46.8	-4.4	4.4
-22	-7.6	40.7	42.5	44.3	-4.2	4.2
-21	-5.8	38.8	40.4	42.1	-4.0	4.0
-20	-4	36.9	38.4	39.9	-3.8	3.8
-19	-2.2	35.2	36.5	37.9	-3.6	3.6
-18	-0.4	33.5	34.7	36.0	-3.5	3.4
-17	1.4	32.0	33.1	34.2	-3.3	3.3
-16	3.2	30.5	31.5	32.5	-3.2	3.1
-15	5	29.1	30.0	30.9	-3.0	3.0
-14	6.8	27.7	28.6	29.4	-2.9	2.8
-13	8.6	26.5	27.2	28.0	-2.8	2.7
-12	10.4	25.3	26.0	26.6	-2.7	2.6
-11	12.2	24.1	24.8	25.4	-2.6	2.5
-10	14	23.0	23.6	24.2	-2.5	2.4
-9	15.8	22.0	22.5	23.1	-2.4	2.3
-8	17.6	21.0	21.5	22.0	-2.3	2.2
-7	19.4	20.1	20.5	21.0	-2.2	2.1
-6	21.2	19.2	19.6	20.0	-2.2	2.1
-5	23	18.4	18.7	19.1	-2.1	2.1
-4	24.8	17.6	17.9	18.3	-2.1	2.0
-3	26.6	16.8	17.1	17.5	-2.0	2.0
-2	28.4	16.1	16.4	16.7	-2.0	2.0
-1	30.2	15.4	15.7	16.0	-2.0	1.9
0	32	14.7	15.0	15.3	-2.0	1.9
1	33.8	14.1	14.4	14.6	-2.0	1.9
2	35.6	13.5	13.8	14.0	-2.0	1.9
3	37.4	12.9	13.2	13.4	-2.0	1.9
4	39.2	12.4	12.6	12.9	-2.1	1.9
5	41	11.9	12.1	12.3	-2.0	2.0
6	42.8	11.4	11.6	11.8	-2.1	2.0
7	44.6	10.9	11.1	11.4	-2.1	2.1
8	46.4	10.4	10.7	10.9	-2.2	2.1
9	48.2	10.0	10.2	10.5	-2.3	2.1
10	50	9.6	9.8	10.0	-2.3	2.2
11	51.8	9.2	9.4	9.6	-2.4	2.3
12	53.6	8.8	9.0	9.3	-2.4	2.4
13	55.4	8.5	8.7	8.9	-2.5	2.5
14	57.2	8.1	8.3	8.6	-2.6	2.6

