Service Manual

FRIEDRICH

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

Breeze™ Select 208/230 VOLT

Outdoor Unit	WFPU17Y243D (24K), WFPU17Y363D(36K), WFPU17Y483D (48K) , WFPU17Y603D (60K)
Indoor Unit	WFH24Y193D (24K), WFH36Y193D (36K), WFH48Y223D (48K), WFH60Y223D (60K)

THE EXPERTS IN ROOM AIR CONDITIONING

96112002_00

TABLE OF CONTENTS

TABLE OF CONTENTS

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.
- Use on a properly grounded outlet only.
- Do not cut or modify the power supply cord or remove the ground prong of the plug.
- 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

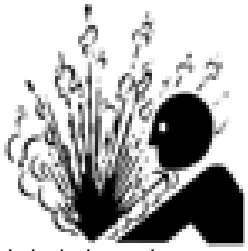
Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.

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. R454B 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

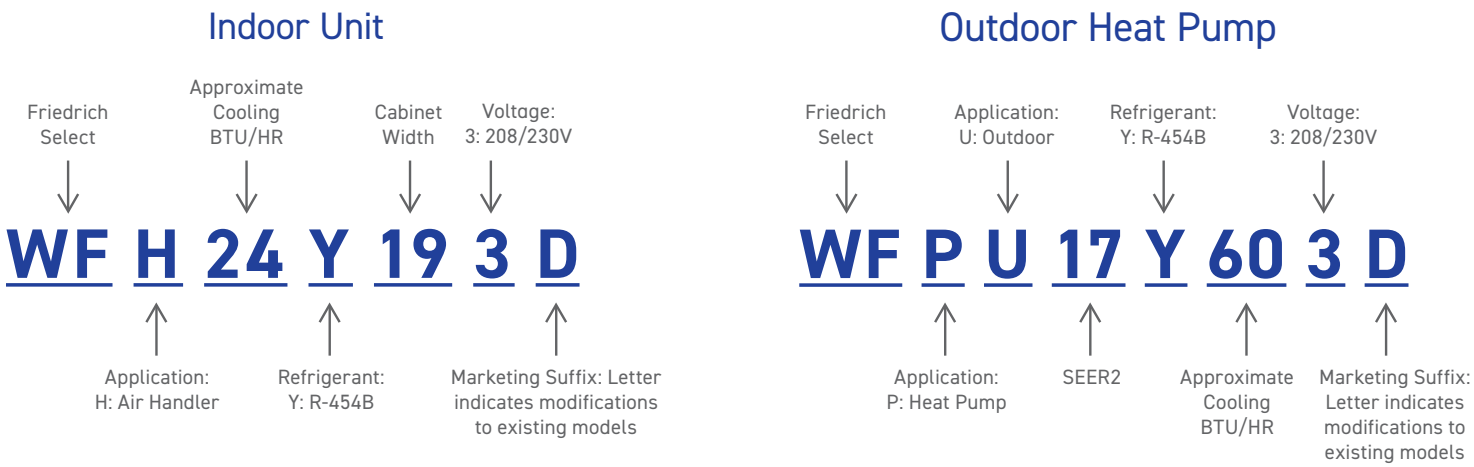


Figure 103 (Model Identification Guide)

Serial Number Reference Guide

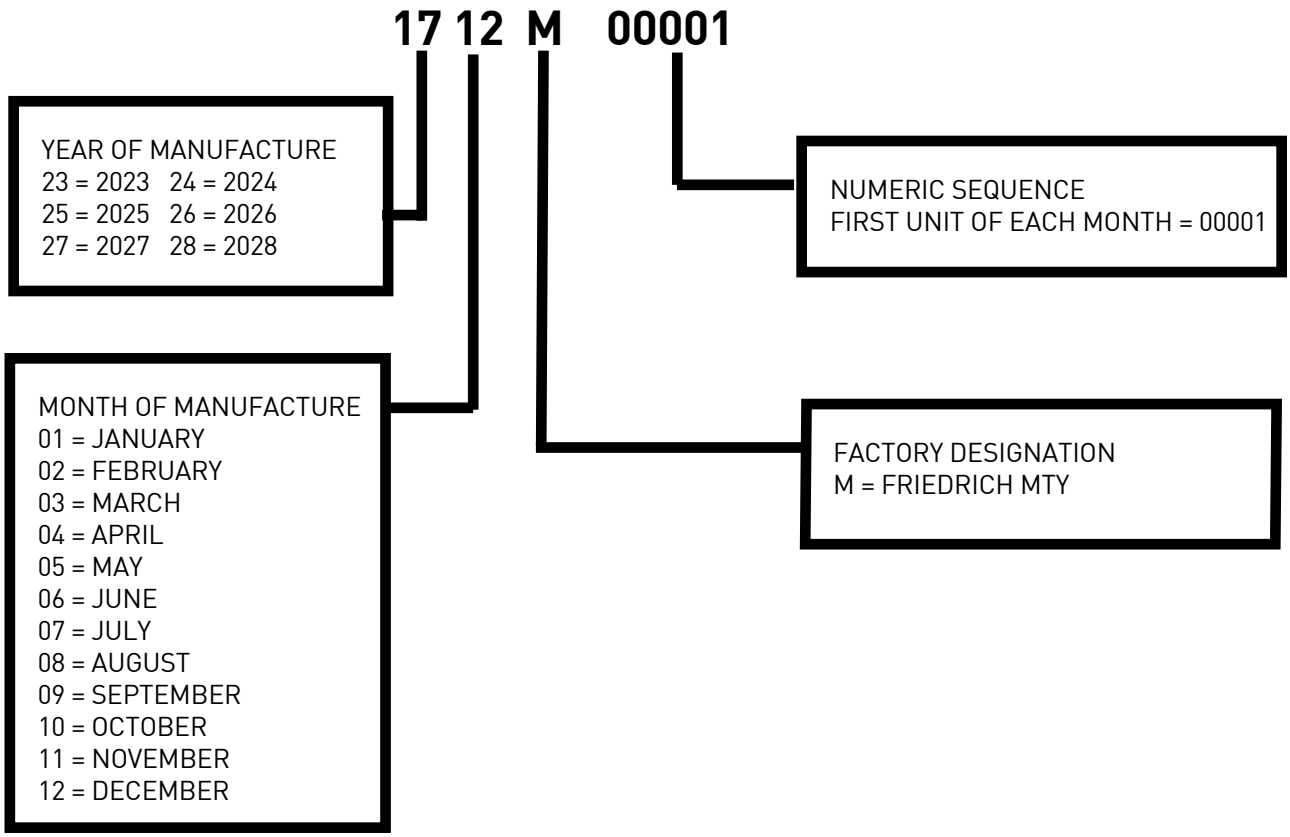


Figure 104 (Serial Number Reference Guide)

SPECIFICATIONS

24k-36k BTU

INDOOR MODEL NUMBER			WFH24Y193D	WFH36Y193D
OUTDOOR MODEL NUMBER			WFPU17Y243D	WFPU17Y363D
	Power Supply	V/Ph/Hz	208~230/1/60	208~230/1/60
	Energy Star Standard(Current)	Y/N	N	N
	Energy Star -Cold Climate	Y/N	Y	Y
	A2l Sensor	Y/N	Y	Y
Cooling	Rated Capacity At 95 °F	Btu/H	24000	35000
	Cooling Capacity Range(Min-Max)	Btu/H	6000~24600	11000~36500
	Cooling Capacity Range(Min-Max)	W	1760~7200	3223~10700
	Capacity At 115°F	Btu/H	22600	28200
	Power Input	W	2616	3104
	Current	A	11.6	13.7
	EER2 At 95°F	Btu/H/W	10	9.8
	SEER2	Btu/H/W	18	17.5
	Operating Temperature Range Indoor	°F	45-95	45-95
		°F	7-35	7-35
	Operating Temperature Range Outdoor	°F	5-115	5-115
		°F	-15 - 46	-15 - 46
Heating	Rated Capacity At 47 °F	Btu/H	24000	36000
	Heating Capacity Range(Min-Max)	Btu/H	3750~25500	6100~39400
	Heating Capacity Range(Min-Max)	W	1100~7471	1787~11544
	Power Input	W	1917	2859
	Current	A	8.8	13.1
	COP2 At 47 °F	W/W	3.7	3.7
	CoOP @ 5f	W/W	2	2
	HSPF2	Btu/H/W	9	9
	Rated Capacity Heating At 17 -8.3 °F	Btu/H	17000	22200
	Maximum Heating Capacity @17 ° -8.3 F	Btu/H	/	/
	Maximum Heating Capacity @5-15 °F	Btu/H	18000	22000
	Maximum Heating Capacity @-5-20.5 °F	Btu/H	11400	18000
	Maximum Heating Capacity @-13-25°F	Btu/H	N/A	N/A
	Maximum Heating Capacity @-22-30°F	Btu/H	N/A	N/A
	Operating Temperature Range Indoor	°F	45-95	45-95
		°F	7-35	7-35
	Operating Temperature Range Outdoor°F	°F	-4 - 75	-4 - 75
		°F	-20 - 24	-20 - 24
Indoor Electrical	Rated Current	Cooling (A)	2.6	3.8
		Heating (A)	2.6	3.8
	MOP (Rating Of Overcurrent Protective Device	A	10	10
	MCA(Minimum Circuit Ampacity)	A	3.3	4.8
	Thermostat Type		24v	24v
	Communication Wire Size And Type		6x18 AWG	6x18 AWG

* 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

24k-36k BTU

INDOOR MODEL NUMBER			WFH24Y193D	WFH36Y193D
OUTDOOR MODEL NUMBER			WFPU17Y243D	WFPU17Y363D
Indoor Airflow	Rated	M3/H	1360	1905
		Cfm	800	1120
	Min-Max	M3/H	902-1360	1334-1905
		Cfm	530-800	785-1120
	Ultra Low Speed	M3/H	902	1334
		Cfm	530	785
Esp	Rated	In.w.c.(Pa)	0.58 (145)	0.58 (145)
	Range	In.w.c.(Pa)	0-0.8 (0-200)	0-0.8 (0-200)
Indoor Noise Level (Hi)		Db(A)	55	57
Indoor Fan Motor (Multi Speed Ecm)	QTY		1	1
	Model		Zwk702b006088	Zwk702b500066
	Output	Hp	1/3	1/2
	RLA	A	2.4~2.6	3.6~3.8
	Winding Resistance	Ω	/	/
	Speed	R/Min	350~1400	350~1400
Indoor Coil	Number Of Rows		4	4
	Tube Pitch(A)	Mm	21	21
		In	0.8	0.8
	Row Pitch(B)	Mm	13.6	13.6
		In	0.5	0.5
	Fin Spacing	Mm	1.4	1.4
		Fins Per In	18	18
	Fin Type		Hydrophilic Aluminium	Hydrophilic Aluminium
	Tube Outside Diameter And Type	Mm	7,Innergroove Tube	7,Innergroove Tube
	Coil Dimension(Wxhxd)	Mm	2 444×420×54.4	2 444×420×54.4
		In	2 17-1/2×16-1/2×2-1/8	2 17-1/2×16-1/2×2-1/8
	Number Of Circuits		8	8
Indoor Throttle Type			TXV	TXV
Drainage Water Pipe Diameter		Inch	3/4''	3/4''
Outdoor Airflow	Air Circulation(High) For Outdoor	Cfm	3150	3800
		M3/H	1853	2235
Outdoor Throttle Type			Eev	Eev
Outdoor Electrical	(Mca) Minimum Circuit Ampacity	Amps	16	21
	Max Circuit Breaker	Amps	25	30
	Communication Cable		6x18 AWG	6x18 AWG
	Working Voltage	Volts	208~230/1/60	208~230/1/60
* 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				
Outdoor Fan Motor	Qty		1	1
	Model		Zwb2710l01al	Zwb278l46a
	Output	HP	1/12	1/7
	Rla	A	0.3	0.8
	Winding Resistance	Ω	44±7%	38.5±7%
	Speed	R/Min	880	880

Figure 201

SPECIFICATIONS

24k-36k BTU

INDOOR MODEL NUMBER			WFH24Y193D	WFH36Y193D
OUTDOOR MODEL NUMBER			WFPU17Y243D	WFPU17Y363D
Outdoor Coil	Number Of Rows		2	2
	Tube Pitch(A)	Mm	21	21
		In	0.8	0.8
	Row Pitch(B)	Mm	21.7	21.7
		In	0.852	0.9
	Fin Spacing	Mm	1.4	1.5
		Fins Per In	18	17
	Fin Type		895×630×43.3	975×714×43.3
	Tube Outside Diameter And Type	Mm	35.2×24.8×1.7	38-3/8×28-1/8×1-3/4
	Coil Dimension (WxHxD)	Mm	Hydrophilic Aluminium	Hydrophilic Aluminium
		In	7.94,Innergroove Tube	7.94, Innergroove Tube
	Number Of Circuits		6	5
Compressor	Model		C-6rz210h1ebf	Ettm240d43umtb
	Brand		Sanyo	Gmcc
	Type		Twin Rotary	Twin Rotary
	Capacity	Btu/H	21325	22860
	Input	W	1500	1805
	Rated Current	A	4.6	8.2
	Compressor	A	12	15
	Refrigerant Oil	Ml	Fv68s/950	Vg74 /920
Moisture Removal		Pints/Hr	4.6	9.5
		L/H	2.2	4.5
Refrigerant Type/Quantity	Type		R454b	R454b
	Refrigerant Charge	Oz(Kg)	70.5 (2.0)	88.2 (2.5)
	Factory Precharge	Ft (M)	25 (7.6)	25 (7.6)
	Additional Charge For Each Ft	Oz/Ft	0.4	0.4
Refrigerant Piping	Liquid Side/ Gas Side	Mm(Inch)	9.52/15.88(3/8'/5/8')	9.52/15.88(3/8'/5/8')
	Max. Pipe Length	M	30	35
		Ft	100	115
	Max. Difference In Level	M	20	25
		Ft	66	80
Design Pressure	H/L	MPA	4.14/2.62	4.14/2.62
		PSIG	600/380	600/380
Dimensions & Weight				
Indoor Unit	Dimension (WxHxD)	Inches 1/8ths	19-5/8 × 46-1/8 × 21-5/8	19-5/8 × 46-1/8 × 21-5/8
		Mm	500×1170×550	500×1170×550
	Packing(LxWxH)	Inches 1/8ths	22-1/2×49-5/8×25-3/8	22-1/2×49-5/8×25-3/8
		Mm	570×1260×645	570×1260×645
	Net Weight	Lbs	130.5	135.1
		Kg	59.2	61.3
	Shipping Weight	Lbs	153.6	158.1
		Kg	69.7	71.7

Figure 201

SPECIFICATIONS

24k-36k BTU

INDOOR MODEL NUMBER			WFH24Y193D	WFH36Y193D
OUTDOOR MODEL NUMBER			WFPU17Y243D	WFPU17Y363D
Outdoor Unit	Dimension (WxHxD)	Inches 1/8ths	33-7/8 ×26-3/8 ×12-1/4	35-3/8×29-1/2×13-3/8
		Mm	860×670×310	900×750×340
	Packing(LxWxH)	Inches 1/8ths	39×28-3/4 ×17-3/4	41×32-5/8×18-1/8
		Mm	990×730×450	1040×830×460
	Net Weight	Lbs	104.5	116.8
		Kg	47	53
	Shipping Weight	Lbs	112.2	125.7
		Kg	50.5	57
Loading	Outdoor Unit Loading Capacity (20gp/40gp/40'Hq)		90/186/186	54/110/165
	Indoor Unit Loading Capacity (20gp/40gp/40'Hq)		36/72/144	36/72/144
	Indoor Unit Stack Height (Stack Limit)		5	5
	Outdoor Unit Stack Height (Stack Limit)		4	4

Figure 201

SPECIFICATIONS

48-60k BTU

Indoor Model			WFH48Y223D	WFH60Y223D
Outdoor Model			WFPU17Y483D	WFPU17Y603D
	Power Supply	V/ph/Hz	208~230/1/60	208~230/1/60
	Energy Star Standard(Current)	Y/N	N	N
	Energy Star -Cold Climate	Y/N	Y	N
	A2L Sensor	Y/N	Y	Y
Cooling	Rated Capacity at 95	Btu/h	48000	54000
	Cooling Capacity Range(MIN-MAX)	Btu/h	14000~48600	14000~54000
	Cooling Capacity Range(MIN-MAX)	W	4100~14200	4100~15800
	Capacity at 115°F	Btu/h	40000	44400
	Power Input	W	4720	5246
	Current	A	22	24
	EER2 at 95°F	Btu/h/W	10	8.8
	SEER2	Btu/h/W	18	17
	Operating temperature range Indoor	°F	45-95	45-95
		°F	7-35	7-35
	Operating temperature range Outdoor	°F	5-115	5-115
		°F	-15 - 46	-15 - 46
Heating	Rated Capacity at 47°F	Btu/h	48000	55000
	Heating Capacity Range(MIN-MAX)	Btu/h	7490~49300	7490~57300
	Heating Capacity Range(MIN-MAX)	W	2194~14444	2190~16789
	Power Input	W	3761	4554
	Current	A	17.2	20.8
	COP2 at 47°F	W/W	3.7	3.5
	COP @ 5°F	W/W	2	2.0
	HSPF2	Btu/h/W	9	8.5
	Rated Capacity Heating at 17-8.3°F	Btu/h	32200	33200
	Maximum Heating Capacity @17-8.3°F	Btu/h	/	/
	Maximum Heating Capacity @5-15°F	Btu/h	35000	36000
	Maximum Heating Capacity @-5-20.5°F	Btu/h	26600	29600
	Maximum Heating Capacity @-13-25°F	Btu/h	N/A	N/A
	Maximum Heating Capacity @-22F-30°F	Btu/h	N/A	N/A
	Operating temperature range Indoor	°F	45-95	45-95
		°F	7-35	7-35
	Operating temperature range Outdoor	°F	-4 - 75	-4 - 75
		°F	-20 - 24	-20 - 24
Indoor Electrical	Rated Current	Cooling (A)	5.4	5.4
		Heating (A)	5.4	5.4
	MOP(Rating of Overcurrent Protective Device	A	10	10
	MCA(Minimum Circuit Ampacity)	A	6.8	6.8
	Thermostat type		24v	24v
	communication wire size and type		6x18AWG	6x18AWG

* 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

SPECIFICATION

24k-36k BTU

Indoor Model			WFH48Y223D	WFH60Y223D
Outdoor Model			WFPU17Y483D	WFPU17Y603D
Indoor AirFlow	Rated	m3/h	2900	2900
		CFM	1706	1706
	Min-Max	m3/h	1967-2900	1967-2900
		CFM	1157-1706	1157-1706
	Ultra low speed	m3/h	1967	1967
		CFM	1157	1157
ESP	Rated	In.W.C.(Pa)	0.58 (145)	0.58 (145)
	Range	In.W.C.(Pa)	0-0.8 (0-200)	0-0.8 (0-200)
Indoor noise level (Hi)		dB(A)	57	57
Indoor fan motor (Multi speed ECM)	Qty		1	1
	Model		ZKSD-560-8-50-16	ZKSD-560-8-50-16
	output	HP	3/4	3/4
	RLA	A	5.0~5.4	5.0~5.4
	Winding Resistance	Ω	/	/
	Speed	r/min	350~1400	350~1400
Indoor Coil	Number of Rows		5	5
	Tube Pitch(a)	mm	21	21
		in	0.8	0.8
	Row Pitch(b)	mm	13.6	13.6
		in	0.5	0.5
	Fin Spacing	mm	1.5	1.5
		Fins Per in	17	17
	Fin Type		Hydrophilic aluminium	Hydrophilic aluminium
	Tube Outside Diameter and Type	mm	7,innergroove tube	7,innergroove tube
	Coil Dimension(WxHxD)	mm	2 (509x546x68)	2 (509x546x68)
		in	2 (20x21-1/2x2-11/16)	2 (20x21-1/2x2-11/16)
	Number of Circuits		12	12
Indoor Throttle type		°F	TXV	TXV
Drainage water pipe diameter		inch	3/4''	3/4''
Outdoor Airflow	Air Circulation(high) for Outdoor	CFM	5700	5700
		m3/h	3350	3350
Outdoor throttle type			EEV	EEV
Outdoor Electrical	(MCA) Minimum Circuit Ampacity	Amps	33	33
	Max Circuit Breaker	Amps	50	50
	Communication Cable		6x18AWG	6x18AWG
	Working Voltage	Volts	208~230/1/60	208~230/1/60
* 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				
Outdoor fan motor	Qty		1	1
	Model		ZWB4710L17A	ZWB4710L17A
	output	HP	1/3	1/3
	RLA	A	1.5	1.5
	Winding Resistance	Ω	7.1±7%	7.1±7%
	Speed	r/min	850	850

FIGURE 202

SPECIFICATION

24k-36k BTU

Indoor Model			WFH48Y223D	WFH60Y223D
Outdoor Model			WFPU17Y483D	WFPU17Y603D
Outdoor Coil	Number of Rows		2	2
	Tube Pitch(a)	mm	21	21
		in	0.8	0.8
	Row Pitch(b)	mm	21.7	21.7
		in	0.9	0.9
	Fin Spacing	mm	1.4	1.4
		Fins Per in	18	18
	Fin Type		1190×840×43.3	1190×840×43.3
	Tube Outside Diameter and Type	mm	46-7/8×33-1/8×1-3/4	46-7/8×33-1/8×1-3/4
	Coil Dimension(WxHxD)	mm	Hydrophilic aluminium	Hydrophilic aluminium
		in	7.94,innergroove tube	7.94,innergroove tube
	Number of Circuits		6	6
Compressor	Model		ETTF310D43UMTB	ETTF310D43UMTB
	Brand		GMCC	GMCC
	Type		Twin ROTARY	Twin ROTARY
	Capacity	Btu/h	29582	29582
	Input	W	2410	2410
	Rated current	A	5.2	5.2
	Compressor	A	23	23
	Refrigerant oil	ml	VG74 /1200	VG74 /1200
Moisture Removal		pints/hr	13.2	15.8
		L/H	6.2	7.5
Refrigerant type/Quantity	Type		R454B	R454B
	REFRIGERANT CHARGE	oz(kg)	137.6 (3.9)	137.6 (3.9)
	FACTORY PRECHARGE	ft (m)	25 (7.6)	25 (7.6)
	Additional charge for each ft	oz/ft	0.4	0.4
Refrigerant piping	Liquid side/ Gas side	mm(inch)	9.52/19.05(3/8'/3/4')	9.52/19.05(3/8'/3/4')
	Max. pipe length	m	40	40
		ft	130	130
	Max. difference in level	m	30	30
		ft	100	100
Design pressure	H/L	MPa	4.14/2.62	4.14/2.62
		PSIG	600/380	600/380
DIMENSIONS & WEIGHT				
Indoor Unit	Dimension (WxHxD)	inches 1/8ths	22×53-7/8 ×24	22×53-7/8 ×24
		mm	560×1370×610	560×1370×610
	Packing(LxWxH)	inches 1/8ths	25-1/4×55-1/2×28	25-1/4×55-1/2×28
		mm	640×1410×710	640×1410×710
	Net Weight	lbs	180.6	180.6
		kg	82	82
	Shipping Weight	lbs	204.4	204.4
		kg	92.7	92.7

FIGURE 202

SPECIFICATION

24k-36k BTU

Indoor Model			WFH48Y223D	WFH60Y223D
Outdoor Model			WFPU17Y483D	WFPU17Y603D
Outdoor Unit	Dimension (WxHxD)	inches 1/8ths	43-1/4×34-1/2×17-3/4	43-1/4×34-1/2×17-3/4
		mm	1100×875×450	1100×875×450
	Packing(LxWxH)	inches 1/8ths	45-7/8×39-1/2×21-1/4	45-7/8×39-1/2×21-1/4
		mm	1165×1005×540	1165×1005×540
	Net Weight	lbs	186.7	186.7
		kg	84	84
	Shipping Weight	lbs	210.9	210.9
		kg	95	95
Loading	Outdoor Unit Loading Capacity (20GP/40GP/40'HQ)		40/88/88	40/88/88
	Indoor Unit Loading Capacity (20GP/40GP/40'HQ)		39/78/102	39/78/102
	Indoor Unit Stack height (Stack Limit)		4	4
	Outdoor Unit Stack height (Stack Limit)		3	3

NOTE:

1. Test Conditions:

1.1 Rated Capacity Test Conditions:

Cooling: Indoor: DB 80.0˚F /WB 67.0˚F Outdoor: DB 95.0˚F /WB 75.0˚F

Heating: Indoor: DB 70.0˚F /WB 60.0˚F Outdoor: DB 47˚F/WB 43˚F

1.2 SEER & HSPF Test Standard: AHRI 210/240.

2. The Sound Pressure Level is based on the following conditions:

Indoor Unit

Air Handler Unit

Measure the noise value of the point 3.28 feet in front of the outlet of the wind tunnel and 3.28 feet high from the bottom of the unit.

3. The above data was measured in an anechoic chamber. Please take into consideration the reflected sound of your specific application environment.

4. All specifications are subject to change by the manufacturer without prior notice.

5. Max. Running Current (A): REFER TO NAMEPLATE

6. Follow local and National electrical codes and regulations when selecting field wires, and all the above are the minimum wire size.

3. Install main switch and circuit breaker for each system separately. Select a high response type circuit breaker that acts within 0.1 second.

4. If an auxiliary heater is required and already installed on indoor unit, power source cable should be installed separately and the size should be selected in accordance with Local and National Electrical Codes. Refer to Figure 203(Electric Heater Kit Selection Table) for Specifications.

FIGURE 202

SPECIFICATIONS

Electric Heater kits

Breeze AHU Electric Heat Kits								
Heating kW Correction Factor								
Supply Voltage	240	230	220	210	208			
Correction Factor	1	0.9	0.8	0.8	0.8			

Standard Features
Controlled by Relays or Contactors
Plug-in wiring harness for ease on installation into air handler UL certified

Electrical Data

Air Handlers

Model and Heat Kit Usage	Phase	Unit MCA	Circuit #1		Circuit #2		Coil QTY Used	Actual KW @ 240V
			MCA	MOP	MCA	MOP		
24k AHU		3.3						
AUX5KWA			29.3	30	-	-	1	5
AUX7KWA			42.5	45	-	-	2	7.5
AUX10KWA	1		55.4	60	-	-	2	10
36k AHU		4.8						
AUX5KWA			30.8	30	-	-	1	5
AUX7KWA			43.9	45	-	-	2	7.5
AUX10KWA			56.9	60	-	-	2	10
AUX15KWA	1		45.9	50	39.1	40	4	15
48/60K AHU		6.8						
AUX5KWA			32.8	35	-	-	1	5
AUX7KWA			45.9	50	-	-	2	7.5
AUX10KWA			58.9	60	-	-	2	10
AUX15KWA			45.9	50	39.1	40	4	15
AUX20KWA	1		58.9	60	52.1	55	4	20

Note 1: Please refer to Units Series and Rating plate for confirmation of MCA & MOP values.
Note 2: Please refer to Units Series and Rating plate for confirmation of MCA & MOP values.
Note 3: This manual is subject to change without notice . Always refer to the unit model nameplate to verify data.
Note 4: The electric heat kits designed for use with these units may include a combination of 15 through 60 amp circuit breakers to provide an electrical disconnect for service personnel that are intended to help protect internal electrical components in the event of a short circuit of ground fault. As designed, the circuit breakers supplied do not provide over-current protection of the branch circuit(s). Therefore, the branch circuit(s) shall be sized and protected according to the nameplate.

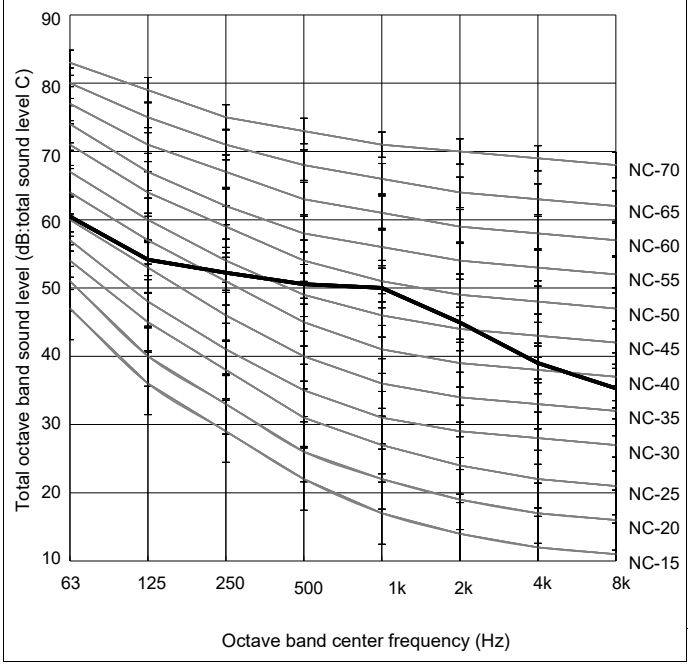
Figure 203

SPECIFICATIONS

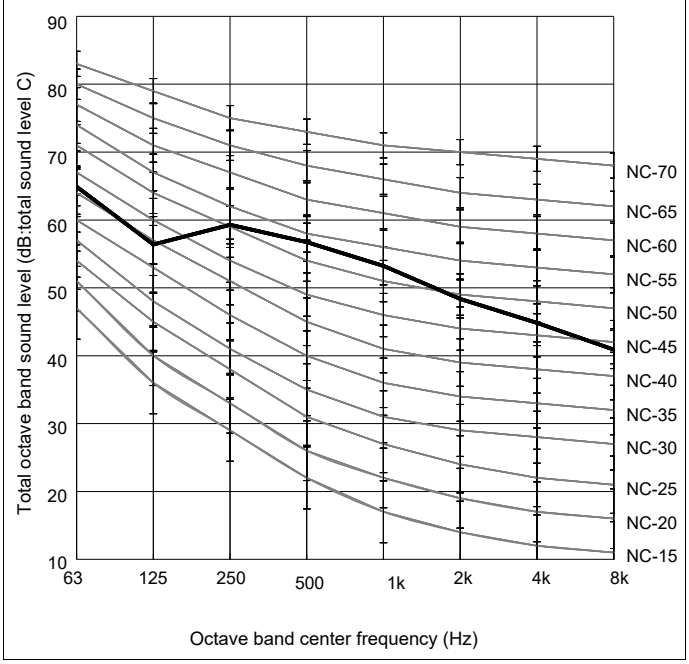
Sound Pressure Data

Outdoor unit

Model	24K
Test condition	3.28ft(1.0m) in front of the unit; 2.7ft (0.83) high from the bottom of the unit; 3.28ft (1.0m) above the ground.



Model	36K
Test condition	3.28ft. (1.0m) in front of the unit; 3.28ft. (1.0m) above the bottom of the unit.



Model	48K/60K
Test condition	3.28ft. (1.0m) in front of the unit; 3.28ft. (1.0m) above the bottom of the unit.

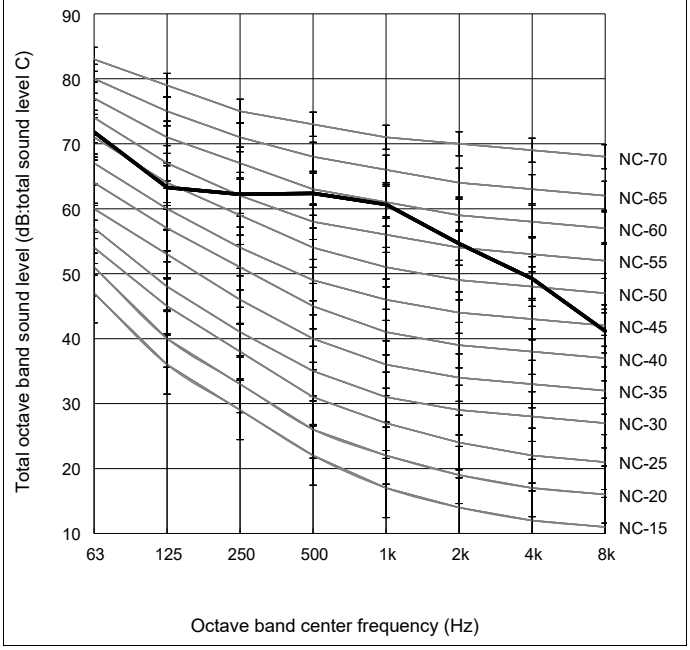


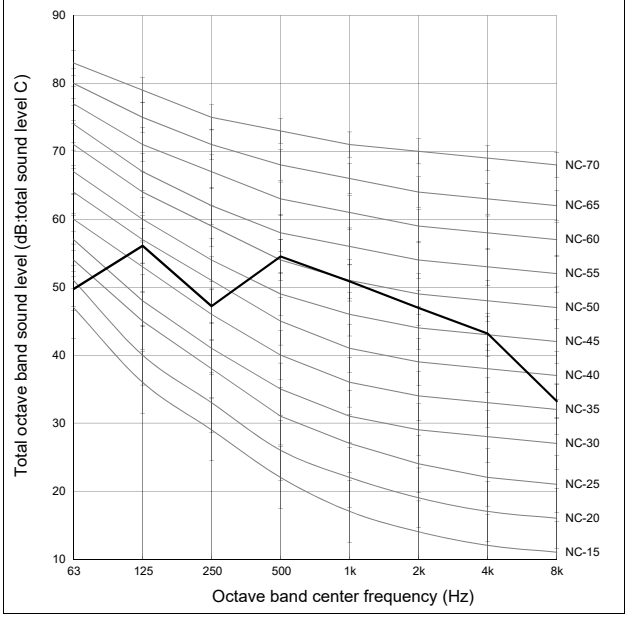
Figure 204

SPECIFICATIONS

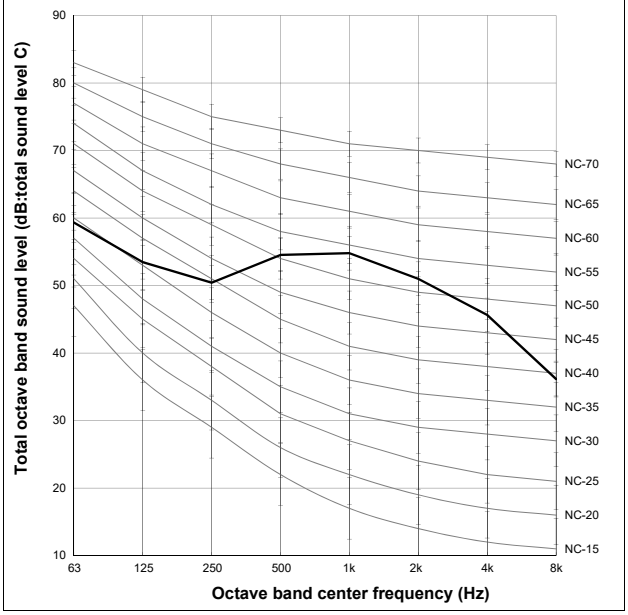
Sound Pressure Data

Indoor Unit

Model	24K
Test Condition	3.28ft. (1.0m) in front of the outlet of the wind tunnel; 3.28ft. (1.0m) above the bottom of the unit.



Model	36K
Test Condition	3.28ft. (1.0m) in front of the outlet of the wind tunnel; 3.28ft. (1.0m) above the bottom of the unit.



Model	48K/60K
Test Condition	3.28ft. (1.0m) in front of the outlet of the wind tunnel; 3.28ft. (1.0m) above the bottom of the unit.

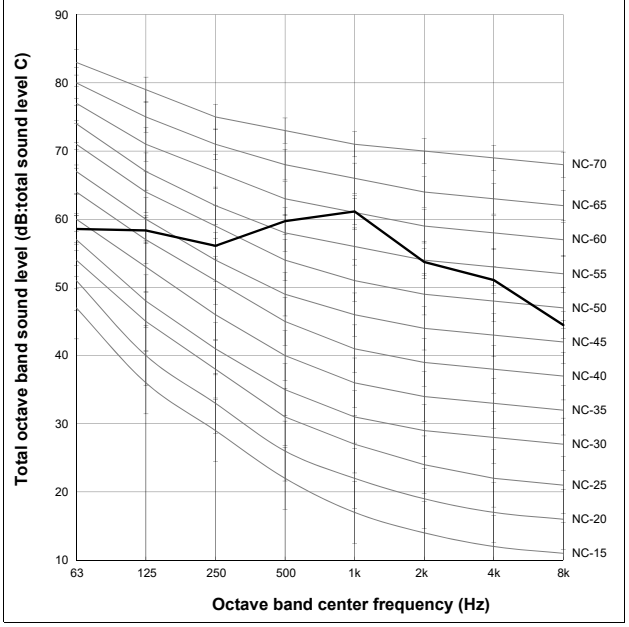


Figure 205

SPECIFICATIONS

Blower Data - Indoor Unit

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 , and electric heating operation.

Air Flow Table

Air Handler Model Size	Motor Speed		Extemal Static Pressure in.H2O[KPa]								
			0[.0]	0.08[.02]	0.24[.06]	0.32[.08]	0.4[.10]	0.48[.12]	0.6[.15]	0.68[.17]	0.8[.20]
24	Tap(1)	CFM	568	552	509	473	431	380	/	/	/
		Watts	69	75	80	89	99	107	/	/	/
	Tap(2)	CFM	579	561	522	481	439	387	/	/	/
		Watts	71	77	82	90	101	109	/	/	/
	Tap(3)	CFM	862	828	792	735	705	673	661	618	561
		Watts	106	114	125	137	145	154	169	170	177
	Tap(4)	CFM	975	940	906	859	853	803	769	735	681
		Watts	148	155	165	178	185	193	203	213	219
	Tap(5)	CFM	1055	1024	995	948	922	895	864	825	779
		Watts	197	204	214	228	234	241	251	258	267

Air Handler Model Size	Motor Speed		Extemal Static Pressure in.H2O[KPa]								
			0[.0]	0.08[.02]	0.24[.06]	0.32[.08]	0.4[.10]	0.48[.12]	0.6[.15]	0.68[.17]	0.8[.20]
36	Tap(1)	CFM	714	695	671	632	585	567	/	/	/
		Watts	136	140	144	149	153	156	/	/	/
	Tap(2)	CFM	726	706	682	640	592	574	/	/	/
		Watts	138	142	147	151	155	158	/	/	/
	Tap(3)	CFM	1350	1314	1269	1206	1116	1082	1050	990	930
		Watts	257	264	274	282	292	297	302	309	316
	Tap(4)	CFM	1460	1409	1368	1323	1266	1192	1122	1060	1020
		Watts	280	288	295	304	313	323	333	340	350
	Tap(5)	CFM	1526	1479	1441	1399	1350	1292	1221	1148	1088
		Watts	342	348	355	363	371	381	394	401	406

Air Handler Model Size	Motor Speed		Extemal Static Pressure in.H2O[KPa]								
			0[.0]	0.08[.02]	0.24[.06]	0.32[.08]	0.4[.10]	0.48[.12]	0.6[.15]	0.68[.17]	0.8[.20]
48	Tap(1)	CFM	1119	1113	1107	1042	1054	1085	/	/	/
		Watts	248	263	276	283	294	302	/	/	/
	Tap(2)	CFM	1150	1145	1139	1059	1072	1104	/	/	/
		Watts	250	265	278	286	297	305	/	/	/
	Tap(3)	CFM	1762	1753	1744	1737	1716	1667	1632	1593	1553
		Watts	383	405	427	438	455	467	480	495	509
	Tap(4)	CFM	1932	1902	1855	1827	1784	1750	1720	1691	1666
		Watts	458	470	486	498	514	524	541	555	572
	Tap(5)	CFM	2015	1982	1938	1911	1869	1840	1789	1765	1715
		Watts	517	529	545	558	574	585	600	612	619

[!] Required 300-450CFM/ton range.

[!] CFM means Standard Cubic Foot per Hour.

[!] When there is an electric heater, please set the fan speed based on the air volume that the electric heater needs (not less than 350CFM/TON).

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

SPECIFICATIONS

Electrical Data - Outdoor Unit

Indoor Unit	Power supply			Applicable voltage		ELB	
	Voltage (V)	PH	Frequency (Hz)	Umin (V)	Umax (V)	Nominal Current (A)	Nominal Sensitive Current (mA)
24K	208/230	1	60	187	253	25	30
36K	208/230	1	60	187	253	30	30
48K/60K	208/230	1	60	187	253	50	30

NOTE:

1. The above compressor data is based on 100% capacity combination of indoor units at the rated operating frequency.
2. This data is based on the same conditions as the nominal heating and cooling capacities.
3. The compressor is started by an inverter, resulting in extremely low starting current.

SPECIFICATIONS

Outdoor Unit Clearances

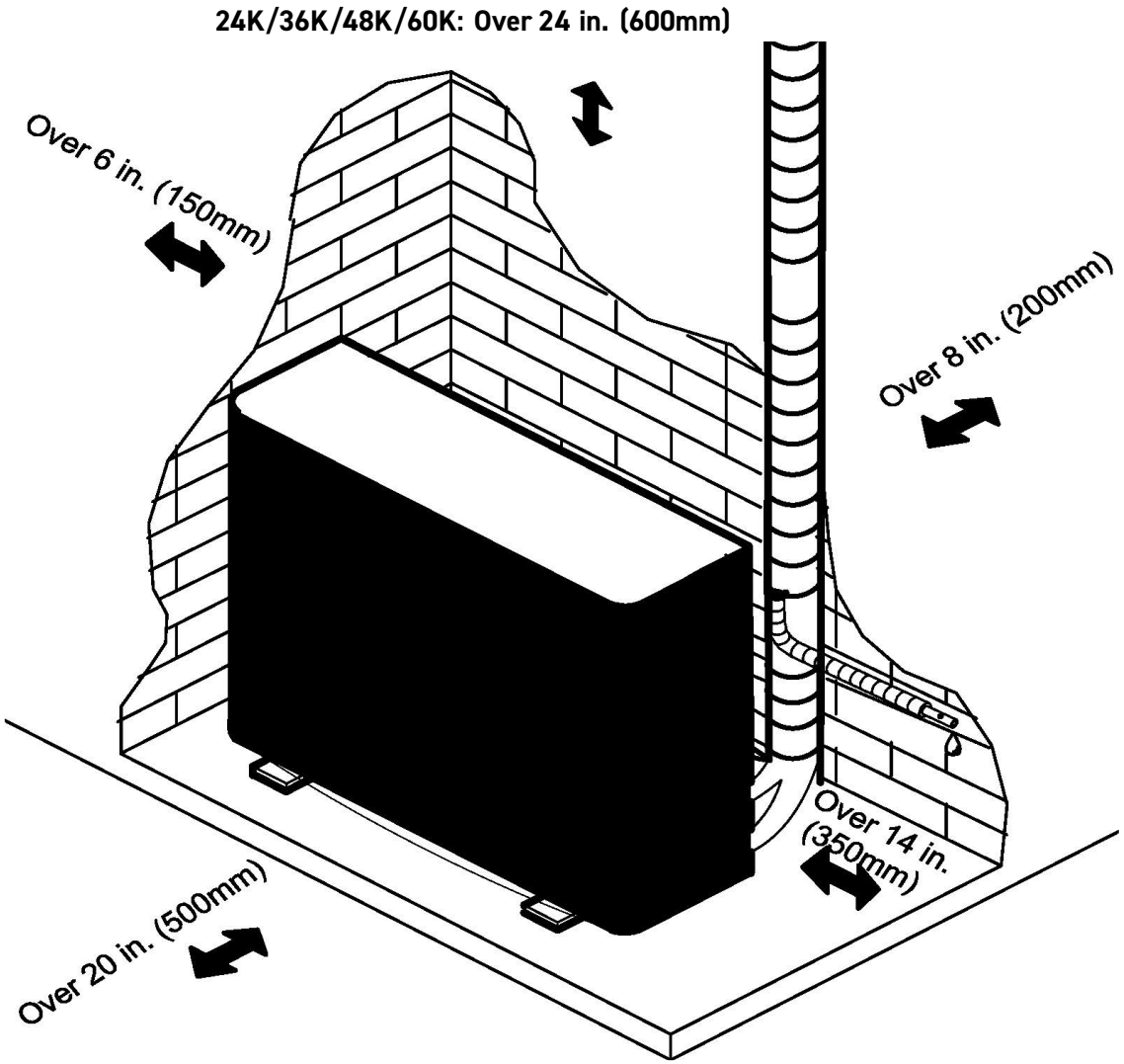


Figure 206 (Outdoor Unit Clearances)

SPECIFICATIONS

Dimensions Indoor Unit

24-36k (WFH24Y193D, WFH36Y193D)

24K/36K

Unit : in.(mm)

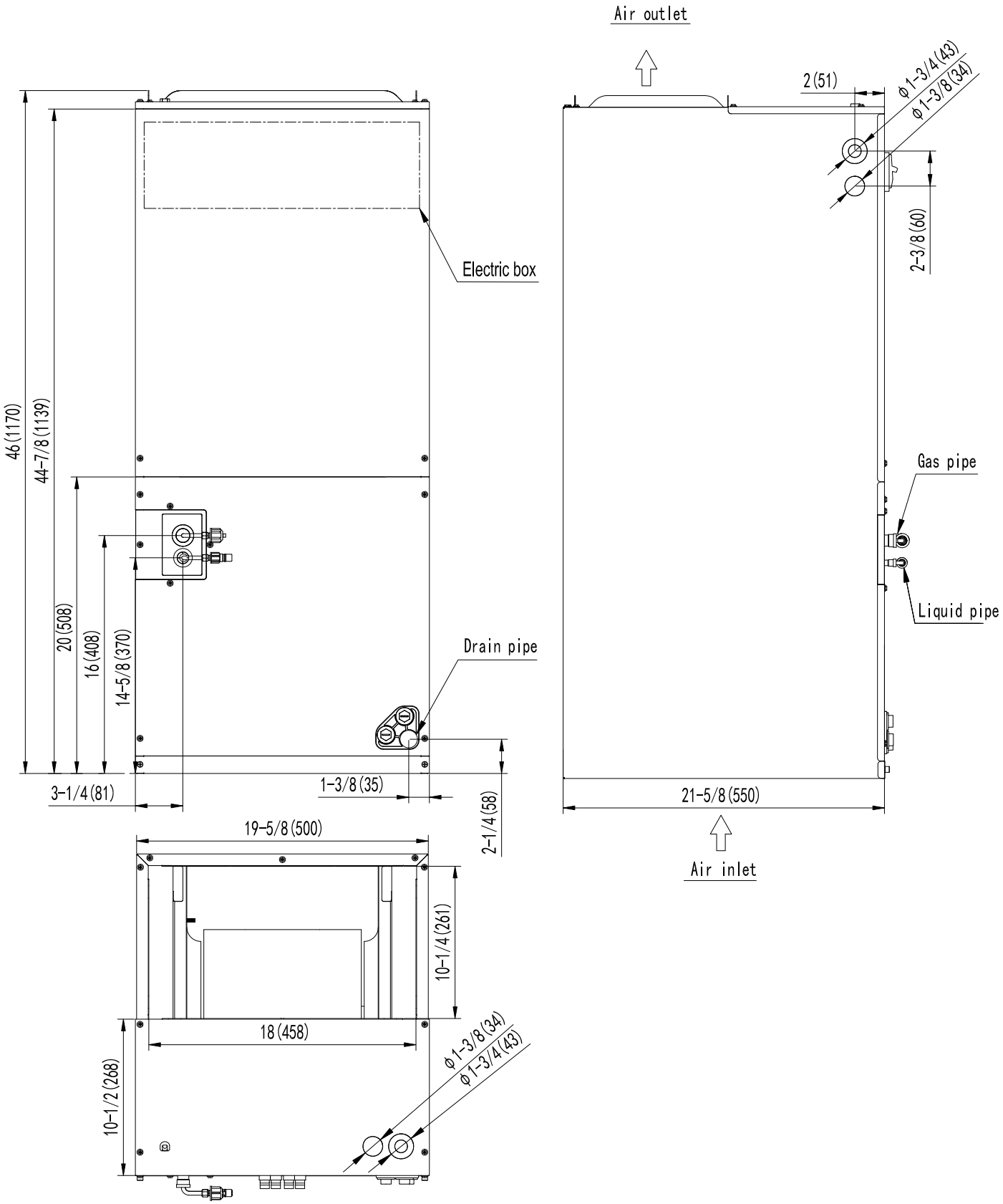


Figure 207 (24k-36k BTU Indoor Unit Dimensions)

SPECIFICATIONS

Dimensions Indoor Unit

48k-60k AHU (WFH48Y223D,WFH60Y223D)

48K/60K

Unit : in.(mm)

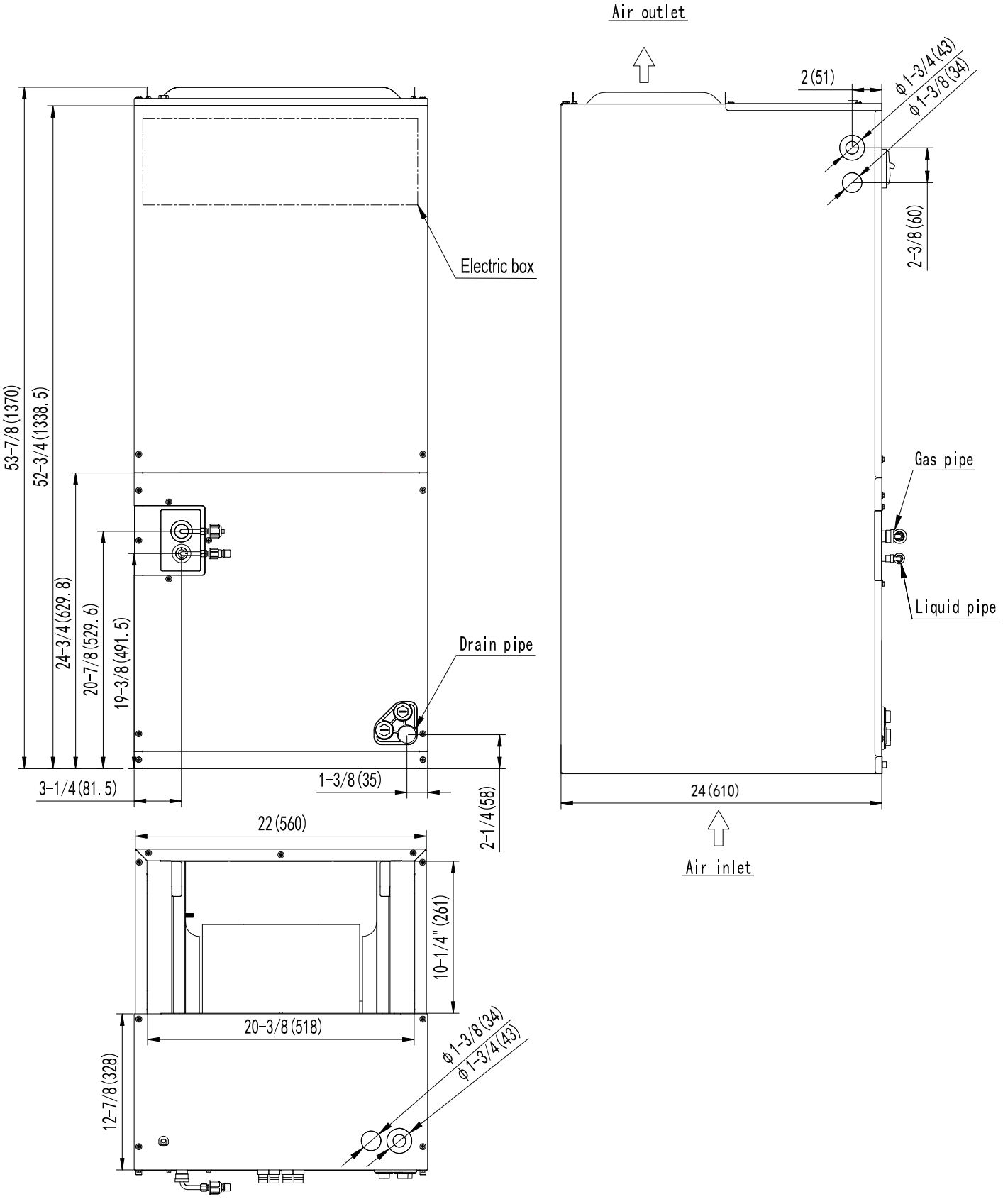


Figure 208 (48k-60k BTU Indoor Unit Dimensions)

SPECIFICATIONS

Dimensions Outdoor Unit

WFPU17Y243D (24K BTU)

Unit : in.(mm)