APPENDIX

Coil and Ambient Temp Sensor Resistance Values

2. THE PARAMETER OF THE OTHER SENSOR (R0=15K±2% B0/100=3450K±2%)						
T [°C]	T [°F]	Rmin [KΩ]	Rnom [KΩ]	Rmax [KΩ]	DR(MIN)%	DR(MAX)%
15	59	7.8	8.0	8.2	-2.7	2.7
16	60.8	7.5	7.7	7.9	-2.8	2.8
17	62.6	7.2	7.4	7.6	-2.9	2.9
18	64.4	6.9	7.1	7.3	-3.0	3.0
19	66.2	6.6	6.9	7.1	-3.1	3.1
20	68	6.4	6.6	6.8	-3.2	3.2
21	69.8	6.1	6.3	6.6	-3.4	3.4
22	71.6	5.9	6.1	6.3	-3.5	3.5
23	73.4	5.7	5.9	6.1	-3.7	3.6
24	75.2	5.4	5.7	5.9	-3.8	3.8
25	77	5.2	5.5	5.7	-4.0	3.9
26	78.8	5.0	5.3	5.5	-4.0	4.0
27	80.6	4.9	5.1	5.3	-4.1	4.1
28	82.4	4.7	4.9	5.1	-4.2	4.1
29	84.2	4.5	4.7	4.9	-4.2	4.2
30	86	4.4	4.6	4.8	-4.3	4.3
31	87.8	4.2	4.4	4.6	-4.4	4.3
32	89.6	4.0	4.2	4.4	-4.4	4.4
33	91.4	3.9	4.1	4.3	-4.5	4.5
34	93.2	3.8	3.9	4.1	-4.6	4.6
35	95	3.7	3.8	4.0	-3.9	4.6
36	96.8	3.5	3.7	3.9	-4.7	4.7
37	98.6	3.4	3.6	3.7	-4.8	4.8
38	100.4	3.3	3.4	3.6	-4.8	4.8
39	102.2	3.2	3.3	3.5	-4.9	4.9
40	104	3.0	3.2	3.4	-5.0	4.9
41	105.8	2.9	3.1	3.3	-5.0	5.0
42	107.6	2.8	3.0	3.1	-5.1	5.1
43	109.4	2.7	2.9	3.0	-5.2	5.1
44	111.2	2.6	2.8	2.9	-5.2	5.2
45	113	2.6	2.7	2.9	-5.3	5.2
46	114.8	2.5	2.6	2.8	-5.3	5.3
47	116.6	2.4	2.5	2.7	-5.4	5.4
48	118.4	2.3	2.4	2.6	-5.5	5.4
49	120.2	2.2	2.4	2.5	-5.5	5.5
50	122	2.2	2.3	2.4	-5.6	5.6
51	123.8	2.1	2.2	2.3	-5.7	5.6
52	125.6	2.0	2.1	2.3	-5.7	5.7
53	127.4	2.0	2.1	2.2	-5.8	5.7
54	129.2	1.9	2.0	2.1	-5.8	5.8
55	131	1.8	1.9	2.1	-5.9	5.9
56	132.8	1.8	1.9	2.0	-6.0	5.9
57	134.6	1.7	1.8	1.9	-6.0	6.0
58	136.4	1.7	1.8	1.9	-6.1	6.0
59	138.2	1.6	1.7	1.8	-6.2	6.1

APPENDIX

Coil and Ambient Temp Sensor Resistance Values

2. THE PARAMETER OF THE OTHER SENSOR (R0=15K±2% B0/100=3450K±2%)						
T [°C]	T [°F]	Rmin [KΩ]	Rnom [KΩ]	Rmax [KΩ]	DR(MIN)%	DR(MAX)%
60	140	1.6	1.7	1.8	-6.2	6.1
61	141.8	1.5	1.6	1.7	-6.2	6.3
62	143.6	1.5	1.6	1.7	-6.5	6.3
63	145.4	1.4	1.5	1.6	-6.4	6.3
64	147.2	1.4	1.5	1.6	-6.5	6.4
65	149	1.3	1.4	1.5	-6.4	6.5
66	150.8	1.3	1.4	1.5	-6.6	6.6
67	152.6	1.2	1.3	1.4	-6.6	6.6
68	154.4	1.2	1.3	1.4	-6.7	6.6
69	156.2	1.2	1.2	1.3	-6.7	6.7
70	158	1.1	1.2	1.3	-6.8	6.8
71	159.8	1.1	1.2	1.3	-6.8	6.8
72	161.6	1.1	1.1	1.2	-6.9	6.9
73	163.4	1.0	1.1	1.2	-7.0	6.9
74	165.2	1.0	1.1	1.2	-7.0	6.9
75	167	1.0	1.0	1.1	-7.1	7.1
76	168.8	0.9	1.0	1.1	-7.2	7.1
77	170.6	0.9	1.0	1.1	-7.2	7.1
78	172.4	0.9	1.0	1.0	-7.3	7.2
79	174.2	0.9	0.9	1.0	-7.3	7.3
80	176	0.8	0.9	1.0	-7.4	7.3
81	177.8	0.8	0.9	0.9	-7.4	7.4
82	179.6	0.8	0.8	0.9	-7.5	7.4
83	181.4	0.8	0.8	0.9	-7.5	7.5
84	183.2	0.7	0.8	0.9	-7.6	7.6
85	185	0.7	0.8	0.8	-7.6	7.6
86	186.8	0.7	0.8	0.8	-7.7	7.7
87	188.6	0.7	0.7	0.8	-7.7	7.7
88	190.4	0.7	0.7	0.8	-7.8	7.8
89	192.2	0.6	0.7	0.7	-7.8	7.8
90	194	0.6	0.7	0.7	-7.9	7.9
91	195.8	0.6	0.7	0.7	-8.0	7.4
92	197.6	0.6	0.6	0.7	-8.0	8.0
93	199.4	0.6	0.6	0.7	-8.1	8.0
94	201.2	0.6	0.6	0.7	-8.1	8.1
95	203	0.5	0.6	0.6	-8.2	8.1
96	204.8	0.5	0.6	0.6	-8.2	8.2
97	206.6	0.5	0.6	0.6	-8.2	8.2
98	208.4	0.5	0.5	0.6	-8.3	8.3
99	210.2	0.5	0.5	0.6	-8.4	8.3
100	212	0.5	0.5	0.6	-8.4	8.4
101	213.8	0.5	0.5	0.5	-8.5	8.4
102	215.6	0.4	0.5	0.5	-8.5	8.5
103	217.4	0.4	0.5	0.5	-8.6	8.5
104	219.2	0.4	0.5	0.5	-8.6	8.6