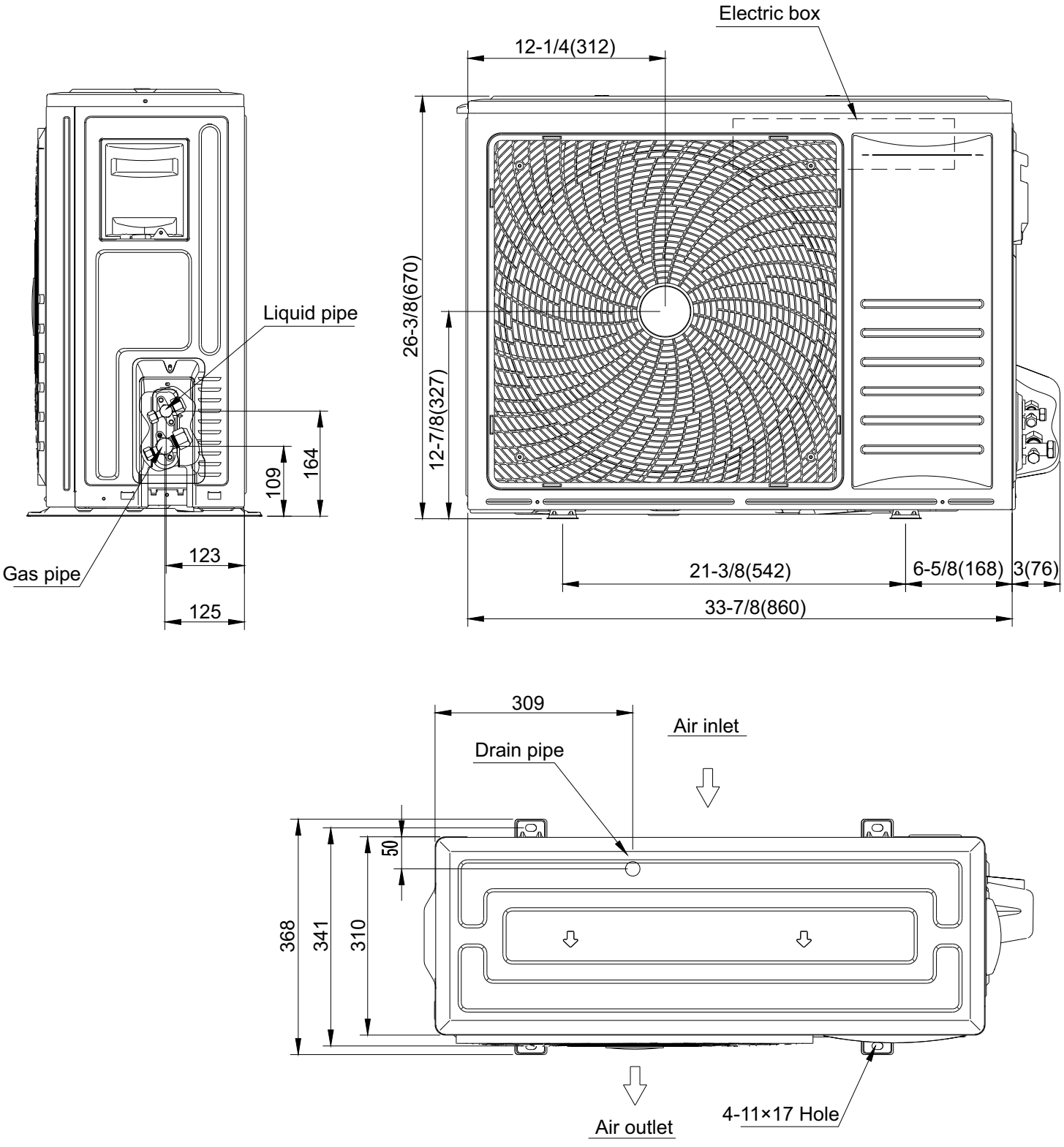


Figure 209 (24k Outdoor Unit Dimensions)

SPECIFICATIONS

Dimensions Outdoor Unit

WFPU17Y363D (36k (BTU)

Unit : in.(mm)

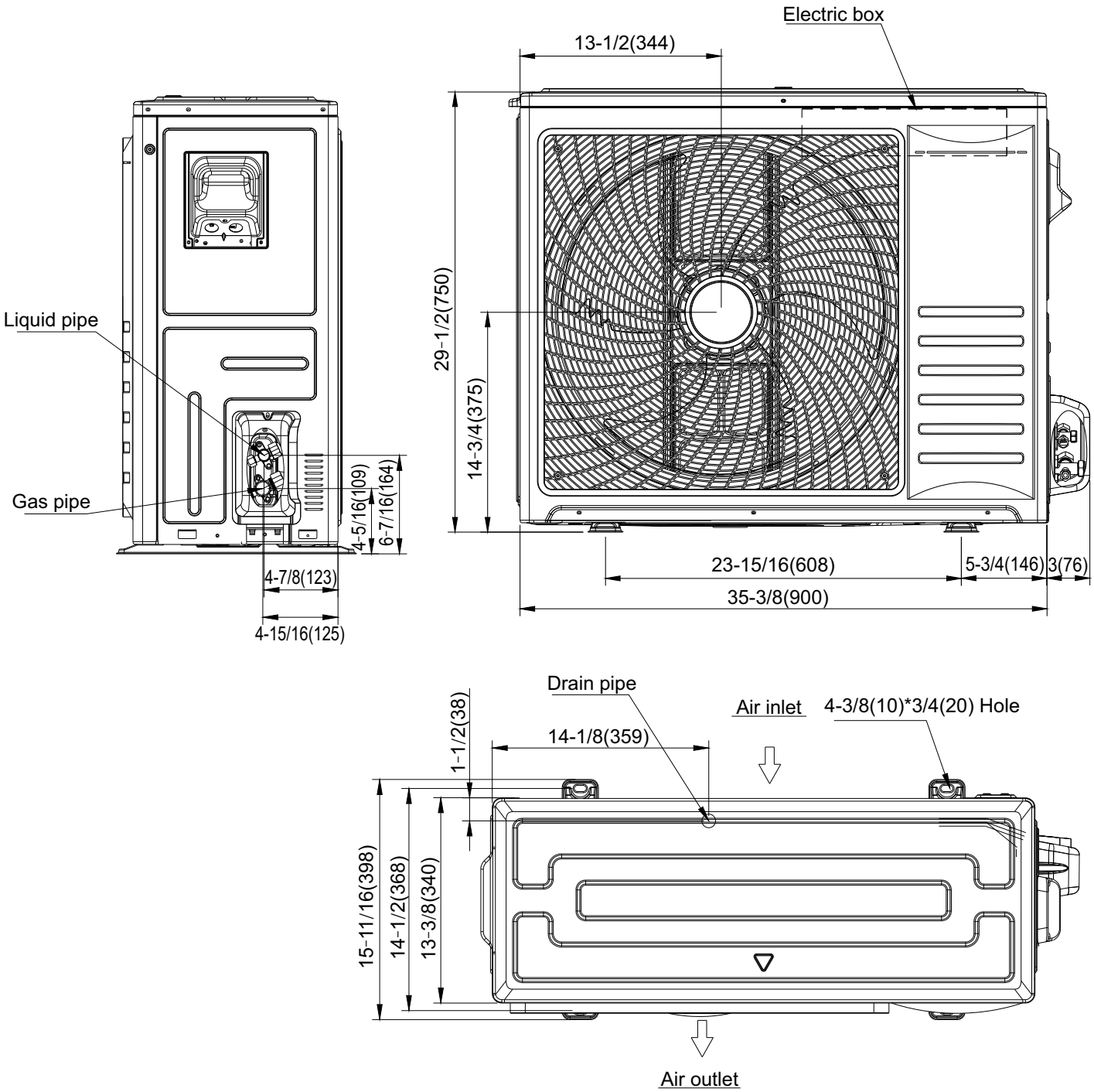


Figure 210 (36k Outdoor Unit Dimensions)

SPECIFICATIONS

Dimensions Outdoor Unit

WFPU17Y483D (48k (BTU), WFPU17Y603D (60k (BTU)

Unit: in.(mm)

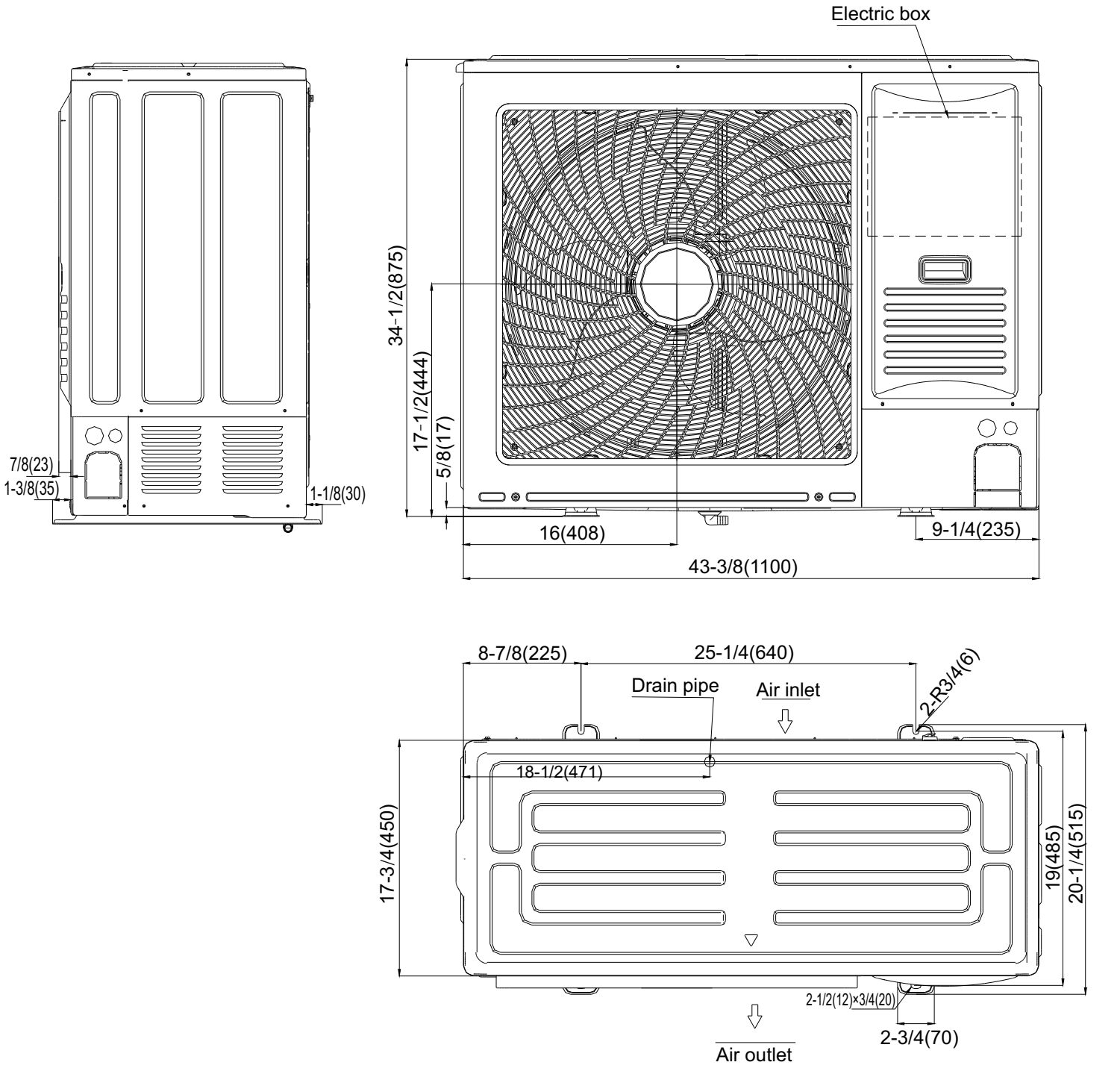


Figure 211 (48-60k BTU Outdoor Unit Dimensions)

SPECIFICATIONS

Capacities and Selection Data - Capacity Characteristics Charts

Conditions:

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

Remarks:
TC:Total Capacity (Gross) (kBtu/h)
S/T: Sensible Capacity Ratio
kW(PI): Power Input (including the compressor & cond. fan motor) (kW) DB:
Dry Bulb Temperature
WB: Wet Bulb Temperature
IDB: Indoor Dry Bulb Temperature
IWB: Indoor Wet Bulb Temperature

SPECIFICATIONS

Capacities and Selection Data - Capacity Characteristics Charts

Performance data (Cooling operation at rated frequency) 24K

outdoor unit matches 24K indoor unit

Airflow (CMF)	Outdoor DB	IWB (°F)	59				63				67				71			
		IDB (°F)	70	75	80	85	70	75	80	85	70	75	80	85	70	75	80	85
600	5	TC	18.6	18.8	19.2	19.4	19.2	19.4	19.6	19.8	20.5	20.7	20.9	21.0	\	25.0	25.2	25.4
		S/T	0.99	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.57	0.73	0.90	\	0.39	0.53	0.67
		kW	1.08	1.09	1.10	1.10	1.10	1.11	1.12	1.13	1.13	1.14	1.15	1.17	\	1.43	1.44	1.46
	25	TC	19.4	19.6	20.0	20.3	20.0	20.3	20.5	20.7	21.4	21.6	21.8	21.9	\	26.1	26.3	26.5
		S/T	0.99	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.57	0.73	0.90	\	0.39	0.53	0.67
		kW	1.20	1.21	1.22	1.22	1.22	1.24	1.24	1.26	1.26	1.27	1.28	1.30	\	1.59	1.60	1.62
	50	TC	20.5	20.7	21.1	21.4	21.1	21.4	21.6	21.8	22.5	22.7	23.0	23.1	\	27.5	27.7	27.9
		S/T	0.99	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.57	0.73	0.90	\	0.39	0.53	0.67
		kW	1.33	1.35	1.36	1.36	1.36	1.37	1.38	1.40	1.40	1.41	1.42	1.44	\	1.76	1.78	1.80
	75	TC	20.5	20.7	21.1	21.4	21.1	21.4	21.6	21.8	22.6	22.8	23.0	23.2	\	27.2	27.4	27.6
		S/T	1.00	1.00	0.99	1.00	0.62	0.83	1.00	1.00	0.39	0.56	0.73	0.90	\	0.39	0.53	0.67
		kW	1.48	1.49	1.51	1.51	1.51	1.53	1.55	1.55	1.55	1.57	1.59	1.61	\	1.94	1.96	1.98
	85	TC	20.2	20.4	20.8	21.1	20.8	21.1	21.3	21.5	22.3	22.5	22.7	22.8	\	26.7	26.9	27.1
		S/T	1.00	1.00	1.00	1.00	0.62	0.84	1.00	1.00	0.39	0.57	0.74	0.91	\	0.39	0.53	0.67
		kW	1.67	1.68	1.70	1.70	1.70	1.72	1.74	1.75	1.75	1.77	1.79	1.80	\	2.20	2.23	2.24
	95	TC	19.8	20.0	20.5	20.7	20.5	20.7	20.9	21.1	21.9	22.1	22.3	22.5	\	26.1	26.3	26.4
		S/T	1.00	1.00	1.00	1.00	0.62	0.84	1.00	1.00	0.39	0.57	0.74	0.92	\	0.39	0.53	0.68
		kW	2.00	2.02	2.05	2.05	2.05	2.06	2.09	2.11	2.12	2.13	2.15	2.18	\	2.62	2.64	2.67
	105	TC	19.4	19.7	20.1	20.3	20.1	20.3	20.5	20.7	21.5	21.7	21.8	22.0	\	25.2	25.3	25.4
		S/T	0.99	1.00	1.00	1.00	0.62	0.84	1.00	1.00	0.39	0.57	0.75	0.93	\	0.39	0.54	0.69
		kW	2.38	2.41	2.43	2.43	2.43	2.46	2.49	2.51	2.51	2.54	2.56	2.58	\	3.04	3.05	3.06
	115	TC	17.4	17.6	18.0	18.2	18.0	18.2	18.4	18.6	19.3	19.5	19.5	19.7	\	20.9	21.1	21.1
		S/T	1.00	1.00	1.00	1.00	0.62	0.85	1.00	1.00	0.40	0.60	0.79	0.99	\	0.39	0.58	0.76
		kW	2.43	2.45	2.48	2.48	2.48	2.51	2.54	2.56	2.58	2.60	2.62	2.62	\	2.70	2.72	2.73
800	5	TC	20.0	20.2	20.7	20.9	20.7	20.9	21.1	21.3	22.2	22.3	22.5	22.7	\	26.7	26.9	27.1
		S/T	0.99	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.57	0.73	0.90	\	0.39	0.53	0.67
		kW	1.26	1.27	1.29	1.29	1.29	1.30	1.31	1.33	1.32	1.34	1.36	1.37	\	1.64	1.66	1.67
	25	TC	20.9	21.1	21.6	21.8	21.6	21.8	22.1	22.3	23.1	23.3	23.5	23.7	\	27.9	28.1	28.3
		S/T	0.99	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.57	0.73	0.90	\	0.39	0.53	0.67
		kW	1.40	1.41	1.43	1.43	1.43	1.45	1.46	1.48	1.47	1.49	1.51	1.52	\	1.82	1.84	1.86
	50	TC	22.0	22.2	22.7	23.0	22.7	23.0	23.2	23.4	24.3	24.5	24.7	24.9	\	29.4	29.6	29.8
		S/T	0.99	1.00	1.00	1.00	0.63	0.86	1.00	1.00	0.39	0.58	0.76	0.94	\	0.39	0.54	0.69
		kW	1.55	1.57	1.59	1.59	1.59	1.61	1.62	1.64	1.63	1.66	1.67	1.69	\	2.02	2.05	2.06
	75	TC	22.0	22.3	22.7	23.0	22.7	23.0	23.2	23.5	24.3	24.6	24.7	24.9	\	29.1	29.4	29.6
		S/T	1.00	1.00	1.00	1.00	0.62	0.85	1.00	1.00	0.39	0.58	0.76	0.94	\	0.39	0.54	0.69
		kW	1.70	1.72	1.74	1.74	1.74	1.75	1.77	1.79	1.79	1.80	1.83	1.85	\	2.12	2.15	2.17
	85	TC	21.6	21.8	22.3	22.6	22.3	22.6	22.8	23.1	23.9	24.1	24.3	24.5	\	28.4	28.6	28.8
		S/T	1.00	1.00	1.00	1.00	0.63	0.86	1.00	1.00	0.39	0.58	0.76	0.95	\	0.39	0.54	0.70
		kW	1.87	1.89	1.92	1.92	1.92	1.93	1.95	1.98	1.98	1.99	2.01	2.04	\	2.45	2.47	2.49
	95	TC	21.4	21.6	22.1	22.3	22.1	22.3	22.5	22.8	23.4	23.8	24.0	24.1	\	27.7	27.8	28.0
		S/T	1.00	1.00	0.99	1.00	0.63	0.87	1.00	1.00	0.39	0.58	0.76	1.00	\	0.39	0.55	0.71
		kW	2.23	2.25	2.28	2.28	2.28	2.30	2.32	2.35	2.36	2.37	2.40	2.42	\	2.88	2.91	2.93
	105	TC	20.8	21.1	21.6	21.8	21.6	21.8	22.0	22.3	23.0	23.2	23.4	23.6	\	25.7	25.7	25.8
		S/T	0.99	1.00	0.99	1.00	0.63	0.87	1.00	1.00	0.39	0.59	0.78	1.00	\	0.39	0.57	0.74
		kW	2.63	2.66	2.68	2.68	2.68	2.72	2.75	2.77	2.78	2.81	2.83	2.85	\	3.12	3.10	3.12
	115	TC	17.3	17.5	17.8	18.0	17.8	18.0	18.2	18.4	19.6	19.7	19.4	19.5	\	20.2	20.3	20.4
		S/T	1.00	1.00	1.00	1.00	0.64	0.88	1.00	1.00	0.40	0.62	0.86	1.00	\	0.40	0.62	0.84
		kW	2.47	2.49	2.52	2.52	2.52	2.55	2.57	2.60	2.64	2.66	2.65	2.67	\	2.69	2.70	2.71

SPECIFICATIONS

Capacities and Selection Data - Capacity Characteristics Charts

Airflow (CMF)	Outdoor DB	IWB (°F)	59				63				67				71			
		IDB (°F)	70	75	80	85	70	75	80	85	70	75	80	85	70	75	80	85
1000	5	TC	21.3	21.5	22.0	22.2	22.0	22.2	22.5	22.7	23.5	23.7	23.9	24.1	\	28.2	28.4	28.8
		S/T	0.99	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.57	0.73	0.90	\	0.39	0.53	0.67
		kW	1.48	1.49	1.50	1.50	1.50	1.52	1.54	1.55	1.55	1.57	1.59	1.60	\	1.87	1.89	1.79
	25	TC	22.2	22.5	22.9	23.2	22.9	23.2	23.5	23.7	24.6	24.8	24.9	25.1	\	29.4	29.6	30.1
		S/T	0.99	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.57	0.73	0.90	\	0.39	0.53	0.67
		kW	1.64	1.65	1.67	1.67	1.67	1.69	1.71	1.72	1.72	1.74	1.76	1.78	\	2.08	2.10	1.99
	50	TC	23.4	23.7	24.1	24.4	24.1	24.4	24.7	25.0	25.9	26.1	26.2	26.4	\	31.0	31.2	31.7
		S/T	0.99	1.00	1.00	1.00	0.64	0.88	1.00	1.00	0.39	0.59	0.78	0.99	\	0.38	0.55	0.71
		kW	1.82	1.84	1.86	1.86	1.86	1.88	1.90	1.92	1.92	1.93	1.96	1.98	\	2.31	2.33	2.21
	75	TC	23.4	23.7	24.3	24.5	24.3	24.5	24.8	25.0	26.0	26.2	26.4	26.6	\	31.7	31.9	31.9
		S/T	0.99	1.00	1.00	1.00	0.63	0.88	1.00	1.00	0.39	0.59	0.78	1.00	\	0.38	0.55	0.71
		kW	1.87	1.89	1.92	1.92	1.92	1.93	1.95	1.98	1.98	1.99	2.01	2.04	\	2.55	2.56	2.56
	85	TC	23.0	23.2	23.7	24.0	23.7	24.0	24.2	24.5	25.5	25.6	25.8	25.9	\	29.9	30.1	30.3
		S/T	0.99	1.00	1.00	1.00	0.64	0.89	1.00	1.00	0.39	0.59	0.79	1.00	\	0.39	0.56	0.73
		kW	2.12	2.13	2.16	2.16	2.16	2.18	2.20	2.23	2.24	2.25	2.27	2.29	\	2.72	2.75	2.76
	95	TC	22.4	22.6	23.1	23.4	23.1	23.4	23.7	23.9	24.8	25.0	25.1	25.3	\	28.5	28.6	28.6
		S/T	1.00	1.00	1.00	1.00	0.64	0.90	1.00	1.00	0.39	0.60	0.80	1.00	\	0.39	0.57	0.75
		kW	2.49	2.51	2.54	2.54	2.54	2.56	2.59	2.62	2.63	2.65	2.67	2.68	\	3.07	3.08	3.08
	105	TC	21.8	22.0	22.5	22.7	22.5	22.7	23.0	23.2	24.1	24.3	24.4	24.6	\	26.0	26.2	26.0
		S/T	1.00	1.00	1.00	1.00	0.65	0.90	1.00	1.00	0.39	0.60	0.81	1.00	\	0.39	0.59	0.79
		kW	2.90	2.93	2.96	2.96	2.96	3.00	3.02	3.06	3.07	3.10	3.12	3.14	\	3.23	3.25	3.19
	115	TC	17.4	17.5	17.9	18.2	17.9	18.2	18.4	18.5	19.3	19.4	19.5	19.6	\	20.7	20.8	20.9
		S/T	1.00	1.00	1.00	1.00	0.66	1.00	1.00	1.00	0.40	0.66	0.93	1.00	\	0.40	0.65	0.90
		kW	2.56	2.59	2.62	2.62	2.62	2.65	2.68	2.70	2.74	2.75	2.76	2.77	\	2.86	2.87	2.87

Performance data (Heating operation at rated frequency) 24K outdoor unit matches 24K indoor unit

Airflow (CFM)	**ID ℉**	ODB (°F)	75	65	55	47	35	25	15	5	-4
		OWB (°F)	64	55	48	43	32	23	13	3	-6
600	60	TC	28.3	28.3	28.2	27.1	23.0	21.4	18.0	16.7	14.6
		kW	1.56	1.66	1.96	2.13	1.98	2.11	1.90	1.89	1.80
	70	TC	21.9	21.7	21.8	21.5	21.5	21.0	17.7	16.4	14.3
		kW	1.16	1.23	1.44	1.69	2.02	2.30	2.09	2.04	1.92
	75	TC	18.4	18.3	18.3	18.3	18.1	18.1	16.7	15.4	13.0
		kW	0.97	1.04	1.21	1.44	1.67	1.96	2.19	2.12	2.00
	80	TC	15.1	15.1	15.1	15.0	15.0	14.8	14.8	14.8	12.8
		kW	0.81	0.86	1.01	1.17	1.39	1.57	1.97	2.15	2.09
800	60	TC	31.6	31.6	30.7	27.4	23.4	21.8	18.3	17.0	14.8
		kW	1.84	1.95	2.16	2.09	1.96	2.10	1.94	1.89	1.81
	70	TC	24.5	24.3	24.1	24.0	22.8	21.3	17.9	16.6	14.5
		kW	1.34	1.44	1.65	1.90	2.14	2.27	2.09	2.04	1.94
	75	TC	20.6	20.6	20.6	20.2	20.3	20.3	17.0	15.6	13.2
		kW	1.13	1.20	1.41	1.60	1.91	2.25	2.18	2.11	2.01
	80	TC	16.9	16.9	16.9	16.8	16.6	16.6	16.6	15.4	13.0
		kW	0.93	0.99	1.15	1.33	1.55	1.80	2.26	2.21	2.09
1000	60	TC	35.2	34.6	31.2	27.9	23.7	22.1	18.6	17.3	15.1
		kW	2.16	2.21	2.15	2.09	1.97	2.11	1.98	1.93	1.85
	70	TC	27.0	27.0	27.0	26.9	23.2	21.7	18.3	17.0	14.8
		kW	1.54	1.64	1.93	2.24	2.14	2.29	2.12	2.07	1.98
	75	TC	23.0	23.0	22.7	22.6	22.6	21.4	17.2	15.9	13.6
		kW	1.31	1.39	1.59	1.86	2.21	2.39	2.21	2.15	2.05
	80	TC	19.0	18.9	18.9	18.8	18.6	18.6	17.0	15.7	13.3
		kW	1.09	1.16	1.33	1.55	1.79	2.08	2.29	2.24	2.12