APPENDIX

Coil and Ambient Temp Sensor Resistance Values

2. THE PARAMETER OF THE OTHER SENSOR (R0=15K±2% B0/100=3450K±2%)						
T [°C]	**T [°F]**	**Rmin [KΩ]**	**Rnom [KΩ]**	**Rmax [KΩ]**	**DR(MIN)%**	**DR(MAX)%**
105	221	0.4	0.4	0.5	-8.7	8.6
106	222.8	0.4	0.4	0.5	-8.7	8.7
107	224.6	0.4	0.4	0.5	-8.8	8.7
108	226.4	0.4	0.4	0.4	-8.8	8.8
109	228.2	0.4	0.4	0.4	-8.8	8.8
110	230	0.4	0.4	0.4	-8.9	8.8
111	231.8	0.3	0.4	0.4	-9.0	8.9
112	233.6	0.3	0.4	0.4	-9.0	9.0
113	235.4	0.3	0.4	0.4	-9.0	9.0
114	237.2	0.3	0.4	0.4	-9.1	9.1
115	239	0.3	0.3	0.4	-9.1	9.1
116	240.8	0.3	0.3	0.4	-9.2	9.1
117	242.6	0.3	0.3	0.4	-9.2	9.2
118	244.4	0.3	0.3	0.3	-9.3	8.8
119	246.2	0.3	0.3	0.3	-9.3	9.3
120	248	0.3	0.3	0.3	-9.3	9.3

APPENDIX

Accessories -Wall Controller

WALL CONTROLLERS



FPWC1

FPWC1 Optional wired wall controller for Floating Air Select single zone and Floating Air ® Pro, Pro X , single and multizone models.
Optional for Breeze Premier
Cable length = 24 ft (8m)

APPENDIX

Friedrich Authorized Parts Depots

FRIEDRICH

United Products Distributors Inc.
4030A Benson Ave
Halethorpe, MD 21227
888-907-9675
c.businsky@updinc.com

Shivani Refigeration & Air Conditioning Inc.
2259 Westchester Ave.
Bronx, NY 10462
sales@shivanionline.com

NEUCO Inc.
515 W Crossroads Parkway
Bolingbrook, IL 60440
312.809.1418
borr@neuco.com

The Gabbert Company
6868 Ardmore
Houston, Texas 77054

713-747-4110
800-458-4110

Johnstone Supply of Woodside
27-01 Brooklyn Queens Expway
Woodside, New York 11377

718-545-5464
800-431-1143

Reeve Air Conditioning, Inc.
2501 South Park Road
Hallandale, Florida 33009

954-962-0252
800-962-3383

Total Home Supply
26 Chapin Rd Ste 1109
Pine Brook, NJ 07058
877-847-0050
support@totalhomesupply.com
https://www.totalhomesupply.com/brands/Friedrich.html

TECHNICAL SUPPORT CONTACT INFORMATION

Friedrich Air Conditioning Co.
10001 Reunion Place, Suite 500 · San Antonio, Texas 78216
1-877-599-5665
www.friedrich.com