SPECIFICATIONS

Capacities and Selection Data - Capacity Characteristics Charts

Performance data (Cooling operation at rated frequency) 36K outdoor unit matches 36K indoor unit

Airflow (CMF)	Outdoor DB	IWB (°F)	59				63				67				71			
		IDB (°F)	70	75	80	85	70	75	80	85	70	75	80	85	70	75	80	85
600	5	TC	27.1	27.4	28.0	28.3	28.0	28.3	28.6	28.9	29.9	30.2	30.5	30.6	\	36.5	36.7	37.0
		S/T	0.99	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.57	0.73	0.90	\	0.39	0.53	0.67
		kW	1.60	1.62	1.63	1.63	1.63	1.65	1.66	1.69	1.69	1.70	1.72	1.74	\	2.12	2.14	2.17
	25	TC	28.3	28.6	29.2	29.6	29.2	29.6	29.9	30.2	31.2	31.5	31.8	32.0	\	38.1	38.4	38.6
		S/T	0.99	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.57	0.73	0.90	\	0.39	0.53	0.67
		kW	1.78	1.80	1.81	1.81	1.81	1.84	1.85	1.87	1.87	1.88	1.91	1.93	\	2.36	2.38	2.42
	50	TC	29.8	30.1	30.7	31.1	30.7	31.1	31.4	31.8	32.9	33.2	33.5	33.7	\	40.1	40.4	40.7
		S/T	0.99	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.57	0.73	0.90	\	0.39	0.53	0.67
		kW	1.98	2.00	2.02	2.02	2.02	2.04	2.05	2.08	2.08	2.09	2.12	2.14	\	2.62	2.65	2.68
	75	TC	29.8	30.2	30.8	31.1	30.8	31.1	31.6	31.9	33.0	33.3	33.6	33.8	\	39.7	40.0	40.3
		S/T	1.00	1.00	0.99	1.00	0.62	0.83	1.00	1.00	0.39	0.56	0.73	0.90	\	0.39	0.53	0.67
		kW	2.20	2.22	2.25	2.25	2.25	2.27	2.30	2.31	2.30	2.34	2.36	2.39	\	2.89	2.92	2.94
	85	TC	29.4	29.7	30.3	30.7	30.3	30.7	31.0	31.3	32.5	32.8	33.1	33.3	\	39.0	39.3	39.5
		S/T	1.00	1.00	1.00	1.00	0.62	0.84	1.00	1.00	0.39	0.57	0.74	0.91	\	0.39	0.53	0.67
		kW	2.48	2.50	2.53	2.53	2.53	2.56	2.58	2.61	2.61	2.63	2.66	2.68	\	3.27	3.31	3.34
	95	TC	28.9	29.2	29.8	30.2	29.8	30.2	30.5	30.8	32.0	32.3	32.5	32.8	\	38.0	38.3	38.6
		S/T	1.00	1.00	1.00	1.00	0.62	0.84	1.00	1.00	0.39	0.57	0.74	0.92	\	0.39	0.53	0.68
		kW	2.98	3.00	3.04	3.04	3.04	3.07	3.11	3.13	3.15	3.17	3.20	3.24	\	3.90	3.93	3.97
	105	TC	28.3	28.7	29.3	29.6	29.3	29.6	29.9	30.2	31.3	31.7	31.9	32.1	\	36.7	36.8	37.0
		S/T	0.99	1.00	1.00	1.00	0.62	0.84	1.00	1.00	0.39	0.57	0.75	0.93	\	0.39	0.54	0.69
		kW	3.54	3.58	3.62	3.62	3.62	3.66	3.70	3.74	3.74	3.78	3.80	3.84	\	4.52	4.53	4.55
	115	TC	25.4	25.7	26.3	26.5	26.3	26.5	26.8	27.1	28.2	28.4	28.5	28.7	\	30.5	30.7	30.8
		S/T	1.00	1.00	1.00	1.00	0.62	0.85	1.00	1.00	0.40	0.60	0.79	0.99	\	0.39	0.58	0.76
		kW	3.61	3.65	3.69	3.69	3.69	3.74	3.78	3.81	3.84	3.87	3.89	3.90	\	4.02	4.05	4.06
800	5	TC	29.2	29.4	30.2	30.5	30.2	30.5	30.8	31.1	32.3	32.5	32.8	33.1	\	39.0	39.2	39.5
		S/T	0.99	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.57	0.73	0.90	\	0.39	0.53	0.67
		kW	1.87	1.89	1.91	1.91	1.91	1.93	1.96	1.98	1.97	2.00	2.02	2.04	\	2.43	2.47	2.49
	25	TC	30.5	30.7	31.5	31.8	31.5	31.8	32.2	32.5	33.7	33.9	34.2	34.5	\	40.7	41.0	41.2
		S/T	0.99	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.57	0.73	0.90	\	0.39	0.53	0.67
		kW	2.08	2.10	2.13	2.13	2.13	2.15	2.17	2.20	2.18	2.22	2.24	2.27	\	2.70	2.74	2.76
	50	TC	32.1	32.4	33.2	33.5	33.2	33.5	33.9	34.2	35.5	35.7	36.0	36.3	\	42.8	43.1	43.4
		S/T	0.99	1.00	1.00	1.00	0.63	0.86	1.00	1.00	0.39	0.58	0.76	0.94	\	0.39	0.54	0.69
		kW	2.31	2.34	2.36	2.36	2.36	2.39	2.41	2.44	2.43	2.47	2.49	2.52	\	3.00	3.04	3.07
	75	TC	32.1	32.5	33.2	33.5	33.2	33.5	33.9	34.3	35.5	35.8	36.0	36.3	\	42.5	42.8	43.1
		S/T	1.00	1.00	1.00	1.00	0.62	0.85	1.00	1.00	0.39	0.58	0.76	0.94	\	0.39	0.54	0.69
		kW	2.53	2.56	2.58	2.58	2.58	2.61	2.63	2.66	2.66	2.68	2.72	2.75	\	3.16	3.20	3.22
	85	TC	31.6	31.9	32.6	33.0	32.6	33.0	33.3	33.7	34.9	35.2	35.4	35.7	\	41.4	41.7	42.0
		S/T	1.00	1.00	1.00	1.00	0.63	0.86	1.00	1.00	0.39	0.58	0.76	0.95	\	0.39	0.54	0.70
		kW	2.79	2.81	2.85	2.85	2.85	2.88	2.90	2.94	2.94	2.97	2.99	3.03	\	3.65	3.67	3.71
	95	TC	31.1	31.6	32.3	32.6	32.3	32.6	32.9	33.3	34.2	34.7	35.0	35.2	\	40.4	40.6	40.8
		S/T	1.00	1.00	0.99	1.00	0.63	0.87	1.00	1.00	0.39	0.58	0.76	1.00	\	0.39	0.55	0.71
		kW	3.31	3.35	3.39	3.39	3.39	3.42	3.45	3.49	3.51	3.53	3.57	3.60	\	4.29	4.33	4.35
	105	TC	30.3	30.7	31.4	31.8	31.4	31.8	32.1	32.5	33.5	33.9	34.1	34.4	\	37.4	37.4	37.6
		S/T	0.99	1.00	0.99	1.00	0.63	0.87	1.00	1.00	0.39	0.59	0.78	1.00	\	0.39	0.57	0.74
		kW	3.92	3.96	3.99	3.99	3.99	4.05	4.08	4.12	4.14	4.17	4.21	4.24	\	4.64	4.61	4.64
	115	TC	25.2	25.5	26.0	26.3	26.0	26.3	26.6	26.9	28.6	28.7	28.3	28.4	\	29.5	29.6	29.7
		S/T	1.00	1.00	1.00	1.00	0.64	0.88	1.00	1.00	0.40	0.62	0.86	1.00	\	0.40	0.62	0.84
		kW	3.67	3.71	3.75	3.75	3.75	3.79	3.83	3.87	3.93	3.96	3.94	3.97	\	4.01	4.02	4.03

SPECIFICATIONS

Capacities and Selection Data - Capacity Characteristics Charts

Airflow (CMF)	Outdoor DB	IWB (°F)	59				63				67				71			
		IDB (°F)	70	75	80	85	70	75	80	85	70	75	80	85	70	75	80	85
1000	5	TC	31.0	31.4	32.0	32.4	32.0	32.4	32.8	33.1	34.3	34.6	34.8	35.1	\	41.1	41.4	42.0
		S/T	0.99	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.57	0.73	0.90	\	0.39	0.53	0.67
		kW	2.19	2.22	2.24	2.24	2.24	2.27	2.29	2.31	2.31	2.33	2.36	2.38	\	2.79	2.81	2.66
	25	TC	32.4	32.8	33.4	33.8	33.4	33.8	34.2	34.6	35.9	36.1	36.3	36.6	\	42.9	43.2	43.9
		S/T	0.99	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.57	0.73	0.90	\	0.39	0.53	0.67
		kW	2.44	2.46	2.48	2.48	2.48	2.52	2.54	2.57	2.57	2.59	2.62	2.65	\	3.10	3.12	2.96
	50	TC	34.1	34.5	35.2	35.6	35.2	35.6	36.0	36.4	37.7	38.0	38.2	38.6	\	45.1	45.4	46.2
		S/T	0.99	1.00	1.00	1.00	0.64	0.88	1.00	1.00	0.39	0.59	0.78	0.99	\	0.38	0.55	0.71
		kW	2.71	2.74	2.76	2.76	2.76	2.80	2.83	2.85	2.85	2.88	2.92	2.94	\	3.44	3.47	3.29
	75	TC	34.2	34.6	35.4	35.7	35.4	35.7	36.1	36.5	37.9	38.1	38.4	38.8	\	46.3	46.5	46.6
		S/T	0.99	1.00	1.00	1.00	0.63	0.88	1.00	1.00	0.39	0.59	0.78	1.00	\	0.38	0.55	0.71
		kW	2.79	2.81	2.85	2.85	2.85	2.88	2.90	2.94	2.94	2.97	2.99	3.03	\	3.79	3.80	3.80
	85	TC	33.5	33.9	34.6	35.0	34.6	35.0	35.3	35.7	37.1	37.3	37.6	37.8	\	43.6	43.8	44.1
		S/T	0.99	1.00	1.00	1.00	0.64	0.89	1.00	1.00	0.39	0.59	0.79	1.00	\	0.39	0.56	0.73
		kW	3.15	3.17	3.21	3.21	3.21	3.25	3.27	3.31	3.33	3.35	3.38	3.40	\	4.05	4.08	4.11
	95	TC	32.7	33.0	33.7	34.1	33.7	34.1	34.5	34.8	36.2	36.4	36.6	36.9	\	41.5	41.7	41.7
		S/T	1.00	1.00	1.00	1.00	0.64	0.90	1.00	1.00	0.39	0.60	0.80	1.00	\	0.39	0.57	0.75
		kW	3.70	3.74	3.78	3.78	3.78	3.81	3.85	3.89	3.92	3.94	3.97	3.99	\	4.57	4.58	4.58
	105	TC	31.8	32.1	32.8	33.2	32.8	33.2	33.5	33.9	35.2	35.4	35.6	35.9	\	37.9	38.1	37.9
		S/T	1.00	1.00	1.00	1.00	0.65	0.90	1.00	1.00	0.39	0.60	0.81	1.00	\	0.39	0.59	0.79
		kW	4.31	4.35	4.40	4.40	4.40	4.46	4.49	4.55	4.57	4.61	4.64	4.67	\	4.80	4.83	4.75
	115	TC	25.4	25.6	26.2	26.5	26.2	26.5	26.8	27.0	28.2	28.3	28.4	28.6	\	30.2	30.3	30.4
		S/T	1.00	1.00	1.00	1.00	0.66	1.00	1.00	1.00	0.40	0.66	0.93	1.00	\	0.40	0.65	0.90
		kW	3.81	3.85	3.90	3.90	3.90	3.94	3.98	4.02	4.07	4.08	4.11	4.12	\	4.25	4.26	4.28

Performance data (Heating operation at rated frequency) 36K

outdoor unit matches 36K indoor unit

Airflow (CFM)	**ID ℉**	ODB (°F)	75	65	55	47	35	25	15	5	-4
		OWB (°F)	64	55	48	43	32	23	13	3	-6
600	60	TC	42.4	42.4	42.3	40.7	34.6	32.2	27.0	25.0	21.8
		kW	2.34	2.51	2.95	3.20	2.98	3.18	2.90	2.85	2.71
	70	TC	32.8	32.6	32.7	32.3	32.3	31.6	26.5	24.6	21.4
		kW	1.75	1.85	2.17	2.54	3.04	3.46	3.15	3.06	2.89
	75	TC	27.6	27.5	27.5	27.5	27.1	27.1	25.0	23.1	19.6
		kW	1.46	1.57	1.83	2.16	2.52	2.95	3.29	3.19	3.01
	80	TC	22.7	22.7	22.7	22.6	22.4	22.2	22.2	22.2	19.2
		kW	1.21	1.29	1.52	1.76	2.10	2.37	2.97	3.24	3.14
800	60	TC	47.4	47.4	46.0	41.2	35.1	32.7	27.5	25.6	22.2
		kW	2.77	2.94	3.26	3.14	2.95	3.16	2.92	2.85	2.72
	70	TC	36.7	36.5	36.2	36.0	34.2	32.0	26.9	24.9	21.7
		kW	2.02	2.16	2.48	2.86	3.21	3.42	3.15	3.06	2.91
	75	TC	30.9	30.8	30.8	30.3	30.4	30.4	25.4	23.4	19.9
		kW	1.70	1.81	2.12	2.41	2.88	3.39	3.28	3.18	3.02
	80	TC	25.3	25.3	25.3	25.2	24.9	24.8	24.9	23.1	19.6
		kW	1.40	1.48	1.73	2.00	2.33	2.71	3.40	3.32	3.14
1000	60	TC	52.8	51.9	46.9	41.9	35.6	33.2	27.9	26.0	22.7
		kW	3.26	3.33	3.24	3.14	2.97	3.18	2.98	2.90	2.78
	70	TC	40.6	40.4	40.4	40.3	34.8	32.5	27.4	25.4	22.1
		kW	2.32	2.47	2.90	3.38	3.23	3.44	3.19	3.12	2.98
	75	TC	34.6	34.4	34.0	33.9	33.9	32.1	25.9	23.8	20.4
		kW	1.98	2.10	2.39	2.80	3.32	3.59	3.32	3.24	3.09
	80	TC	28.4	28.3	28.3	28.2	27.8	27.8	25.6	23.5	20.0
		kW	1.65	1.74	2.00	2.33	2.70	3.13	3.45	3.37	3.19

SPECIFICATIONS

Capacities and Selection Data - Capacity Characteristics Charts

Performance data (Cooling operation at rated frequency) 48K

outdoor unit matches 48K indoor unit

Airflow (CMF)	Outdoor DB	IWB (°F)	59				63				67				71			
		IDB (°F)	70	75	80	85	70	75	80	85	70	75	80	85	70	75	80	85
600	5	TC	37.2	37.6	38.4	38.9	38.4	38.9	39.2	39.6	41.0	41.4	41.8	42.0	\	50.0	50.4	50.8
		S/T	0.99	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.57	0.73	0.90	\	0.39	0.53	0.67
		kW	2.15	2.18	2.20	2.20	2.20	2.22	2.24	2.27	2.27	2.28	2.31	2.34	\	2.85	2.88	2.92
	25	TC	38.9	39.3	40.0	40.6	40.0	40.6	41.0	41.4	42.8	43.2	43.6	43.9	\	52.2	52.6	53.0
		S/T	0.99	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.57	0.73	0.90	\	0.39	0.53	0.67
		kW	2.39	2.42	2.44	2.44	2.44	2.47	2.49	2.52	2.52	2.53	2.56	2.60	\	3.17	3.20	3.25
	50	TC	40.9	41.3	42.2	42.7	42.2	42.7	43.1	43.5	45.1	45.5	45.9	46.2	\	55.0	55.4	55.8
		S/T	0.99	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.57	0.73	0.90	\	0.39	0.53	0.67
		kW	2.66	2.69	2.71	2.71	2.71	2.75	2.76	2.80	2.80	2.81	2.85	2.88	\	3.52	3.56	3.61
	75	TC	40.9	41.5	42.3	42.7	42.3	42.7	43.3	43.7	45.2	45.6	46.1	46.3	\	54.4	54.8	55.2
		S/T	1.00	1.00	0.99	1.00	0.62	0.83	1.00	1.00	0.39	0.56	0.73	0.90	\	0.39	0.53	0.67
		kW	2.95	2.99	3.02	3.02	3.02	3.06	3.09	3.11	3.09	3.14	3.18	3.21	\	3.88	3.92	3.95
	85	TC	40.3	40.8	41.6	42.2	41.6	42.2	42.6	43.0	44.5	44.9	45.4	45.6	\	53.4	53.8	54.1
		S/T	1.00	1.00	1.00	1.00	0.62	0.84	1.00	1.00	0.39	0.57	0.74	0.91	\	0.39	0.53	0.67
		kW	3.33	3.37	3.40	3.40	3.40	3.44	3.47	3.51	3.51	3.54	3.57	3.61	\	4.40	4.45	4.49
	95	TC	39.7	40.1	40.9	41.5	40.9	41.5	41.9	42.3	43.8	44.2	44.5	44.9	\	52.2	52.6	52.9
		S/T	1.00	1.00	1.00	1.00	0.62	0.84	1.00	1.00	0.39	0.57	0.74	0.92	\	0.39	0.53	0.68
		kW	4.01	4.04	4.09	4.09	4.09	4.13	4.18	4.21	4.23	4.26	4.30	4.35	\	5.25	5.28	5.34
	105	TC	38.8	39.4	40.2	40.6	40.2	40.6	41.0	41.5	43.0	43.4	43.7	44.0	\	50.4	50.5	50.8
		S/T	0.99	1.00	1.00	1.00	0.62	0.84	1.00	1.00	0.39	0.57	0.75	0.93	\	0.39	0.54	0.69
		kW	4.77	4.82	4.87	4.87	4.87	4.92	4.97	5.02	5.02	5.08	5.11	5.16	\	6.08	6.09	6.11
	115	TC	34.8	35.2	36.0	36.3	36.0	36.3	36.7	37.1	38.7	39.0	39.1	39.4	\	41.9	42.2	42.3
		S/T	1.00	1.00	1.00	1.00	0.62	0.85	1.00	1.00	0.40	0.60	0.79	0.99	\	0.39	0.58	0.76
		kW	4.85	4.90	4.96	4.96	4.96	5.02	5.08	5.13	5.16	5.20	5.23	5.25	\	5.40	5.44	5.46
800	5	TC	40.0	40.4	41.4	41.8	41.4	41.8	42.3	42.7	44.3	44.6	44.9	45.3	\	53.4	53.8	54.2
		S/T	0.99	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.57	0.73	0.90	\	0.39	0.53	0.67
		kW	2.52	2.55	2.57	2.57	2.57	2.60	2.63	2.66	2.64	2.69	2.71	2.74	\	3.27	3.31	3.34
	25	TC	41.8	42.2	43.2	43.6	43.2	43.6	44.1	44.5	46.3	46.5	46.9	47.3	\	55.8	56.2	56.6
		S/T	0.99	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.57	0.73	0.90	\	0.39	0.53	0.67
		kW	2.80	2.83	2.86	2.86	2.86	2.89	2.92	2.95	2.94	2.98	3.01	3.05	\	3.64	3.68	3.71
	50	TC	44.0	44.4	45.5	45.9	45.5	45.9	46.5	46.9	48.7	49.0	49.4	49.8	\	58.7	59.1	59.5
		S/T	0.99	1.00	1.00	1.00	0.63	0.86	1.00	1.00	0.39	0.58	0.76	0.94	\	0.39	0.54	0.69
		kW	3.11	3.14	3.18	3.18	3.18	3.21	3.25	3.28	3.26	3.32	3.35	3.38	\	4.04	4.09	4.13
	75	TC	44.0	44.5	45.5	45.9	45.5	45.9	46.5	47.0	48.7	49.1	49.4	49.8	\	58.3	58.7	59.1
		S/T	1.00	1.00	1.00	1.00	0.62	0.85	1.00	1.00	0.39	0.58	0.76	0.94	\	0.39	0.54	0.69
		kW	3.40	3.44	3.47	3.47	3.47	3.51	3.54	3.57	3.57	3.61	3.66	3.69	\	4.25	4.30	4.33
	85	TC	43.3	43.7	44.7	45.2	44.7	45.2	45.6	46.2	47.9	48.3	48.6	49.0	\	56.8	57.2	57.6
		S/T	1.00	1.00	1.00	1.00	0.63	0.86	1.00	1.00	0.39	0.58	0.76	0.95	\	0.39	0.54	0.70
		kW	3.75	3.78	3.83	3.83	3.83	3.87	3.90	3.95	3.95	3.99	4.02	4.07	\	4.90	4.94	4.99
	95	TC	42.7	43.3	44.2	44.7	44.2	44.7	45.1	45.6	46.9	47.6	48.0	48.3	\	55.4	55.7	55.9
		S/T	1.00	1.00	0.99	1.00	0.63	0.87	1.00	1.00	0.39	0.58	0.76	1.00	\	0.39	0.55	0.71
		kW	4.45	4.51	4.56	4.56	4.56	4.59	4.64	4.70	4.71	4.75	4.80	4.83	\	5.77	5.82	5.85
	105	TC	41.6	42.2	43.1	43.5	43.1	43.5	44.0	44.5	45.9	46.5	46.7	47.2	\	51.3	51.3	51.6
		S/T	0.99	1.00	0.99	1.00	0.63	0.87	1.00	1.00	0.39	0.59	0.78	1.00	\	0.39	0.57	0.74
		kW	5.27	5.32	5.37	5.37	5.37	5.44	5.49	5.54	5.56	5.61	5.66	5.70	\	6.23	6.20	6.23
	115	TC	34.5	34.9	35.6	36.0	35.6	36.0	36.5	36.9	39.2	39.4	38.8	39.0	\	40.5	40.6	40.8
		S/T	1.00	1.00	1.00	1.00	0.64	0.88	1.00	1.00	0.40	0.62	0.86	1.00	\	0.40	0.62	0.84
		kW	4.94	4.99	5.04	5.04	5.04	5.09	5.15	5.20	5.28	5.32	5.30	5.34	\	5.39	5.40	5.42

SPECIFICATIONS

Capacities and Selection Data - Capacity Characteristics Charts

Airflow (CMF)	Outdoor DB	IWB (°F)	59				63				67				71			
		IDB (°F)	70	75	80	85	70	75	80	85	70	75	80	85	70	75	80	85
1000	5	TC	42.5	43.0	43.9	44.4	43.9	44.4	44.9	45.5	47.1	47.5	47.7	48.1	\	56.3	56.7	57.6
		S/T	0.99	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.57	0.73	0.90	\	0.39	0.53	0.67
		kW	2.95	2.98	3.01	3.01	3.01	3.05	3.08	3.10	3.10	3.13	3.17	3.20	\	3.75	3.78	3.58
	25	TC	44.4	44.9	45.9	46.4	45.9	46.4	46.9	47.5	49.2	49.6	49.8	50.2	\	58.8	59.2	60.1
		S/T	0.99	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.57	0.73	0.90	\	0.39	0.53	0.67
		kW	3.28	3.31	3.34	3.34	3.34	3.39	3.42	3.45	3.45	3.48	3.53	3.56	\	4.16	4.20	3.98
	50	TC	46.7	47.3	48.3	48.8	48.3	48.8	49.4	49.9	51.8	52.2	52.5	52.9	\	61.9	62.3	63.3
		S/T	0.99	1.00	1.00	1.00	0.64	0.88	1.00	1.00	0.39	0.59	0.78	0.99	\	0.38	0.55	0.71
		kW	3.64	3.68	3.71	3.71	3.71	3.76	3.80	3.83	3.83	3.87	3.92	3.95	\	4.63	4.66	4.42
	75	TC	46.9	47.4	48.6	49.0	48.6	49.0	49.5	50.1	52.0	52.3	52.7	53.1	\	63.4	63.7	63.9
		S/T	0.99	1.00	1.00	1.00	0.63	0.88	1.00	1.00	0.39	0.59	0.78	1.00	\	0.38	0.55	0.71
		kW	3.75	3.78	3.83	3.83	3.83	3.87	3.90	3.95	3.95	3.99	4.02	4.07	\	5.09	5.11	5.11
	85	TC	45.9	46.5	47.4	48.0	47.4	48.0	48.4	49.0	50.9	51.2	51.6	51.9	\	59.8	60.1	60.5
		S/T	0.99	1.00	1.00	1.00	0.64	0.89	1.00	1.00	0.39	0.59	0.79	1.00	\	0.39	0.56	0.73
		kW	4.23	4.26	4.32	4.32	4.32	4.37	4.40	4.45	4.47	4.51	4.54	4.58	\	5.44	5.49	5.53
	95	TC	44.8	45.2	46.2	46.7	46.2	46.7	47.3	47.7	49.7	49.9	50.2	50.6	\	56.9	57.2	57.2
		S/T	1.00	1.00	1.00	1.00	0.64	0.90	1.00	1.00	0.39	0.60	0.80	1.00	\	0.39	0.57	0.75
		kW	4.97	5.02	5.08	5.08	5.08	5.13	5.18	5.23	5.27	5.30	5.34	5.37	\	6.15	6.16	6.16
	105	TC	43.5	44.0	44.9	45.5	44.9	45.5	45.9	46.5	48.3	48.6	48.8	49.3	\	52.0	52.3	52.0
		S/T	1.00	1.00	1.00	1.00	0.65	0.90	1.00	1.00	0.39	0.60	0.81	1.00	\	0.39	0.59	0.79
		kW	5.80	5.85	5.92	5.92	5.92	5.99	6.04	6.11	6.15	6.20	6.23	6.28	\	6.46	6.49	6.39
	115	TC	34.8	35.1	35.9	36.3	35.9	36.3	36.7	37.0	38.7	38.8	39.0	39.2	\	41.5	41.6	41.7
		S/T	1.00	1.00	1.00	1.00	0.66	1.00	1.00	1.00	0.40	0.66	0.93	1.00	\	0.40	0.65	0.90
		kW	5.13	5.18	5.25	5.25	5.25	5.30	5.35	5.40	5.47	5.49	5.53	5.54	\	5.72	5.73	5.75

Performance data (Heating operation at rated frequency) 48K

outdoor unit matches 48K indoor unit

Airflow (CFM)	**ID ℉**	ODB (°F)	75	65	55	47	35	25	15	5	-4
		OWB (°F)	64	55	48	43	32	23	13	3	-6
600	60	TC	56.6	56.6	56.4	54.2	46.1	42.9	36.0	33.4	29.1
		kW	3.08	3.29	3.87	4.21	3.92	4.18	3.80	3.75	3.56
	70	TC	43.7	43.4	43.6	43.0	43.0	42.1	35.3	32.8	28.6
		kW	2.30	2.43	2.86	3.34	4.00	4.55	4.14	4.03	3.80
	75	TC	36.8	36.7	36.7	36.7	36.1	36.1	33.4	30.8	26.1
		kW	1.92	2.06	2.40	2.84	3.31	3.87	4.33	4.20	3.96
	80	TC	30.2	30.2	30.2	30.1	29.9	29.7	29.7	29.7	25.7
		kW	1.6	1.70	1.99	2.32	2.76	3.11	3.90	4.25	4.13
800	60	TC	63.2	63.2	61.4	54.9	46.8	43.6	36.7	34.1	29.7
		kW	3.65	3.86	4.28	4.13	3.87	4.16	3.84	3.75	3.58
	70	TC	49.0	48.7	48.3	48.0	45.7	42.6	35.9	33.2	29.0
		kW	2.66	2.84	3.27	3.76	4.23	4.50	4.14	4.03	3.83
	75	TC	41.2	41.1	41.1	40.4	40.6	40.6	33.9	31.2	26.5
		kW	2.23	2.37	2.78	3.17	3.79	4.45	4.31	4.18	3.97
	80	TC	33.8	33.8	33.8	33.7	33.2	33.1	33.2	30.8	26.1
		kW	1.84	1.95	2.28	2.63	3.07	3.56	4.47	4.37	4.13
1000	60	TC	70.3	69.2	62.5	55.9	47.4	44.3	37.2	34.6	30.2
		kW	4.28	4.38	4.25	4.13	3.90	4.18	3.92	3.82	3.66
	70	TC	54.1	53.9	53.9	53.8	46.3	43.3	36.6	33.9	29.5
		kW	3.05	3.25	3.82	4.44	4.24	4.52	4.20	4.10	3.92
	75	TC	46.1	45.9	45.4	45.2	45.2	42.8	34.5	31.7	27.2
		kW	2.60	2.76	3.14	3.68	4.37	4.72	4.37	4.25	4.06
	80	TC	37.9	37.8	37.8	37.7	37.1	37.1	34.1	31.3	26.6
		kW	2.16	2.29	2.63	3.07	3.55	4.11	4.54	4.42	4.20

SPECIFICATIONS

Capacities and Selection Data - Capacity Characteristics Charts

Performance data (Cooling operation at rated frequency) 60K outdoor unit matches 60K indoor unit

Airflow (CMF)	Outdoor DB	IWB (°F)	59				63				67				71			
		IDB (°F)	70	75	80	85	70	75	80	85	70	75	80	85	70	75	80	85
600	5	TC	41.9	42.3	43.2	43.7	43.2	43.7	44.2	44.6	46.1	46.6	47.0	47.3	\	56.3	56.7	57.1
		S/T	0.99	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.57	0.73	0.90	\	0.39	0.53	0.67
		kW	2.75	2.79	2.81	2.81	2.81	2.84	2.86	2.90	2.90	2.92	2.95	2.99	\	3.65	3.69	3.74
	25	TC	43.7	44.2	45.1	45.6	45.1	45.6	46.1	46.5	48.2	48.6	49.1	49.4	\	58.7	59.2	59.6
		S/T	0.99	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.57	0.73	0.90	\	0.39	0.53	0.67
		kW	3.06	3.10	3.12	3.12	3.12	3.16	3.18	3.22	3.22	3.24	3.28	3.32	\	4.06	4.09	4.15
	50	TC	46.0	46.5	47.4	48.1	47.4	48.1	48.5	49.0	50.7	51.2	51.7	52.0	\	61.8	62.3	62.8
		S/T	0.99	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.57	0.73	0.90	\	0.39	0.53	0.67
		kW	3.40	3.45	3.47	3.47	3.47	3.51	3.53	3.58	3.58	3.60	3.64	3.69	\	4.51	4.55	4.62
	75	TC	46.0	46.6	47.6	48.1	47.6	48.1	48.7	49.1	50.9	51.3	51.8	52.1	\	61.2	61.7	62.1
		S/T	1.00	1.00	0.99	1.00	0.62	0.83	1.00	1.00	0.39	0.56	0.73	0.90	\	0.39	0.53	0.67
		kW	3.78	3.82	3.87	3.87	3.87	3.91	3.95	3.98	3.95	4.02	4.06	4.11	\	4.97	5.01	5.06
	85	TC	45.4	45.9	46.8	47.4	46.8	47.4	47.9	48.4	50.1	50.6	51.0	51.3	\	60.1	60.6	60.9
		S/T	1.00	1.00	1.00	1.00	0.62	0.84	1.00	1.00	0.39	0.57	0.74	0.91	\	0.39	0.53	0.67
		kW	4.26	4.31	4.35	4.35	4.35	4.40	4.44	4.48	4.48	4.53	4.57	4.62	\	5.63	5.70	5.74
	95	TC	44.6	45.1	46.0	46.6	46.0	46.6	47.1	47.6	49.3	49.8	50.1	50.6	\	58.7	59.2	59.5
		S/T	1.00	1.00	1.00	1.00	0.62	0.84	1.00	1.00	0.39	0.57	0.74	0.92	\	0.39	0.53	0.68
		kW	5.12	5.17	5.23	5.23	5.23	5.28	5.34	5.39	5.41	5.46	5.50	5.57	\	6.71	6.76	6.82
	105	TC	43.7	44.3	45.2	45.7	45.2	45.7	46.2	46.6	48.4	48.8	49.1	49.5	\	56.7	56.8	57.1
		S/T	0.99	1.00	1.00	1.00	0.62	0.84	1.00	1.00	0.39	0.57	0.75	0.93	\	0.39	0.54	0.69
		kW	6.10	6.16	6.23	6.23	6.23	6.29	6.36	6.43	6.43	6.49	6.54	6.60	\	7.77	7.80	7.82
	115	TC	39.1	39.6	40.5	40.9	40.5	40.9	41.3	41.8	43.5	43.8	44.0	44.3	\	47.1	47.4	47.6
		S/T	1.00	1.00	1.00	1.00	0.62	0.85	1.00	1.00	0.40	0.60	0.79	0.99	\	0.39	0.58	0.76
		kW	6.21	6.27	6.34	6.34	6.34	6.43	6.49	6.56	6.60	6.65	6.69	6.71	\	6.91	6.96	6.98
800	5	TC	45.0	45.4	46.6	47.0	46.6	47.0	47.6	48.0	49.9	50.1	50.6	51.0	\	60.1	60.5	61.0
		S/T	0.99	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.57	0.73	0.90	\	0.39	0.53	0.67
		kW	3.22	3.26	3.29	3.29	3.29	3.33	3.36	3.40	3.38	3.43	3.47	3.51	\	4.19	4.24	4.28
	25	TC	47.0	47.4	48.6	49.1	48.6	49.1	49.7	50.1	52.0	52.3	52.8	53.2	\	62.7	63.2	63.6
		S/T	0.99	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.57	0.73	0.90	\	0.39	0.53	0.67
		kW	3.58	3.62	3.66	3.66	3.66	3.70	3.74	3.78	3.76	3.82	3.86	3.90	\	4.65	4.71	4.75
	50	TC	49.5	49.9	51.2	51.7	51.2	51.7	52.3	52.7	54.8	55.1	55.6	56.0	\	66.1	66.5	67.0
		S/T	0.99	1.00	1.00	1.00	0.63	0.86	1.00	1.00	0.39	0.58	0.76	0.94	\	0.39	0.54	0.69
		kW	3.98	4.02	4.06	4.06	4.06	4.11	4.15	4.20	4.17	4.24	4.28	4.33	\	5.17	5.23	5.28
	75	TC	49.5	50.1	51.2	51.7	51.2	51.7	52.3	52.9	54.8	55.3	55.6	56.0	\	65.6	66.1	66.5
		S/T	1.00	1.00	1.00	1.00	0.62	0.85	1.00	1.00	0.39	0.58	0.76	0.94	\	0.39	0.54	0.69
		kW	4.35	4.40	4.44	4.44	4.44	4.48	4.53	4.57	4.57	4.62	4.68	4.73	\	5.43	5.50	5.54
	85	TC	48.7	49.1	50.2	50.9	50.2	50.9	51.3	52.0	53.8	54.3	54.6	55.1	\	63.9	64.3	64.8
		S/T	1.00	1.00	1.00	1.00	0.63	0.86	1.00	1.00	0.39	0.58	0.76	0.95	\	0.39	0.54	0.70
		kW	4.79	4.84	4.90	4.90	4.90	4.95	4.99	5.06	5.06	5.10	5.15	5.21	\	6.27	6.32	6.38
	95	TC	48.1	48.7	49.8	50.2	49.8	50.2	50.7	51.3	52.7	53.5	54.0	54.3	\	62.3	62.6	62.9
		S/T	1.00	1.00	0.99	1.00	0.63	0.87	1.00	1.00	0.39	0.58	0.76	1.00	\	0.39	0.55	0.71
		kW	5.70	5.76	5.83	5.83	5.83	5.87	5.94	6.01	6.03	6.07	6.14	6.18	\	7.38	7.44	7.49
	105	TC	46.8	47.4	48.5	49.0	48.5	49.0	49.5	50.1	51.7	52.3	52.6	53.1	\	57.8	57.8	58.1
		S/T	0.99	1.00	0.99	1.00	0.63	0.87	1.00	1.00	0.39	0.59	0.78	1.00	\	0.39	0.57	0.74
		kW	6.74	6.80	6.87	6.87	6.87	6.96	7.02	7.09	7.11	7.18	7.24	7.29	\	7.97	7.93	7.97
	115	TC	38.8	39.3	40.1	40.5	40.1	40.5	41.0	41.5	44.1	44.3	43.7	43.8	\	45.5	45.7	45.9
		S/T	1.00	1.00	1.00	1.00	0.64	0.88	1.00	1.00	0.40	0.62	0.86	1.00	\	0.40	0.62	0.84
		kW	6.32	6.38	6.45	6.45	6.45	6.52	6.58	6.65	6.76	6.80	6.78	6.82	\	6.89	6.91	6.94

SPECIFICATIONS

Capacities and Selection Data - Capacity Characteristics Charts

Airflow (CMF)	Outdoor DB	IWB (°F)	59				63				67				71			
		IDB (°F)	70	75	80	85	70	75	80	85	70	75	80	85	70	75	80	85
1000	5	TC	47.9	48.4	49.4	50.0	49.4	50.0	50.6	51.1	53.0	53.4	53.7	54.1	\	63.4	63.8	64.8
		S/T	0.99	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.57	0.73	0.90	\	0.39	0.53	0.67
		kW	3.77	3.81	3.85	3.85	3.85	3.90	3.94	3.97	3.97	4.01	4.06	4.10	\	4.79	4.83	4.58
	25	TC	50.0	50.6	51.6	52.2	51.6	52.2	52.8	53.4	55.3	55.8	56.1	56.5	\	66.2	66.6	67.7
		S/T	0.99	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.57	0.73	0.90	\	0.39	0.53	0.67
		kW	4.19	4.23	4.27	4.27	4.27	4.33	4.37	4.41	4.41	4.45	4.51	4.55	\	5.33	5.37	5.09
	50	TC	52.6	53.2	54.3	54.9	54.3	54.9	55.6	56.2	58.2	58.7	59.0	59.5	\	69.7	70.1	71.2
		S/T	0.99	1.00	1.00	1.00	0.64	0.88	1.00	1.00	0.39	0.59	0.78	0.99	\	0.38	0.55	0.71
		kW	4.66	4.70	4.75	4.75	4.75	4.81	4.86	4.90	4.90	4.95	5.01	5.06	\	5.92	5.96	5.65
	75	TC	52.7	53.4	54.6	55.1	54.6	55.1	55.7	56.3	58.5	58.9	59.3	59.8	\	71.4	71.7	71.8
		S/T	0.99	1.00	1.00	1.00	0.63	0.88	1.00	1.00	0.39	0.59	0.78	1.00	\	0.38	0.55	0.71
		kW	4.79	4.84	4.90	4.90	4.90	4.95	4.99	5.06	5.06	5.10	5.15	5.21	\	6.52	6.54	6.54
	85	TC	51.7	52.3	53.4	54.0	53.4	54.0	54.5	55.1	57.3	57.6	58.1	58.4	\	67.3	67.6	68.1
		S/T	0.99	1.00	1.00	1.00	0.64	0.89	1.00	1.00	0.39	0.59	0.79	1.00	\	0.39	0.56	0.73
		kW	5.41	5.46	5.52	5.52	5.52	5.59	5.63	5.70	5.72	5.76	5.81	5.85	\	6.96	7.02	7.07
	95	TC	50.4	50.9	52.0	52.6	52.0	52.6	53.2	53.7	55.9	56.2	56.5	57.0	\	64.0	64.3	64.3
		S/T	1.00	1.00	1.00	1.00	0.64	0.90	1.00	1.00	0.39	0.60	0.80	1.00	\	0.39	0.57	0.75
		kW	6.36	6.43	6.49	6.49	6.49	6.56	6.63	6.69	6.74	6.78	6.82	6.87	\	7.86	7.88	7.88
	105	TC	49.0	49.5	50.6	51.2	50.6	51.2	51.7	52.3	54.3	54.6	54.9	55.4	\	58.5	58.9	58.5
		S/T	1.00	1.00	1.00	1.00	0.65	0.90	1.00	1.00	0.39	0.60	0.81	1.00	\	0.39	0.59	0.79
		kW	7.42	7.49	7.58	7.58	7.58	7.66	7.73	7.82	7.86	7.93	7.97	8.04	\	8.26	8.30	8.17
	115	TC	39.1	39.4	40.4	40.9	40.4	40.9	41.3	41.6	43.5	43.7	43.8	44.1	\	46.6	46.8	47.0
		S/T	1.00	1.00	1.00	1.00	0.66	1.00	1.00	1.00	0.40	0.66	0.93	1.00	\	0.40	0.65	0.90
		kW	6.56	6.63	6.71	6.71	6.71	6.78	6.85	6.91	7.00	7.02	7.07	7.09	\	7.31	7.33	7.35

Performance data (Heating operation at rated frequency) 60K outdoor unit matches 60K indoor unit

Airflow (CFM)	**ID ℉**	ODB (°F)	75	65	55	47	35	25	15	5	-4
		OWB (°F)	64	55	48	43	32	23	13	3	-6
600	60	TC	64.8	64.8	64.6	62.1	52.8	49.2	41.3	38.2	33.3
		kW	3.74	3.99	4.70	5.11	4.75	5.07	4.70	4.54	4.32
	70	TC	50.1	49.8	49.9	49.3	49.3	48.2	40.5	37.6	32.7
		kW	2.79	2.95	3.46	4.05	4.85	5.52	5.02	4.89	4.61
	75	TC	42.2	42.0	42.0	42.0	41.4	41.4	38.2	35.2	29.9
		kW	2.33	2.50	2.91	3.45	4.01	4.70	5.25	5.09	4.80
	80	TC	34.6	34.6	34.6	34.5	34.3	34.0	34.0	34.0	29.4
		kW	1.94	2.06	2.42	2.81	3.34	3.77	4.73	5.16	5.01
800	60	TC	72.4	72.4	70.3	62.9	53.6	49.9	42.0	39.0	34.0
		kW	4.42	4.68	5.19	5.01	4.70	5.04	4.66	4.54	4.34
	70	TC	56.1	55.8	55.3	55.0	52.3	48.8	41.1	38.1	33.2
		kW	3.22	3.45	3.96	4.56	5.13	5.45	5.02	4.89	4.65
	75	TC	47.3	47.1	47.1	46.3	46.5	46.5	38.9	35.7	30.3
		kW	2.71	2.88	3.38	3.84	4.59	5.40	5.23	5.07	4.82
	80	TC	38.7	38.7	38.7	38.6	38.1	37.9	38.1	35.2	29.9
		kW	2.23	2.37	2.76	3.19	3.72	4.32	5.42	5.30	5.01
1000	60	TC	80.6	79.3	71.6	64.0	54.4	50.7	42.7	39.7	34.6
		kW	5.19	5.31	5.16	5.01	4.73	5.07	4.75	4.63	4.44
	70	TC	62.0	61.8	61.8	61.6	53.1	49.6	41.9	38.9	33.8
		kW	3.70	3.94	4.63	5.38	5.14	5.49	5.09	4.97	4.75
	75	TC	52.8	52.6	52.0	51.8	51.8	49.0	39.5	36.4	31.1
		kW	3.15	3.34	3.81	4.46	5.30	5.73	5.30	5.16	4.92
	80	TC	43.5	43.3	43.3	43.1	42.5	42.5	39.0	35.9	30.5
		kW	2.62	2.78	3.19	3.72	4.30	4.99	5.50	5.37	5.09

SPECIFICATIONS

Capacities And Selection Data - Piping Length Correction Factor

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

H:

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

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

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

L:

Actual one-way piping length between indoor unit and outdoor unit (m).

EL: Equivalent one-way piping length between indoor unit and outdoor unit (m).

Gas Diameter (mm/inch)	9.52 (3/8')	12.7 (1/2')	15.88 (5/8')	19.05 (3/4')	22.22 (7/8')
90° Elbow	0.15	0.2	0.25	0.35	0.40

Cooling：

EL[ft.(m)] Model	**25(7.6)**	**38(10)**	**50(15)**	**66(20)**	**82(25)**	**100(30)**	**115(35)**	**131(40)**
24K	1.00	0.99	0.97	0.95	0.93	0.91	--	--
36K	1.00	0.94	0.92	0.90	0.88	0.84	0.80	--
48K/60K	1.00	0.98	0.96	0.93	0.90	0.88	0.85	0.83

Heating：

EL[ft.(m)] Model	**25(7.6)**	**38(10)**	**50(15)**	**66(20)**	**82(25)**	**100(30)**	**115(35)**	**131(40)**
24K	1.00	0.99	0.99	0.98	0.97	0.96	--	--
36K	1.00	0.98	0.95	0.93	0.91	0.88	0.86	--
48K/60K	1.00	0.98	0.96	0.94	0.92	0.90	0.89	0.88

The correction factor of height between indoor unit and outdoor unit

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

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

SPECIFICATIONS

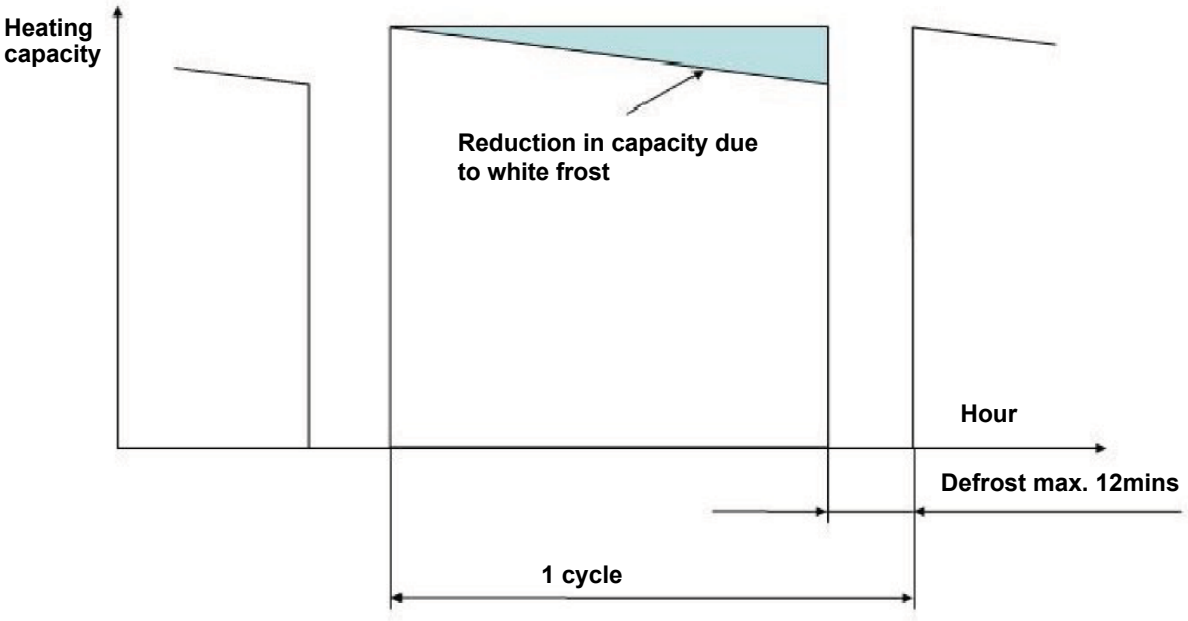
Capacities And Selection Data - Correction Factor to Include Defrosting Operation

The heating capacity in the previous part, 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 × unit capacity

Outdoor temperature [℉(℃)DB]	5(-15)	14(-10)	23(-5)	32(0)	44.6(7)	50(10)	59(15)
Correction factor (humidity rate 85% RH)	0.95	0.95	0.93	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.

SPECIFICATIONS

Electrical Data - Indoor Unit

Indoor Unit	Power Supply			Applicable Voltage		ELB	
	Voltage (V)	PH	Frequency (Hz)	Umin. (V)	Umax. (V)	Nominal Current (A)	Nominal Sensitive Current (mA)
24K/36K/ 48K/60K	208/230	1	60	187	253	10	30

NOTE:

1. The above compressor data is based on 100% capacity combination of indoor units at the rated operating frequency.
2. This data is based on the same conditions as the nominal heating and cooling capacities.
3. The compressor is started by an inverter, resulting in extremely low starting current.

OPERATION

Control Mode - Outdoor Unit

Control function

1. Cooling Anti-Freeze Protection

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

2. Overload Protection

To prevent system overload caused by excessive pressure, the machine 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.

3. Exhaust 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, the compressor provides automatic protection.

4. Oil-return Control

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

5. Operation Mode

Air conditioning mode is the operation mode set by users through thermostat, two modes are available: cooling, heating.

6. Four-way Valve Control

Four-way valve of the outdoor unit shuts down during cooling and defrosting but starts during heating.

7. Start-up Protection

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

8. Pressure Protection

When the pressure increases beyond a preset value, the pressure switch will send a signal to the main PCB, and the unit will automatically enter into protection mode. The compressor will stop and report the fault code protection.

9. Control logic description

9.1 Communication between indoor and outdoor units:

The communication between the outdoor unit, thermostat and the indoor unit is achieved through 24V alternating current.

The thermostat controls the signal output of Y and O, and the outdoor unit identifies its operation mode according to these two signals. If Y is energized, the outdoor unit starts in heating mode; if both Y and O are energized, the outdoor unit starts in cooling mode.

When the outdoor unit meets its defrosting conditions or anti-cold air conditions in heating mode, W is energized, and when it exits from defrosting function and anti-cold air function, W is not energized.

9.2 Cooling Mode

1) Start conditions:

When compressor signal(Y1, Y2) and reversing valve signal O are 24 VAC from the thermostat.

2) Stop conditions:

When compressor signal(Y1, Y2) signal is 0 VAC from the thermostat.

3) Compressor running rules:

The compressor keeps operating with its current frequency, and detects its system pressure at the same time.

The calculation of target frequency in normal operation is divided into two stages:

Within 5 minutes of starting the compressor, the target frequency is calculated based on the required capacity; After 5 minutes of starting the compressor, the target frequency is adjusted based on the target pressure:

If the system pressure is higher than the target pressure, the compressor frequency decreases; When the low pressure of the system is lower than the target value, the compressor frequency increases.

9.3 Heating Mode

(1) Start conditions:

When compressor signal(Y1, Y2) is 24 VAC and reversing valve signal O is 0 VAC from the thermostat.

(2) Stop conditions:

When compressor signal(Y1, Y2)signal Y is 0 VAC from the thermostat, or reversing valve signal O is 24 VAC

The unit restores the normal target pressure to operate or when the compressor has operated for 30min e2 with the decreased target pressure, it is taken as it has stopped operating.

3) Compressor running rules:

The compressor keeps operating with its current frequency, and detects its system pressure at the same time.

The calculation of target frequency in normal operation is divided into two stages:

During heating, when the high pressure of the system is lower than the target pressure, the compressor frequency increases; When the high pressure of the system is higher than the target value, the compressor frequency decreases.

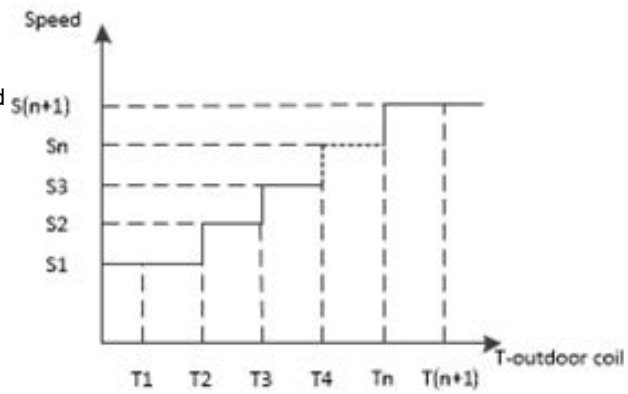
4) Outdoor fan running rules:

Once the outdoor fan starts up, it will follow the rules below:

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 for 30rpm~60rpm.

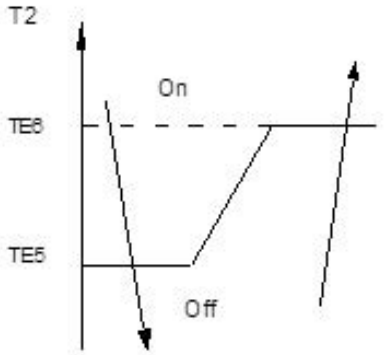


OPERATION

Control Mode - Outdoor Unit

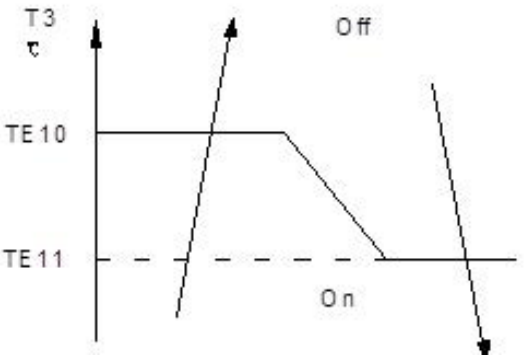
9.4 Evaporator Low-temperature Protection DC Inverter

AC will enter T2 protection if any of the following condition is satisfied.
Condition:
Cooling mode: When the saturation temperature (which is got from low pressure cycling) T2 stays lower than TE5 for 10 seconds, the compressor and outdoor fan will shut off. When T2 is higher than TE6, the compressor and outdoor fan will restart up.



9.5 Condenser High-temperature Protection DC Inverter

outdoor unit
AC will enter T3 protection if any of the following conditions is satisfied.
Condition 1:
Cooling mode: When the outdoor coil temp. T3 stays higher than T2 for 10 seconds, the compressor and outdoor fan will shut off. When T3 is lower than T1, the compressor and outdoor
fan will restart up.
Condition 2:
Heating mode: When the saturation temperature (which is got from high pressure cycling) T3, stays higher than T2 for 10 seconds, the compressor and outdoor fan will shut off. When T3 is lower than T1, the compressor and outdoor fan will restart up.



System Logic

Thermostat - A dual stage heat, dual stage cool thermostat is required for proper operation of this unit.

Y/Y2 (Y/Y2 OUT)- This is the high stage range of frequency used when there is a large temperature difference between the setting temperature and the ambient temperature. (Greater than 5˚ F depending on the thermostat used) If a single stage thermostat is used, the Y/Y2 terminals should be used. The unit will operate as as single stage, but will be less efficient.
The Y/Y2 24v AC signal is sent from the thermostat to the indoor unit control board, which will send power to the M3/ M4 speed tap (Determined by the position of the dip switch S2 on the AHU control board. Placing switch 2 in the on position enables the M4 speed tap), and to the outdoor unit control board to run the compressor in the high range of frequency.
At this time the thermostat should be sending 24V to Y1, Y2, and G to the indoor unit.

Y/Y1 (Y/Y1 OUT) - As the difference between the setting temp and the ambient temp becomes closer, (Greater than 0˚F, but less than 5˚ F, depending on the thermostat used) the thermostat will changeover from Y2 to Y1, and send 24v AC to the indoor control board. The AHU control board will now send power to the M2 speed tap on the indoor blower, and to the outdoor unit control board to run the compressor in the low range of frequency.
At this time the thermostat should be sending 24V to Y1 and G to the indoor unit.

(G/G OUT) - When the ambient temp reaches the setting temp, the thermostat will stop sending the Y1 and the indoor control unit will send 24v to the outdoor unit. If the thermostat is programmed to send a G signal when Y1 cycle is completed, the indoor fan will run at M1 speed , and the outdoor fan and compressor will run at low speed for 5 minutes to complete the post purge cycle.
If the thermostat is not programmed to send a G signal at completion of the Y1 cycle; when the setting temperature is reached; the indoor fan, outdoor fan, and compressor will shutdown.

G - when the indoor unit receives a g signal from the thermostat but no Y1/ Y2 signal (Fan only) the indoor fan motor will run on the M1 speed tap. The compressor and outdoor fan will not run at this time.

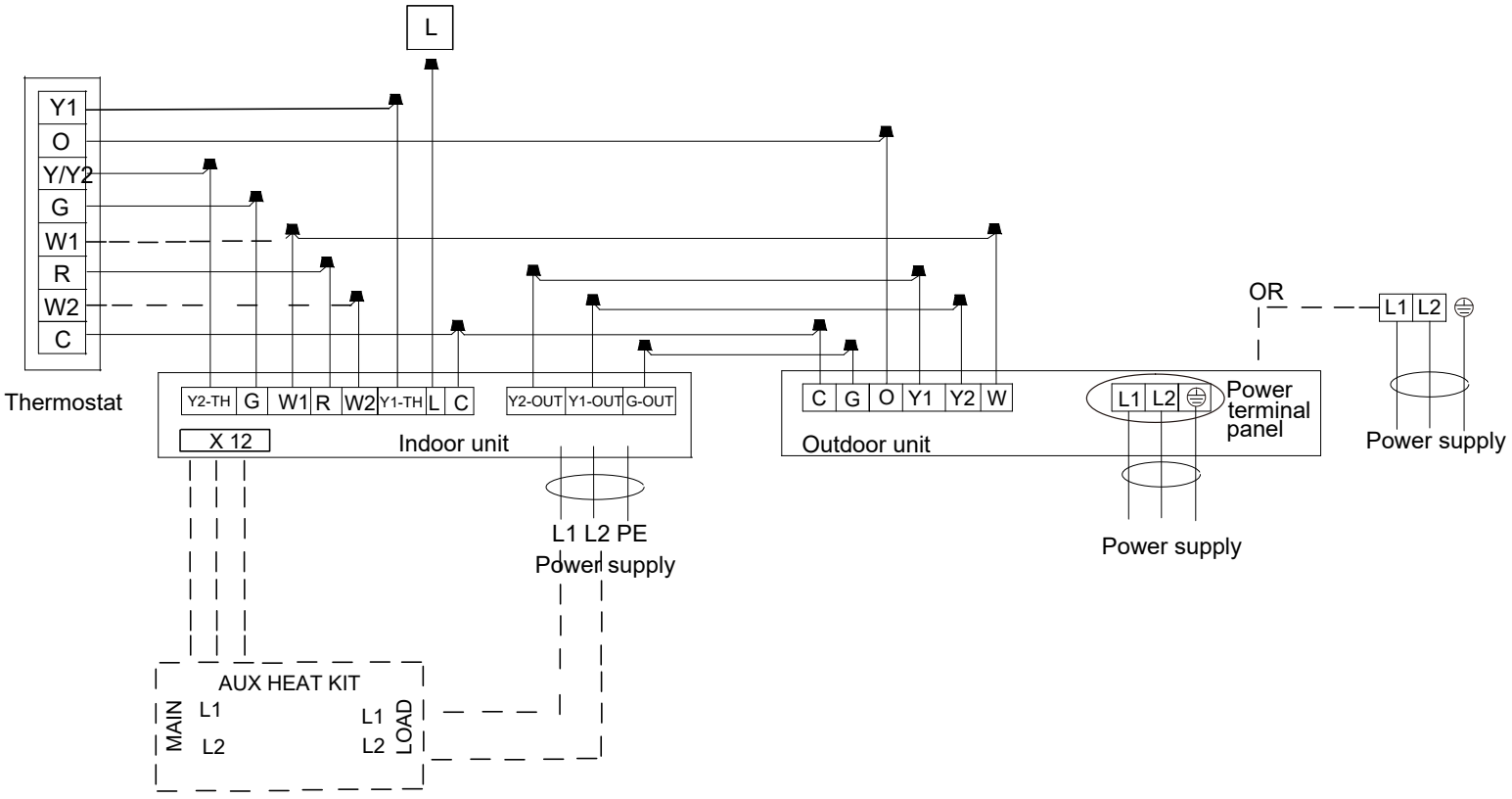
A2L leak sensor shutdown - When a leak occurs, the indoor control board will signal the indoor fan to run at M5 speed tap (Maximum speed). Power will be removed from Y1, Y2, and G terminals on the ODU, shutting down the outdoor fan and compressor. The Indoor Control board will also send 24v out terminal L to be used as an A2L alarm.

OPERATION

System Logic

Electric Heating - The W terminal on the outdoor unit must be connected to the W1 terminal on the indoor unit. The outdoor unit will provide 24v to indoor unit as a signal when defrost conditions are met. The indoor unit will energize the electric heater to operate. If the heater (larger kW kits) has two coils, then only the larger of the two coils will be energized during defrost heating.

1. If the electric heat kit has two coils, and the thermostat utilizes W1 and W2, connect W1 and W2 from the thermostat to W1 and W2 of the indoor unit. One or both of the electric heat coils will be energized depending on the call.
2. If the electric heat kit has two coils, and the thermostat utilizes only W2, connect W2 on the thermostat to both W1 and W2 on the indoor unit. Both electric heat coils will be energized with a W2 call.
3. If the electric heat kit has one coil, and the thermostat utilizes W1 and W2, connect W1 from the thermostat to W1 of the indoor unit. The electric heat coil will be energized with a W1 call.
4. If the electric heat kit has one coil, and the thermostat utilizes only W2, connect W2 from the thermostat to W1 of the indoor unit. The electric heat coil will be energized with a W2 call.

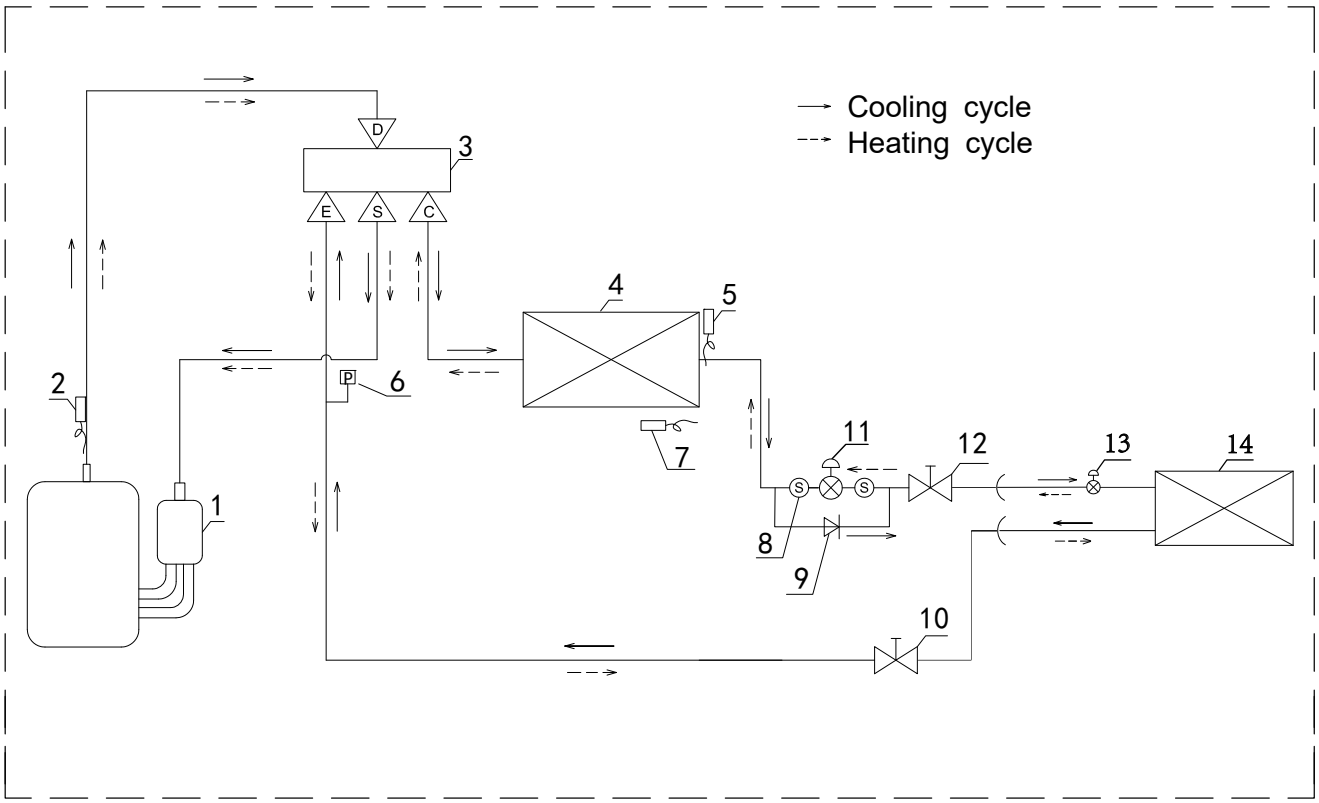


EXPLANATION OF TERMINALS
Y1: COOLING/ HEATING (LOW RANGE)
Y2: COOLING/ HEATING (HIGH RANGE)
Y1-th: COOLING/ HEATING (LOW RANGE FROM THERMOSTAT)
Y2-th: COOLING/ HEATING (HIGH RANGE FROM THERMOSTAT)
L: 24v ALARM SIGNAL
O - REVERSING VALVE SIGNAL (ENERGIZE TO COOL)
C- COMMON
R-24v AC
G- INDOOR FAN SIGNAL
W - DEFROST SIGNAL
W1/W2 ELECTRIC HEAT AUX SIGNAL
Y1 OUT: COOLING/ HEATING (LOW RANGE TO OUTDOOR UNIT)
Y2 OUT: COOLING/ HEATING (HIGH RANGE TO OUTDOOR UNIT)
G OUT: COOLING/ HEATING (CYCLE PURGE SIGNAL TO OUTDOOR UNIT)

NOTE 1: WHEN HEATER IS INSTALLED, CONNECT AHU POWER (WHITE/ BLACK PIGTAIL) TO LOAD SIDE OF APPROPRIATE BREAKER TO POWER AHU. FOR 15 kW/20kW TO CONNECT CB1 WHICH IS L1/L2 OF THE INCLUDED WIRING DIAGRAM
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: WHEN HEATER KIT IS INSTALLED, CONNECT 3 WIRE PIG TAIL FROM AUX HEAT KIT TO CONNECTOR X12 ON THE AHU CIRCUIT BOARD.

OPERATION

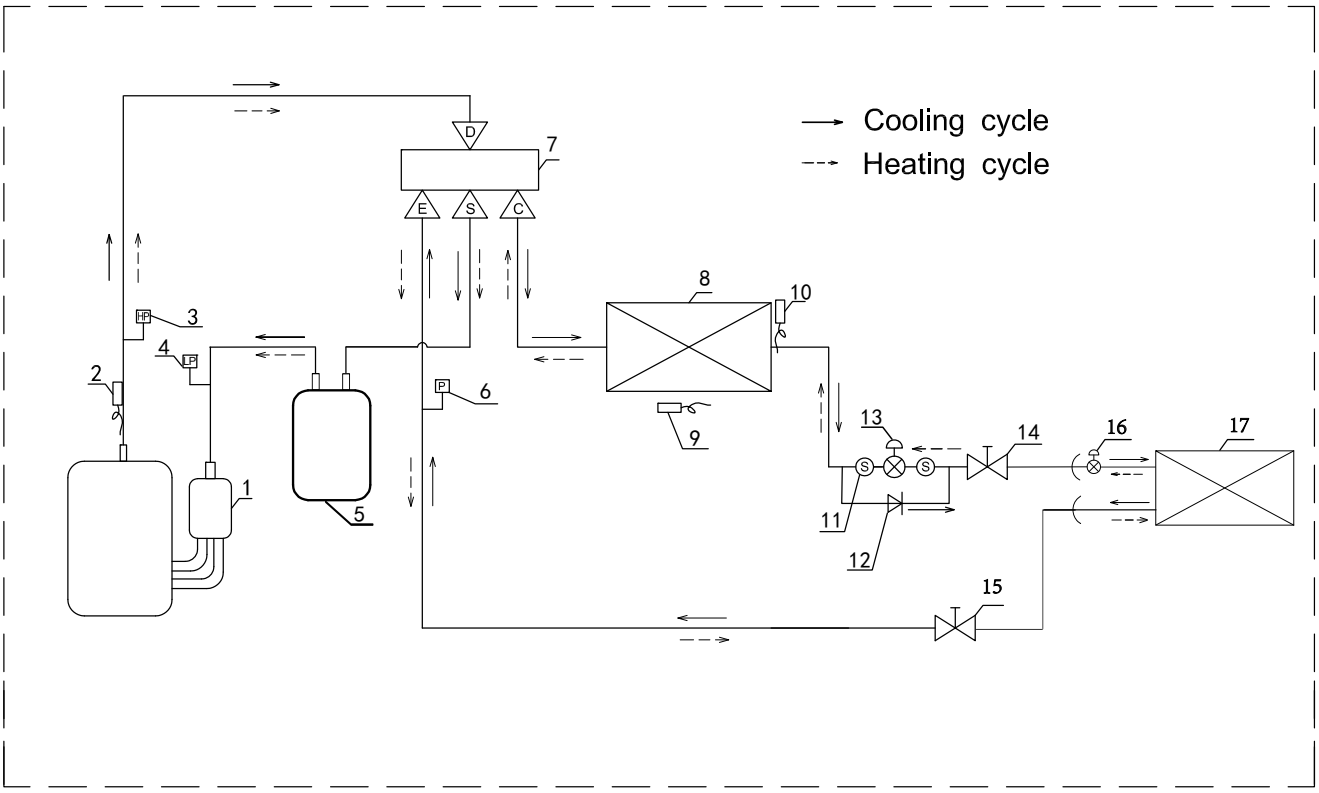
ODU Refrigerant Schematic 24k-36k



List of components			
1	Compressor	8	Strainer
2	Discharge temperature sensor	9	One-way valve
3	4-Way valve	10	Stop valve (Gas)
4	Outdoor heat exchanger	11	Electronic expansion valve
5	Coil temperature sensor	12	Stop valve (Liquid)
6	Pressure sensor	13	TXV
7	Ambient temperature sensor	14	Indoor heat exchanger

OPERATION

ODU Refrigerant Schematic 48k-60k



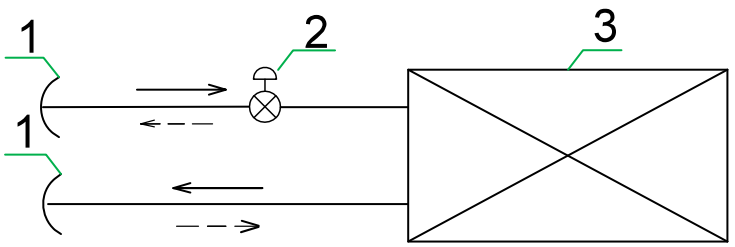
List of components			
1	Compressor	10	Coil temperature sensor
2	Discharge temperature sensor	11	Strainer
3	High pressure switch	12	One-way valve
4	Low pressure switch	13	Electronic expansion valve
5	Gas-liquid separator	14	Stop valve (Liquid)
6	Pressure sensor	15	Stop valve (Gas)
7	4-Way valve	16	TXV
8	Outdoor heat exchanger	17	Indoor heat exchanger
9	Ambient temperature sensor		

OPERATION

AHU Refrigerant Schematic 24k-60k

24K/36K/48K/60K

Cooling Cycle
Heating Cycle



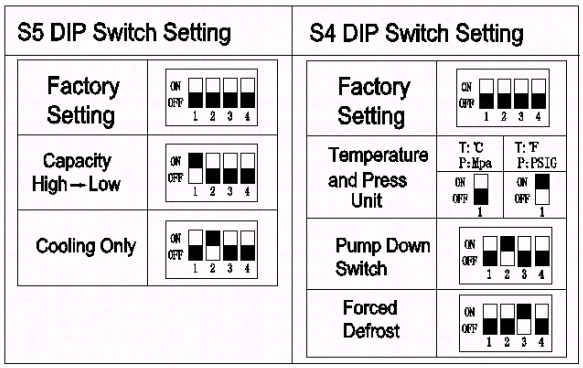
List of Components	
1	Hexagon Nut
2	TXV
3	Indoor Heat Exchanger

OPERATION

Field Settings

DIP Switch Setting of Outdoor Unit (Optional setting)

1. Turn on the power before setting the S4-2/S4-3 DIP switches, and dial the switches from OFF to ON. Without turning on, the switches settings are not refreshed and might be invalid.
2. Turn off all power sources before setting the S4-1/S5-1,2,3 DIP switches. Without turning off, the switches settings are not refreshed and might be invalid.
3. Mark of "■" indicates the position of DIP switches.



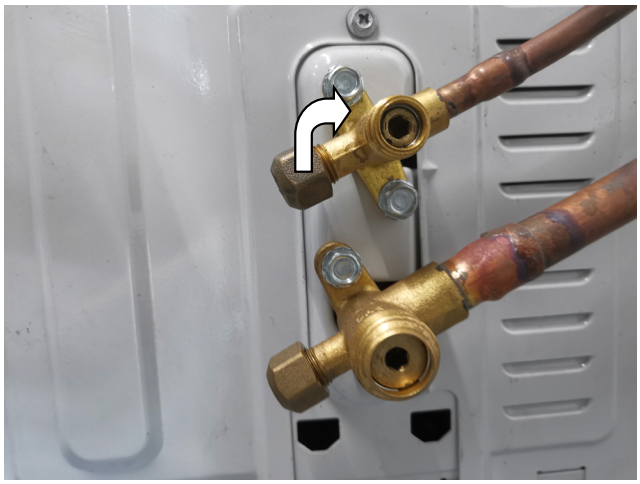
Force defrost mode set
Operation:
Dial the switch from OFF to ON after turning on the appliance, and set it in heating mode, then it will run with manual defrosting mode at once.

Cooling only set
Operation:
Heating mode will be invalid after the DIP has been dialed.

Capacity set
Dial it when the indoor units matched are in the following conditions.

Outdoor unit model	Indoor unit connect
60K	48K

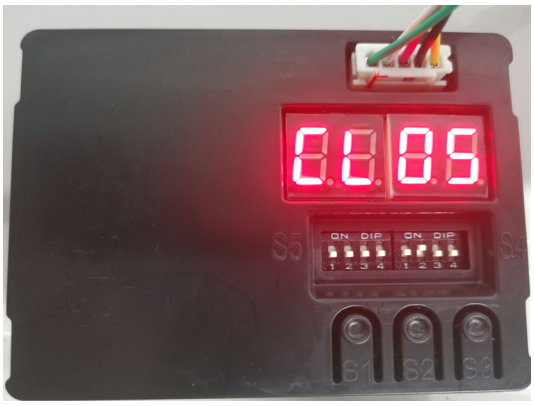
Pump down mode
Actions：
The compressor runs with the target frequency, and without any protection when frequency rises; The EEV runs with setting opening; Outdoor unit fan will run with the set fan speed.



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.

Field Settings

Step 3:
Turn on the 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 7 segment display.
Step 5:
The frequency value will keep changing until "CLOS" is displayed on the 7 segment display, then please check whether the liquid stop valve is closed.



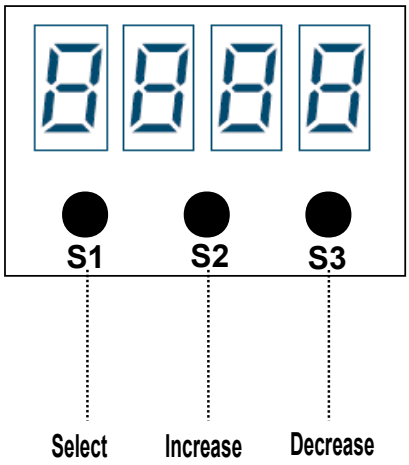
Step 6:
When "GOOD" is displayed on the 7 segment display, please close the stop valve of the gas piping with an Allen wrench in a clockwise direction within 10s.

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

8.2 Running parameter query

Query by 7 segment display

7 segment display Introduction



There are 3 buttons on the 7 segment board.

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

"P." -- Parameter of outdoor 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 be automatically displayed after the parameter code is selected for 3s.

Field Settings

Parameters can be checked in the following table below.

Parameter code	Descriptions
P.0	Fault codes
P.1	Compressor actual frequency
P.5	Compressor exhaust temperature (℃)
P.7	Outdoor ambient temperature(℃)
P.8	Outdoor coil temperature(℃)
P.10	IPM module temperature(℃)
P.11	Outdoor capacity requirement
P.12	IPM fault codes
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.21	Target exhaust overheating
P.23	Actual exhaust overheating (heating)
P.24	Actual outdoor pressure
P.27	Outdoor DC Motor 2 target speed

NOTE: The right is therefore reserved to EEPROM changing without notice.

TROUBLESHOOTING

Normal Malfunction

Troubleshooting	Possible Reasons of Abnormality	How to Deal With
Air conditioner will not start up	1. Power supply failure; 2. Circuit breaker tripped or fuse blown. 3. Power voltage is too low; 4. Improper setting of thermostat ; 5. Thermostat has lost 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 thermostat again; 5. Change batteries."
The compressor starts or stops frequently	The air inlet and outlet have been blocked.	Remove obstacles.
Poor cooling/heating	1. The outdoor heat exchanger is dirty, such as condenser; 2. There are heating devices indoors; 3. The airtightness is not enough, and 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 block obstacles; 5. Check and try to set temperature again."
Sound from settling of parts	During system starting or stopping, a sound might be heard. However, this is due to the normal settling of plastic parts.	It is not abnormal, and the sound will disappear soon.
Water leakage	1. Drainage pipe is blocked or broken; 2. Wrap of refrigerant pipe joint is not closed completely.	1. Change drainage pipe; 2. Re-wrap and make it tight.

Fig. 501

TROUBLESHOOTING

Outdoor Unit Fault Codes

DC-Inverter unitary (Main control board upside-down)

1) 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 the ten's place of the fault code, LED2 indicates the unit's place of the fault code and LED3 indicates outdoor drive control fault.

When LED3 is off, LED1 and LED 2 indicate main control fault code.

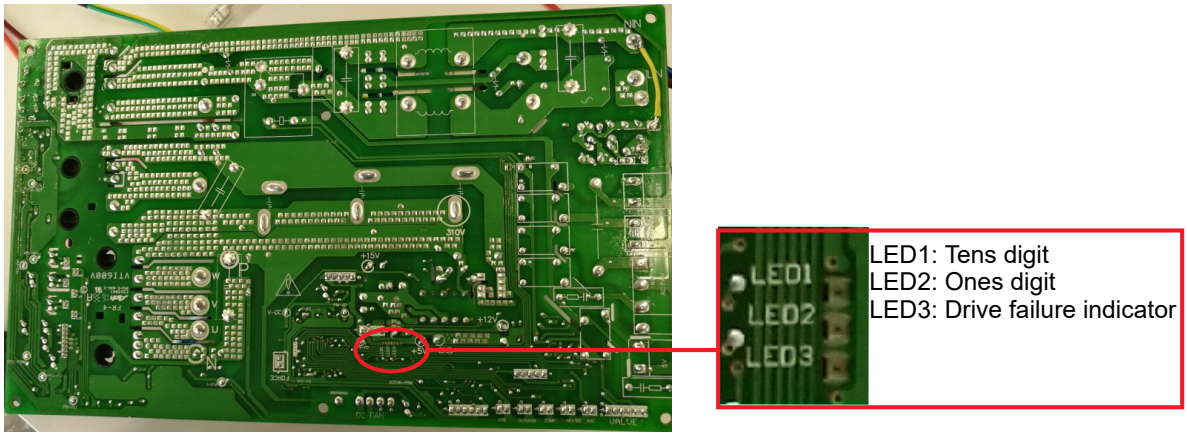
When LED3 is on, LED1 and LED 2 indicate drive control fault code.

When LED3 is flickering and LED1, LED 2 are all off, it indicates the compressor is preheating.

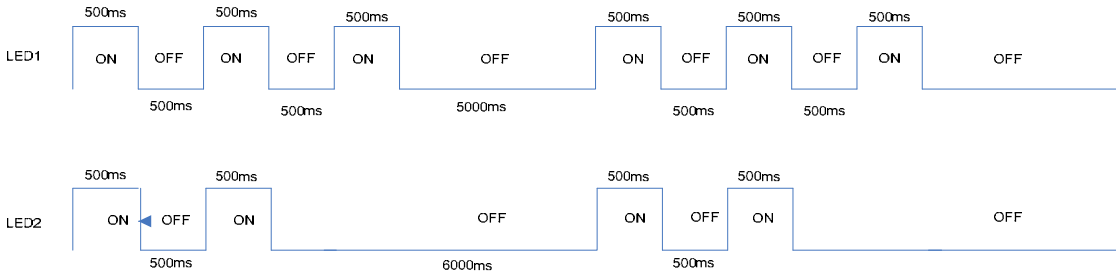
Failures display with 5s interval. It means LED will be off for 5s to report the next fault code.

System protection codes display method is the same with main control fault code.

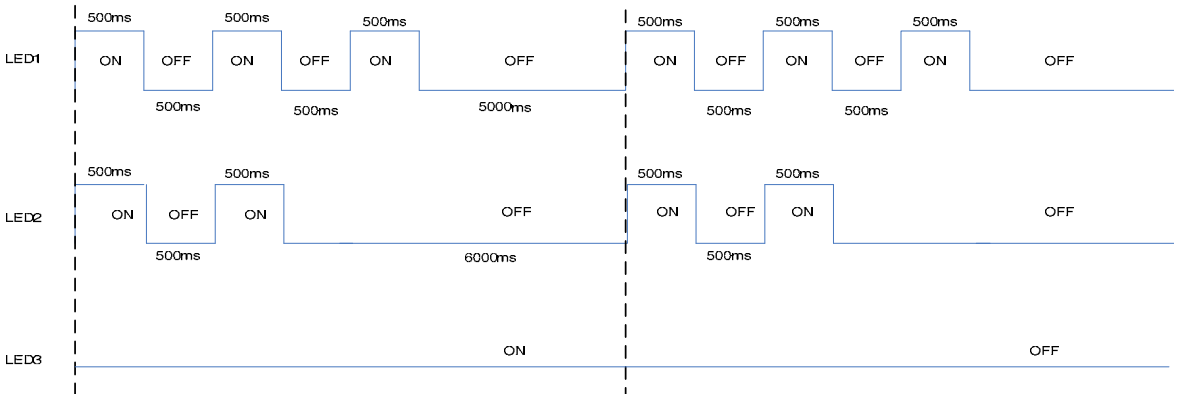
LED lamps will be off when there is no failure, protection or preheating.



For example, outdoor main control fault 32:



For example, outdoor drive fault 32:



TROUBLESHOOTING

Outdoor Unit Fault Codes

2) Display by 7 segment display board.

Fault code will be displayed directly on 7 segment display board.

Main control fault display

Fault code will be displayed by 7 segment display on main control board.

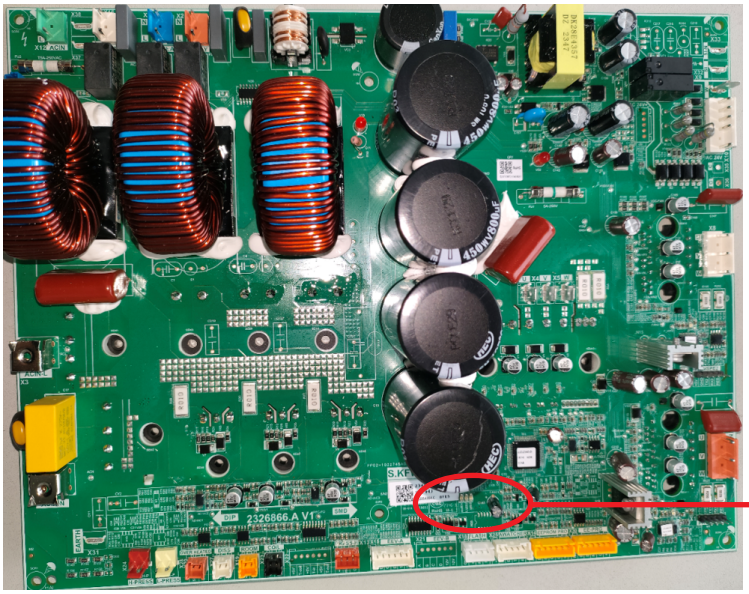
E : Show failure occur.

Display ERROR code.

Drive fault code display

The lamp of drive board flashing shows failure occurs.

How many times the drive failure lamp flicker will show the failure code.



LED2:Drive failure indicator

TROUBLESHOOTING

Diagnostic Codes - Outdoor Unit

Fault code	Fault description	Possible reasons for abnormality	How to deal with	Remarks
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 sampling circuit fails.	1. Reconnect the outdoor ambient temperature sensor; 2. Replace the outdoor ambient temperature sensor. 3. Replace the outdoor control board.	
2	Outdoor coil temperature sensor fault	1. The outdoor coil temperature sensor is connected loosely; 2. The outdoor coil temperature sensor fails to work; 3. The sampling circuit fails.	1. Reconnect the outdoor coil temperature sensor; 2. Replace the outdoor coil temperature sensor. 3. Replace the outdoor control board.	
3	The unit over-current turn off fault	1. Control board current sampling circuit fails; 2. The current is over 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 electrical control board. 2. Normal protection; 3. Replace the compressor; 4. Please see NOTE 3; 5. Please see NOTE 4.	
4	EEprom Data error	1. EE components fails; 2. EE components control circuit fails; 3. EE components are inserted incorrectly."	1. Replace the outdoor control board.	
5	Cooling freezing protection (the indoor coil temperature is too low) or heating overload (indoor coil temperature is too high)	1. The indoor unit can not blow air normally; 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 resulting in low air flow; 5. The setting fan speed 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 . 7. The refrigerant of the unit is low.	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 speed with high speed; 6. Reinstall the indoor unit referring to the user manual to change the distance between the indoor unit and the wall or ceiling; 7. Perform leakage tests on the welding points of the unit and then recharge the refrigerant.	
13	Compressor overheat protector device	1. The wiring of the overload protector is connected loosely. 2. The overload protector fails . 3. The refrigerant is not enough; 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 control board fails.	1. Reconnect the wiring of the overload protector; 2. Replace the overload protector; 3. Perform leakage tests on the welding points of the unit and then recharge the refrigerant. 4. Add refrigerant; 5. Replace expansion valve; 6. Replace the outdoor control board.	

TROUBLESHOOTING

Diagnostic Codes - Outdoor Unit

Fault code	Fault description	Possible reasons for abnormality	How to deal with	Remarks
14	The high pressure switch operation or the unit is turned off for high pressure protection	1. The wiring of the high pressure switch is connected loosely; 2. The high pressure switch fails; 3. The outdoor control board is abnormal; 4. Overload in cooling; 5. Overload in heating.	1. Reconnect the wiring of the high pressure protector; 2. Replace the high pressure switch; 3. Replace the outdoor control board; 4. Please refer to NOTE 3; 5. Please refer to NOTE 4."	Applied to models with high pressure switch or pressure sensor
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 low; 4. The expansion valve fails in heating mode; 5. The outdoor control board has failed.	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 add some refrigerant; 4. Replace the expansion valve; 5. Replace the outdoor control board.	Applied to models with low pressure switch or pressure sensor
16	Overload protection in cooling mode	System overload	Please refer to NOTE 3.	
17	Discharge temperature sensor fault	1. The wiring of the discharge temperature sensor is connected loosely; 2. The discharge temperature sensor fails; 3. The sampling circuit on outdoor control board has failed..	1. Reconnect the wiring of the discharge temperature sensor; 2. Replace the discharge temperature sensor; 3. Replace the outdoor control board.	
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 driver board.	
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 sensor fails.	1. Reconnect the wiring of the high-pressure pressure sensor; 2. Replace the high-pressure sensor; 3. Replace the outdoor control board."	
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 2, table 3.	See Driver Diagnostic codes	
46	IPM and control board communication fault	1. The cable between the control board and the driver board is connected loosely; 2. The cable between the control board and the driver board fails; 3. The driver board fails 4. The control board fails.	1. Reconnect the cable between the control board and the driver board; 2. Replace the communication cable between the control board and the driver board; 3. Replace the driver board; 4. Replace the control board.	

TROUBLESHOOTING

Diagnostic Codes - Outdoor Unit

Fault code	Fault description	Possible reasons for abnormality	How to deal with	Remarks
47	Discharge temperature exceeds upper limit fault	1. Refrigerant is low. 2. The refrigerant is low due to the length of the installation pipe and failure to make proper calculation 3. Throttling service fails; 4. The outdoor ambient temperature is too high.	1. Check the welding point to confirm whether the unit has leakage point, and then add some refrigerant; 2. Add some refrigerant Refer to Refrigerant Charging. 3. Replace the throttling service (such as capillary, expansion valve); 4. Normal protection.	
48	The outdoor DC fan motor fault (upper fan motor)	1. The connecting wiring of the up DC fan motor is loose; 2. The cord of the upper DC fan motor fails; 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. Replace the upper DC fan motor; 3. Replace the upper DC fan motor; 4. Replace the driver board of the fan motor; 5. Check the outdoor fan and ensure the outdoor fan can run normally.	
49	The outdoor DC fan motor fault (lower fan motor)	1. The connecting wiring of the down DC fan motor is loose; 2. The cord of the lower DC fan motor fails; 3. The lower DC fan motor fails; 4. The drive circuit of the down DC fan motor fails; 5. The outdoor fan has been blocked.	1. Reconnect the wiring of the lower DC fan motor; 2. Replace the lower DC fan motor; 3. Replace the lower DC fan motor; 4. Replace the driver board of the fan motor; 5. Check the outdoor fan and ensure the outdoor fan can run normally.	(Only applicable to 48-60k BTU units.
91	The unit turns off due to 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 a failure; 3. Reinstalled the outdoor unit referring to the installation user manual; 4. Normal protection.	
96	Low Refrigerant	The refrigerant of the unit is not enough.	Discharge the refrigerant and charge the refrigerant referring to the rating label.	
97	4-way valve commutation failure fault. (Valve position does nor correspond to call for heat or cool).	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 driver board of the way valve.	

TROUBLESHOOTING

Diagnostic Codes - Outdoor Unit

Overload in cooling mode		
	The root cause	Corrective measure
1	The refrigerant is excessive.	Discharge the refrigerant, and recharge the refrigerant referring to the rating label.
2	The outdoor ambient temperature is too high.	Please use it 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 user 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 and fan capacitor.
6	The outdoor fan is broken or the outdoor fan is blocked.	Check the outdoor fan.
7	The air inlet and outlet have been blocked.	Remove the obstructions.
8	The expansion valve fails.	Replace the expansion valve.

Overload in heating mode		
	The root cause	Corrective measure
1	The refrigerant is excessive.	Discharge the refrigerant, and recharge the refrigerant referring to the rating label.
2	The indoor ambient temperature is too high.	Please use it within allowable temperature range.
3	Short-circuit occurs in the air outlet and air inlet of the indoor unit.	Adjust the installation of the indoor unit referring to the user manual.
4	The indoor filter is dirty.	Clean the indoor filter.
5	The speed of the indoor fan motor is too low.	Check the indoor fan motor and fan capacitor.
6	The indoor fan is broken or the outdoor fan is blocked.	Check the indoor fan.
7	The air inlet and outlet have been blocked.	Remove the obstructions.
8	The expansion valve fails.	Replace the expansion valve.

TROUBLESHOOTING

Diagnostic Codes -Drive 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. Driver board fault.	1. Check power supply 2. Change driver board.
2	Inverter DC low voltage fault		
3	Inverter AC current overload fault		
4	Out-of-step detection	1. Compressor phase lost 2. Bad driver board components 3. The compressor insulation fault.	1. Check compressor wire connection; 2. Change the driver board; 3. Change 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. Driver board fault; 3. Compressor oil shortage, serious wear of crankshaft; 4. The compressor insulation fault.	1. Check the system. 2. Change the driver board; 3. Change the compressor; 4. Change the compressor.
8	Inverter IPM fault (level)		
9	PFC_IPM IPM fault (edge)		
10	PFC_IPM IPM fault (level)		
11	PFC power detection of failure	1. The power supply is not stable; 2. Instantaneous power off; 3. Driver board failure.	1. Check the power supply. 2. No need to deal with. 3. Change the driver board.
12	PFC overload current detection of failure.	1. System overload, current is too high; 2. Driver board fails; 3. PFC fails.	1. Check the system; 2. Change the driver board; 3. Change the PFC.
13	DC voltage detected abnormal .	1. Input voltage is too high or too low; 2. Driver board fails.	1. Check the power supply; 2. Change the driver board.
14	PFC LOW voltage detected failure.		
15	AD offset abnormal detected failure.	Driver board fails.	Change the driver board.
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 incorrect, 2. Driver board fails; 3. Control board fails.	1. Check the wiring; 2. Change the driver board; 3. Change the control board.
23	Motor parameters setting of failure	Initialization is abnormal.	Reset the power supply.
26	DC voltage mutation error	1. Power input changes suddenly 2. Driver board fails."	1. Check power supply, to provide stable power supply; 2. Change driver board.
27	D axis current control error	1. System overload, phase current is too high; 2. Driver board fails.	1. Check system to see if it works normally. 2. Check stop valve to see if it is open; 3. Change the driver board.
28	Q axis current control error	1. System overloads, phase current is too high 2. Driver board fails."	1. Check system to see if it works normally. 2. Check stop valve to see if it is open; 3. Change the driver board.
29	Saturation error of d axis current control integral	1. System overload suddenly; 2. Compressor parameter is not suitable; 3. Driver board fails.	1. Check system to see if it works normally. 2. Check stop valve to see if it is open; 3. Change the driver board.
30	Saturation error of q axis current control integral	1. System overload suddenly; 2. Compressor parameter is not suitable; 3. Driver board fails.	1. Check system to see if it works normally. 2. Check stop valve to see if it is open; 3. Change the driver board.
33	EE data abnormal	Driver board EEPROM is abnormal	1. Change EEPROM 2. Change the driver board.

TROUBLESHOOTING

Protection Circuit Fault Isolation

Protection diagnosis of the complete machine (all types of protection during operation, i.e. under-voltage, over-voltage and over-current protection)

Note:List all types of protection that may occur to the complete machine and describe the conditions and signs of the start, course and end of such protection.

Voltage protection

Protection against AC input over-voltage/under-voltage

1. Conditions for protection against AC input over-voltage/under-voltage:
If the input AC voltage is greater than "protective over-voltage value" or less than "protective under-voltage value" for five seconds, over-voltage/under-voltage protection starts. (E6)
2. Protection actions against AC input over-voltage/under-voltage
The system stops operation.
3. Conditions for ending AC input over-voltage/under-voltage:
If the input AC voltage is lower than "the protective over-voltage value" -10V, or higher than "the protective under-voltage value" +10V, the over-voltage/under-voltage protection will be released.

Current protection:

1. Protection against over-current
Conditions for over-current protection: if the current is equal to or greater than "current value for starting the refrigeration current protection (E2 value)" for six seconds, over-current protection starts.
Protection actions against over-current: indoor display screen and outdoor indicator give indications, the compressor and outdoor fan stop, but indoor fan runs normally.
Condition for ending over-current protection: when the current drops below "current value for releasing the refrigeration current protection (E2 value)", over-current protection will be released.
2. Frequency decreasing for over-current
Conditions for over-current frequency decreasing: if the current is equal to or greater than "current value for starting the refrigeration current protective frequency decreasing (E2 value)", over-current frequency decreasing starts.
Over-current frequency decreasing actions: the compressor will decrease frequency at rate of (E2 value)Hz/S. The indoor and outdoor fans run.
Conditions for ending over-current frequency decreasing: when the current drops below "current value for starting the refrigeration current protective prohibition of frequency rising (E2 value)", over-current under-clocking will be released.

Is the limit auto-reset
3. Prohibition of frequency increasing of compressor exhausting

Conditions for prohibition of frequency rising of compressor discharge

Condition 1: in the case of frequency decreasing of compressor discharge, the discharge temperature of the compressor drops below 39.2°F
Condition 2: in normal operation, the discharge temperature of compressor reaches 41°F.
Either of the above two conditions is met, prohibition of frequency rising of compressor discharge begins.
Actions relates to prohibition of frequency rising of compressor discharge: the frequency of compressor maintains at the current level, which may decrease as the case requires while cannot rise. The indoor and outdoor fans run.
Condition for ending prohibition of frequency rising of compressor discharge: if the temperature of compressor discharge rises above 42.8°F, prohibition of frequency rising of compressor discharge will be released.

4. Prohibition of frequency for anti-overload of outdoor coiled pipe (cooling condenser temperature high) – To prevent compressor overload from tripping.

Condition for anti-overload prohibition of frequency of outdoor coil pipe: in the case of anti-overload frequency decreasing of outdoor coiled pipe, anti-overload prohibition of frequency of the unit begins when the temperature of outdoor coiled pipe drops below "the anti-overload frequency decreasing temperature of outdoor coiled pipe".
Actions relates to anti-overload prohibition of frequency of outdoor coiled pipe: the frequency of compressor maintains at the current level, which may decrease as the case requires while cannot rise. The indoor and outdoor fans run.
Condition for ending anti-overload prohibition of frequency of outdoor coiled pipe: if the temperature of outdoor coiled pipe drops below "temperature to release the anti-overload state of outdoor coiled pipe", anti-overload prohibition of frequency of outdoor coiled pipe will be released.

TROUBLESHOOTING

Check Refrigeration System

TEST SYSTEM FLOW:

Conditions: Compressor is running.

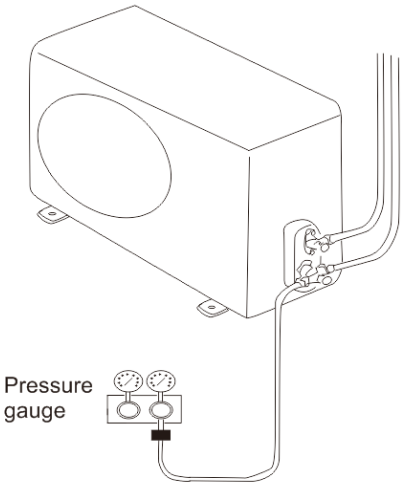
The air condition should be installed in good ventilation.

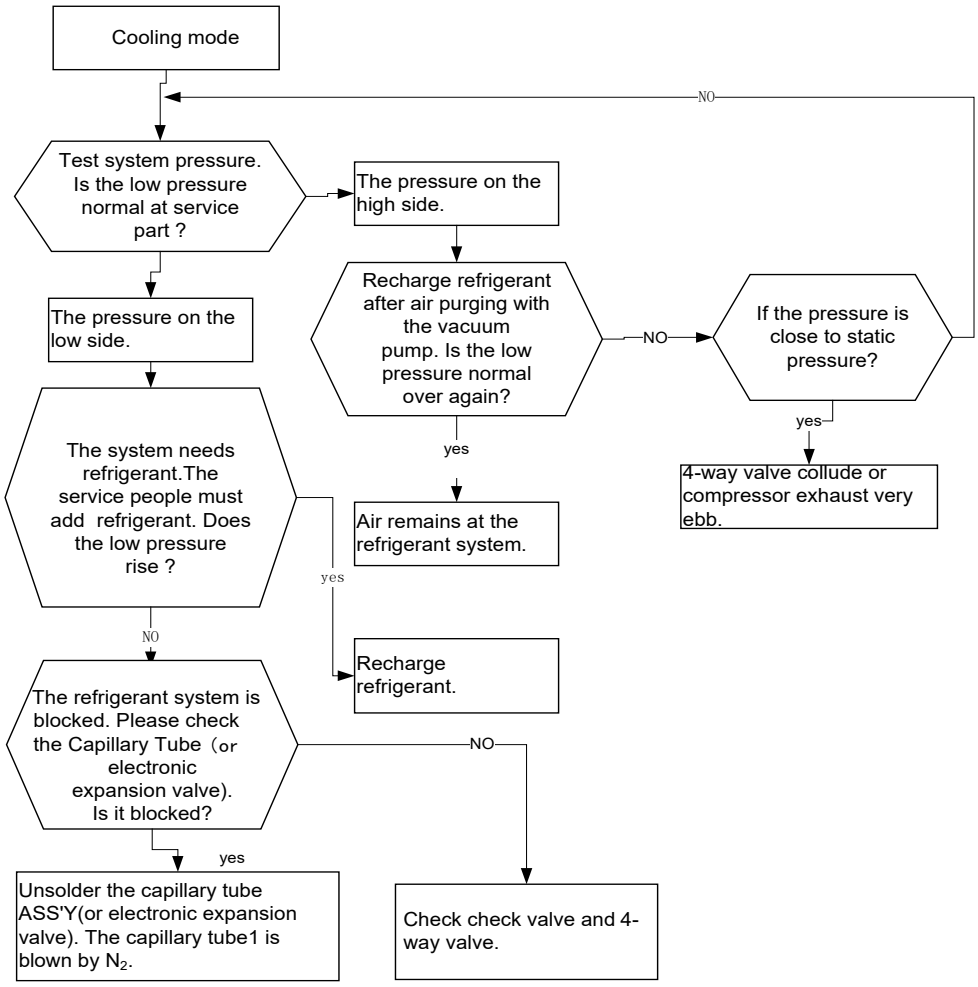
Tool: Pressure Gauge Technique: ① see ② feel ③ test

See ----- Tube defrost.

Feel ----- The difference between tube's temperature.

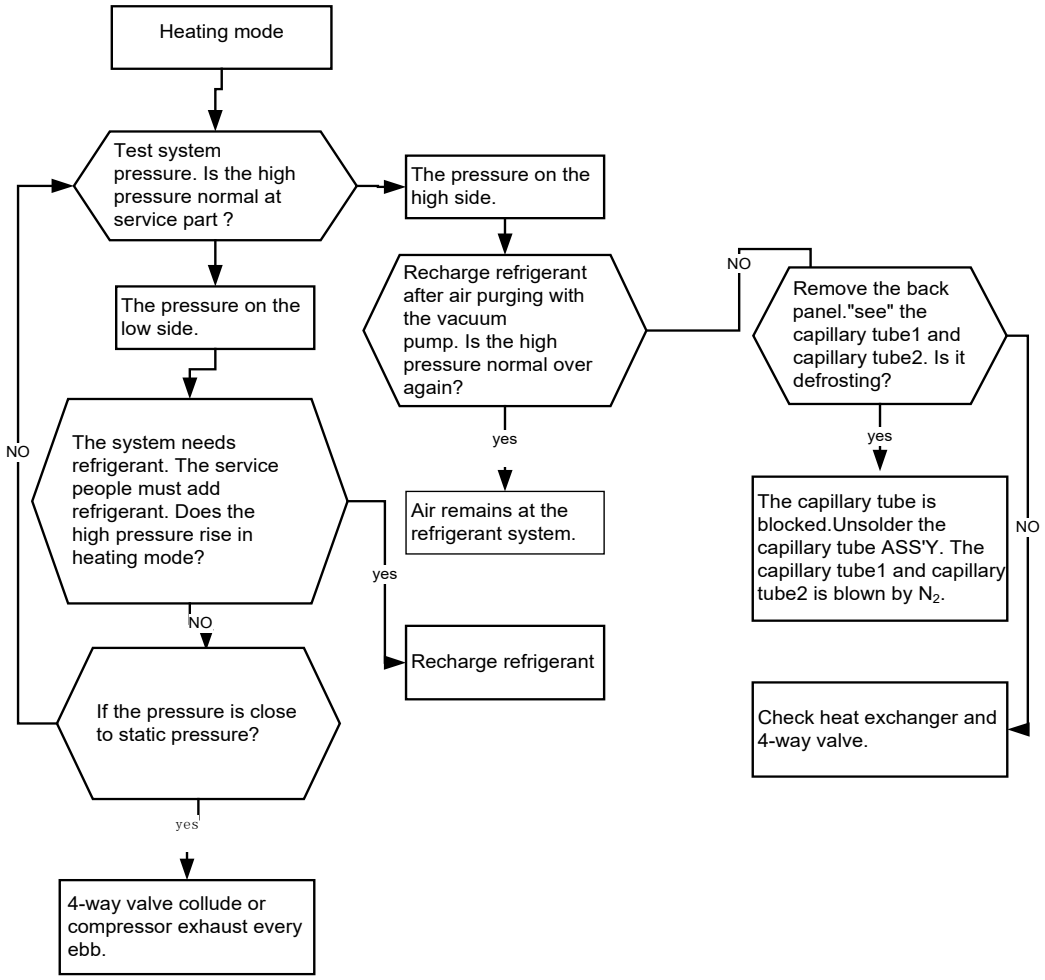
Test ----- Test pressure.





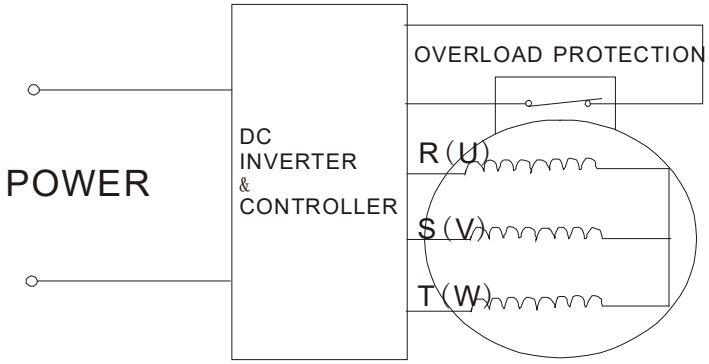
TROUBLESHOOTING

Check Refrigeration System



COMPONENTS TESTING

Compressor



Resistance Test.

The compressor is at fault if the resistance of winding is 0(short circuit)or∞ open circuit.
Common signs compressor is faulty:

- Compressor motor lock.
- Discharge pressure value approaches static pressure value .
- Compressor motor winding abnormality.

Note:

- Don't put a compressor on its side or turn over.
- Assemble the compressor quickly after removing the plugs. Prolonged exposure will damage the internal components of the compressor
- Ensure wiring is correct before operating. Reverse operation will permanently damage the compressor.
- **Electric Reactor**

Common Problems:

- Sound abnormality
- Runs in a sporadic rhythm.
- \ **Judging the connecting terminals of inverter compressor:**

It is impossible to identify terminals U, V and W of inverter compressor with multi-meter. Just connect the terminals in the same way as the original unit when replacing the compressor. A wrong connection will lead to reverse and loud noise of the compressor.

Resistance of compressor coil:

Using an OHM Meter, check resistance from U to V, U to W, and V to W. All of the readings should be within 0.1 ohms of each other. A difference of more than 0.1 ohms indicates that windings may be damaged, and the compressor should be replaced. NOTE: Actual OHM values may vary due to temperature of the compressor.

COMPONENTS TESTING

EEV Stepper Coil

Discharge pipe temperature is too high. This means the compressor is over heating and will shut down and lock itself out. The cause for this issue is lack of refrigerant coming back to the compressor to cool the compressor. The main causes of this would be low charge, restriction or issue with the electronic expansion valve (EEV).

Check Resistance of EEV stepper coil.
Using an ohmmeter check all wires against each other.
5 wire EEV
Red to all colors is 45 +/- 10%
All other colors to each other are 95 +/- 10%

Remove the head off the EEV (pulls right off) & check for any rust build up. If there is any rust inside the EEV head, replace the EEV head. If there is rust on the EEV body you can clean it up with some emery cloth.

COMPONENTS TESTING

Indoor Fan Motor

Indoor Unit Fan Motor
Duct motor model
24K: ZWK702B006073
36K: ZWK702B500026
48K: ZKSD-560-8-50-14
60K: ZKSD-560-8-58

Check Power for Motor
Check L1 and L2 for 230 VAC

DC Voltage test

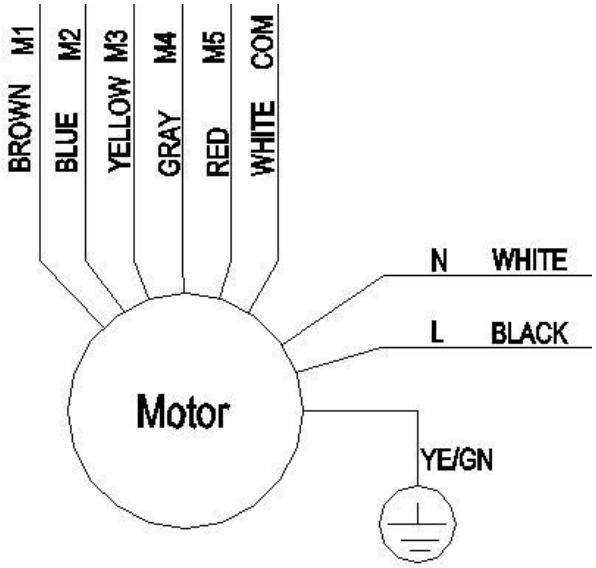
TOOL: Multimeter.
Black probe on white(com)
With Red probe Check for 24 + VAC on
Blue wire for low speed setting,
Blue and Grey wire for medium fan speed setting,
Blue, Grey, and Red wire for High fan speed setting.
Each wire should read 24 VAC with demand for indoor fan.
Insert screwdriver to rotate indoor fan motor slowly for 1 revolution or over, and measure voltage "YELLOW" and "GND" on motor. The voltage repeats 0V DC and 5V DC.

NOTES:
Do not hold motor by lead wires.
Do not plug IN/OUT the motor connector while power is ON.
Do not drop hurl or dump motor against hard material. Malfunction may not be observed at early stage after such shock. But it may be found later, this type of mishandling voids our warranty.

⚠ 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.



COMPONENTS TESTING

Outdoor Fan Motor

Resistance Test.
1. Disconnect the outdoor fan motor plug on the main PCB.

U= Yellow V= Red W= White

3. Using an OHM Meter, check resistance from U to V, U to W, and V to to W.
All of the readings should be within 1 ohms of each other.
A difference of more than 1 ohms indicates that windings may be damaged and the motor should be replaced.
NOTE: Actual OHM values may vary due to temperature of the motor.

4. Using a MegOhm Meter, check the motor windings for a short to ground.
Measure the resistance of each winding to ground.
A reading of less than 10 Megohms indicates that the motor windings may be damaged and the motor should be replaced..
Figure

5. DC Voltage test

Manually rotate indoor fan motor slowly for several revolutions, and measure voltage "YELLOW" and "GND" on motor. The voltage repeats 0V DC and 5V DC.
Notes:
- Do not hold motor by lead wires.
- Do not connect or disconnect the molex connecter while power ON.
- Do not drop motor against hard material. Malfunction may not be observed at early stage after such shock. But it may be found later, this type of mishandling voids our warranty.

⚠ 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.

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.

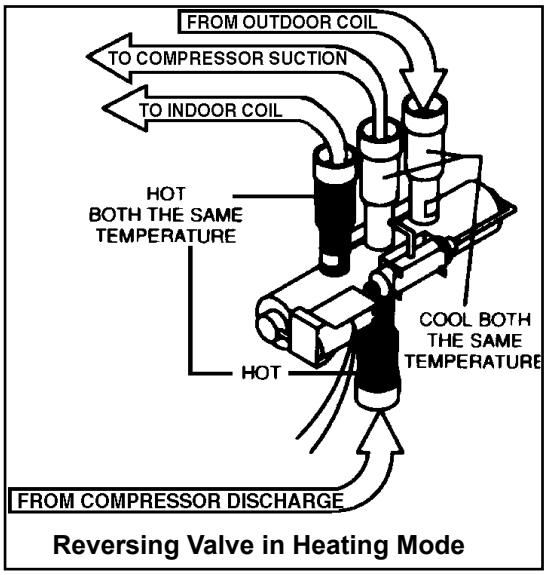
Proper safety procedures must be followed, and PPE must be utilized when working with refrigerants.

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 CN 906 from the 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.



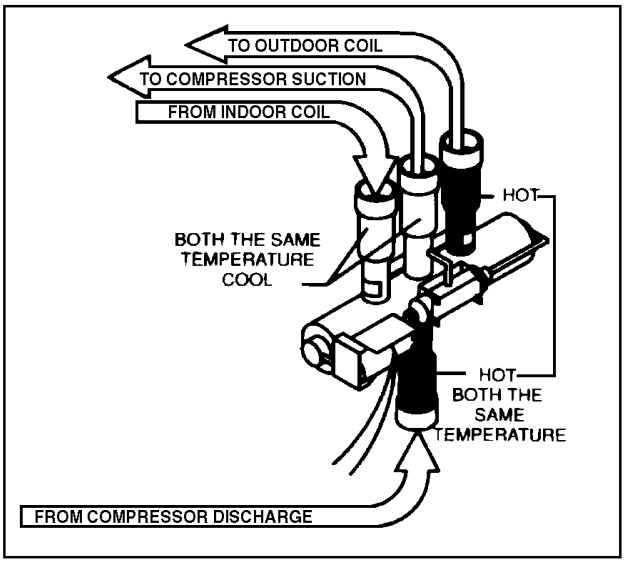
Reversing Valve in Heating Mode

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.

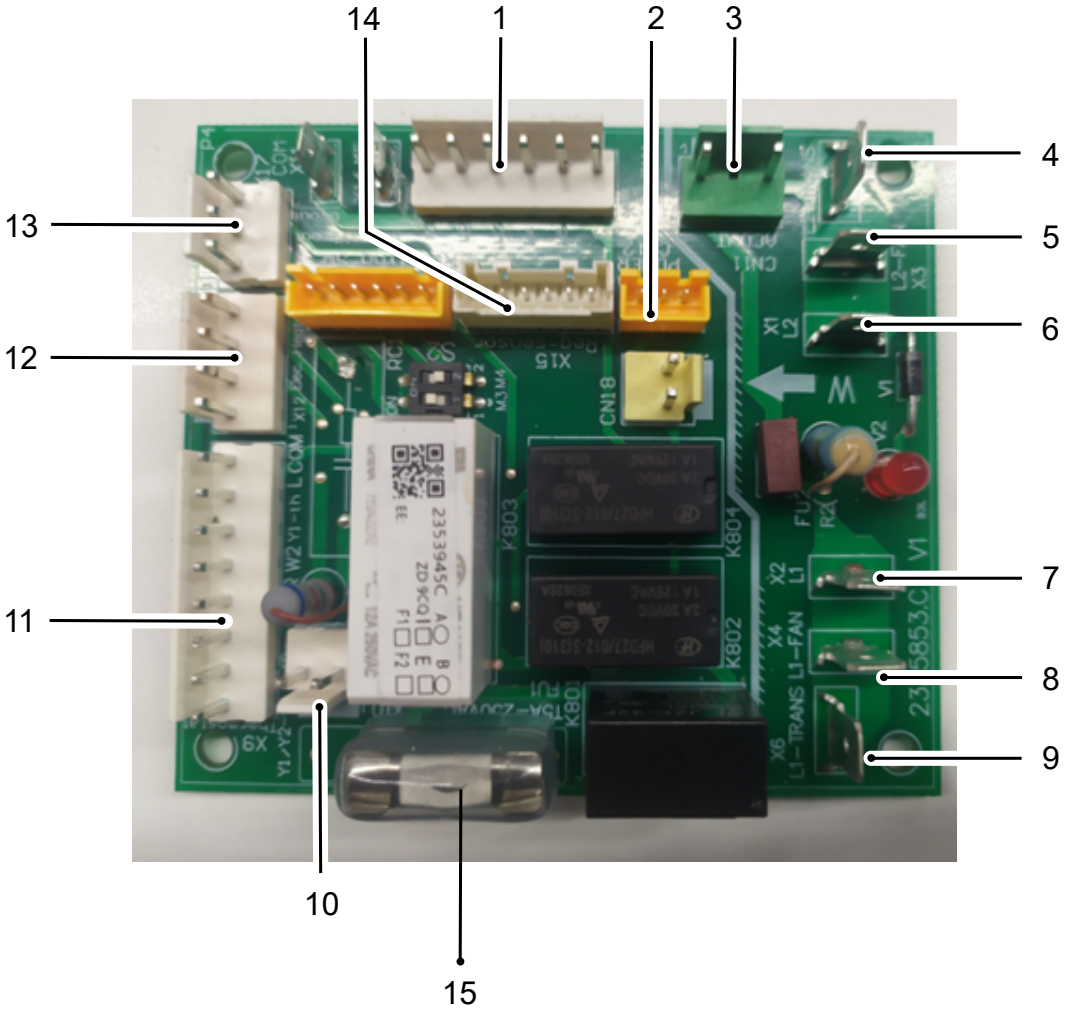
1. Turn off high voltage electrical power to unit.
2. Unplug line voltage lead from reversing valve coil.
3. Check for electrical resistance through the coil. If the coil is open replace the coil.
4. Check from each lead of coil to the copper liquid line as it leaves the unit or the ground lug. There 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.



COMPONENTS TESTING

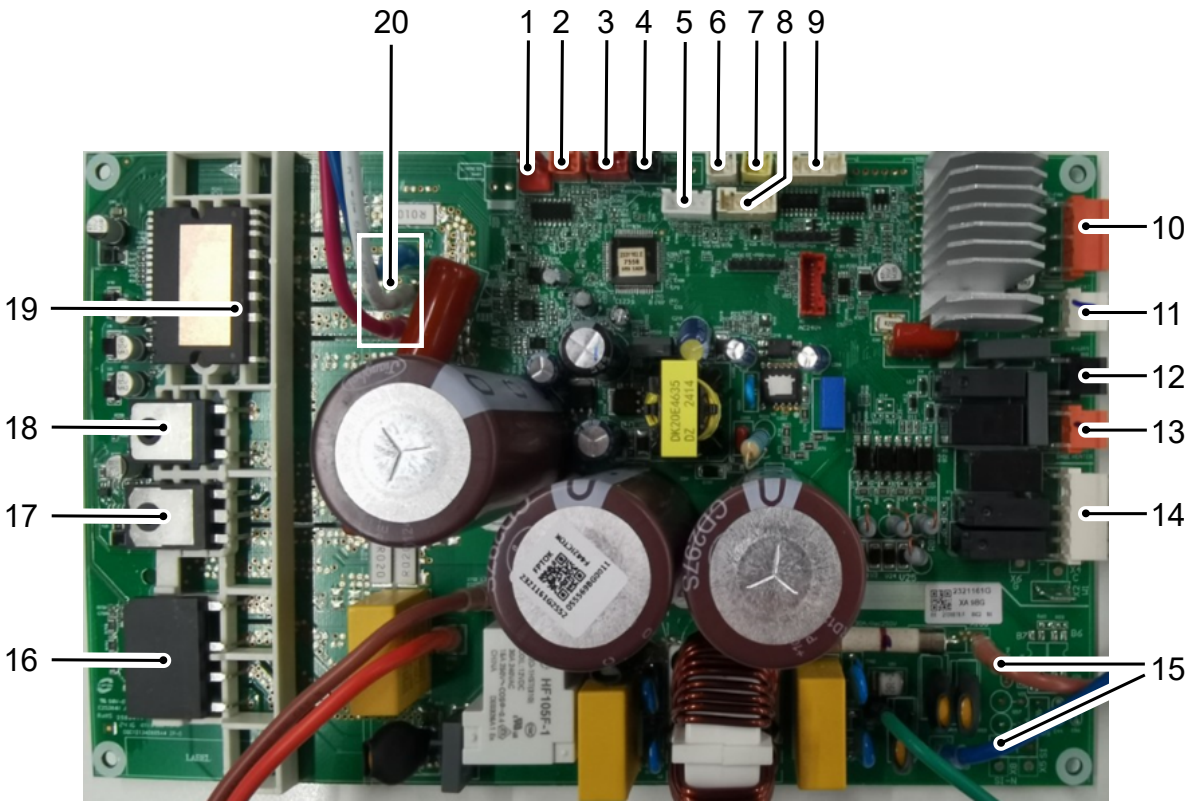
Indoor Unit Main PCB



NO.	Description	NO.	Description
1	EC-FAN Motor	8	L1 for Fan Motor
2	DC-Power	9	L1 for Transformer
3	AC-Power	10	Transformer
4	L2 for Transformer	11	Themostat
5	L2 for Fan Motor	12	Electric Heater
6	AC Power L2	13	TO-outdoor control
7	AC Power L1	14	Refrigerant sensor - R454B
		15	Fuse -φ5.2mm×20mm, 5A, 250V

COMPONENTS TESTING

Outdoor Unit Main PCB (24k-36k BTU)



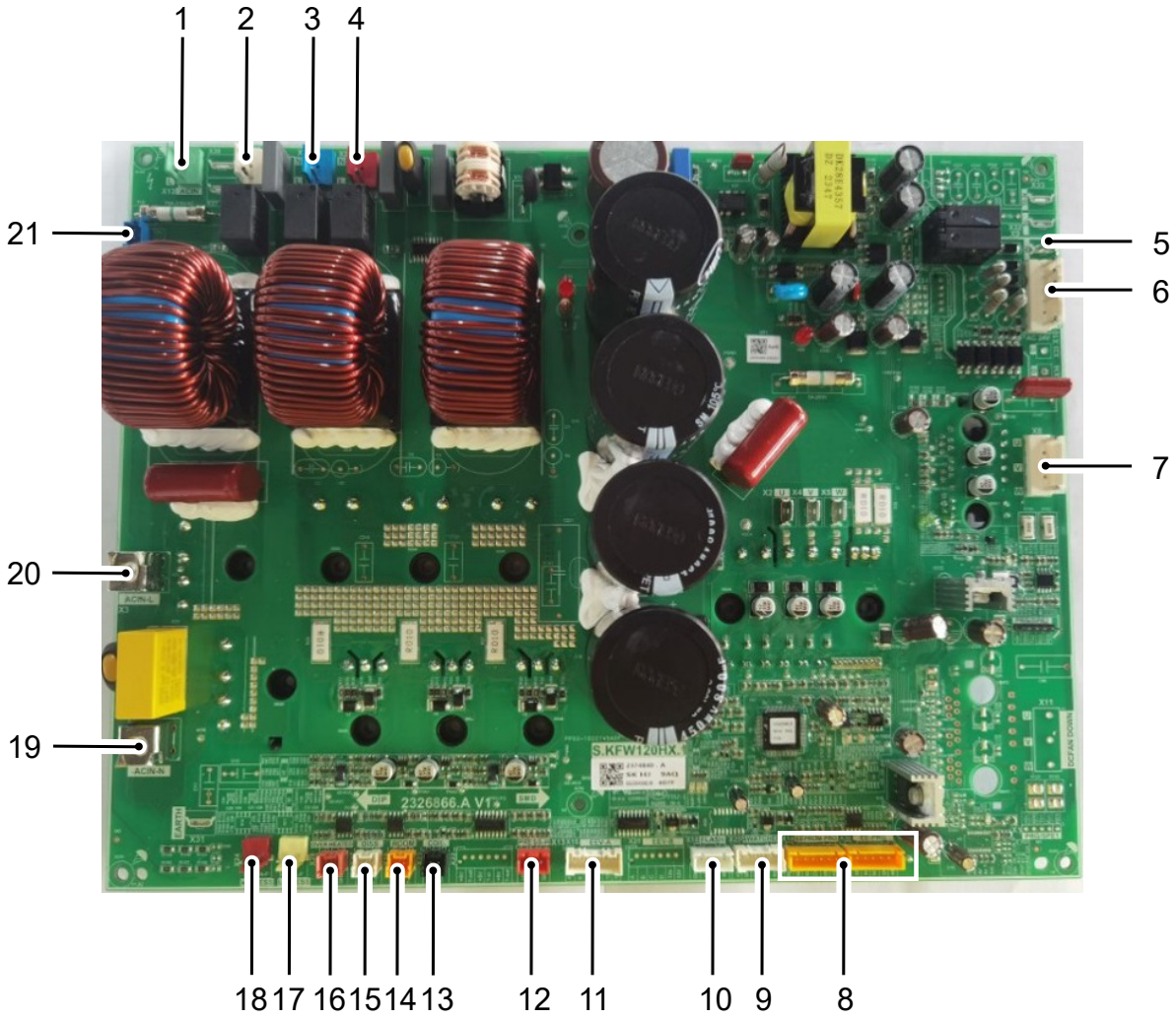
NO.	Description	NO.	Description
1	High Pressure Switch	11	Crankcase Heater
2	Overheat Protector	12	4-way Valve
3	Press Sensor	13	Base Heater
4	Coil Temperature Sensor	14	Communication Signal between IDU&ODU
5	Program	15	AC Power Lin / AC Power Nin
6	Discharge Temperature Sensor	16	Rectification Module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

COMPONENTS TESTING

Outdoor Unit Main PCB (48k-60k BTU)

48K/60K

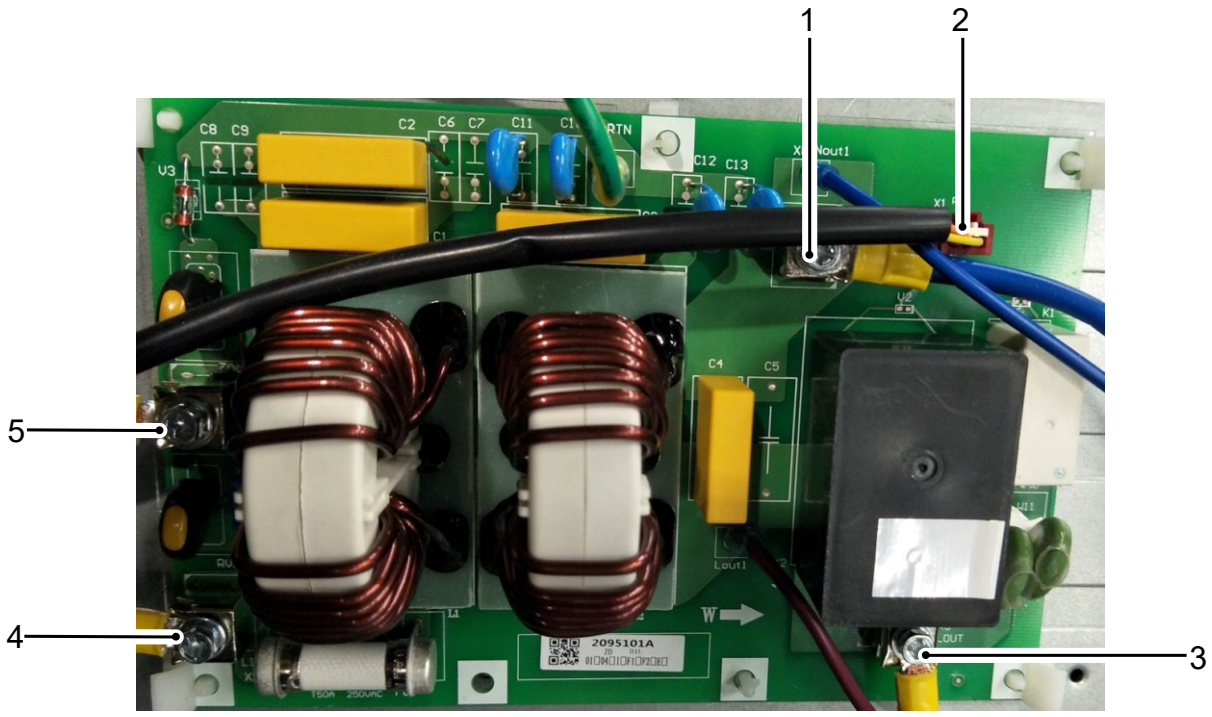
Main control board



NO.	Description	NO.	Description
1	AC Power Input L/N	12	Pressure Sensor
2	Electric Heating Belt	13	Coil Temperature Sensor
3	Base Heater	14	Ambient Temperature Sensor
4	4-way Valve	15	Discharge Temperature Sensor
5	24V Communication Signal-W	16	Overheat Protection Switch
6	24V Communication Signal-C/G/O/Y1/Y2	17	Low Pressure Switch
7	DC fan motor1	18	High Pressure Switch
8	EEPROM	19	AC Power Input N
9	Computer/Checker	20	AC Power Input L
10	Program	21	PTC signal
11	Electronic Expansion Valve Coil		

COMPONENTS TESTING

Outdoor Unit Main Filter PCB (48k-60k BTU)



NO.	Description	NO.	Description
1	N Out	4	Lin
2	Relay Control Signal	5	Nin
3	L Out		

COMPONENTS TESTING

Outdoor Unit Display PCB (48k-60k BTU) (Checker Board)

7 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

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.

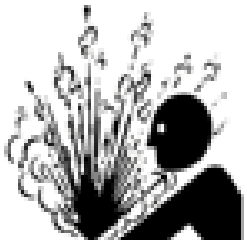
Do not pierce or burn.

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 degree of 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:
  - ·That capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking;
  - ·That no live electrical components and wiring are exposed while charging, recovering or purging the system;
  - ·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.
- If there is any amount of refrigerant in the system charge from the low side.
- 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)

R-454B SEALED SYSTEM REPAIR

Required Equipment

- Pipe tubing cutter.
- Refrigerant recovery cylinder. (Flammable A2L label)
- Ventilation fan.
- Class ABC fire extinguisher.
- Process Tube adapter kit
- Recovery access tool.
- Purge hose fittings
- Pinch off and opening tools

ABC Fire Extinguisher

Recovery Machine

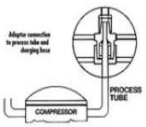
Vaccum Pump

Nitrogen

Guage Manifold

Nitrogen Regulator

Vaccum Guage



Recovery access tool

Process tube adapter kit

Purge hose fittings

Pinch off and opening tools

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:** Discharge capacitors in a way that won't cause any spark. 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.

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 2-3 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. Pressurize nitrogen to 550 psi and leak test all connections with a leak detection fluid. Repair any leaks found.
8. Reassemble sealed enclosures accurately. If seals are worn, replace them.
9. Perform Triple Evacuation. Refer to the Triple Evacuation section of this manual for charging procedures.
10. 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

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 vary less than 540psi. If pressure can not be adequate 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. Charge system with refrigerant. See Refrigerant Charging Section
The only 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.

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-32 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.

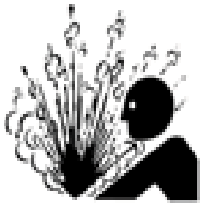
Be aware that refrigerants may not contain an odor.

⚠WARNING: Refrigeration System under High pressure

Do not puncture, heat, expose to flame or incinerate. Only certified refrigeration technicians should service this equipment. R32 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. Perform triple evacuation.
3. Weigh in the refrigerant charge with the proper quantity of R-454B refrigerant per model nameplate.
   a. Although refrigerant has been charged into this unit, additional refrigerant charge is required according to the piping length.
   b. The additional refrigerant precharge quantity should be determined and charged into the system according to the following procedure.
   c. Record the additional refrigerant quantity in order to facilitate maintenance and servicing activities.
   Refrigerant charge before shipment (W0 (oz.))
   W0 is the outdoor unit refrigerant charge before shipment.
   Xg is additional refrigerant outdoor unit needed to charge according to piping length during installation.

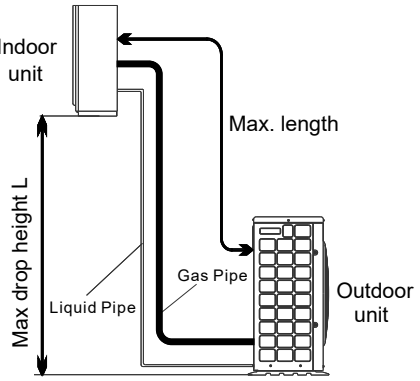
Model	Refrigerant precharged before shipment (oz.)	Total refrigerant pipe length	
		0ft.-25ft.	Longer than 25ft.
24k	70.5	0	Xg = 0.38oz/ft ×(Total pipe length(ft.) -25)
36k	88.2	0	
48k/60k	137.6	0	

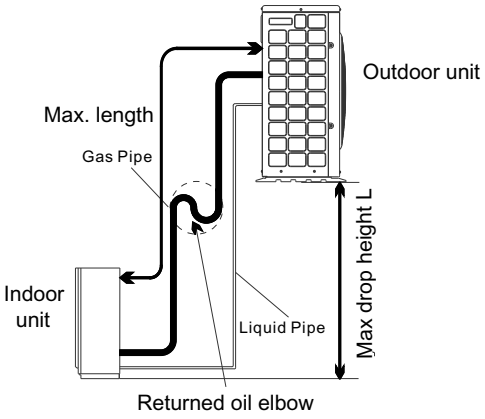
NOTE: EPA Section 608 regulations require that if a system is charged with flammable refrigerant it must have red markings on the service ports.

R-454B SEALED SYSTEM REPAIRS

Refrigerant Charging-Piping Work

MAX. length allowed





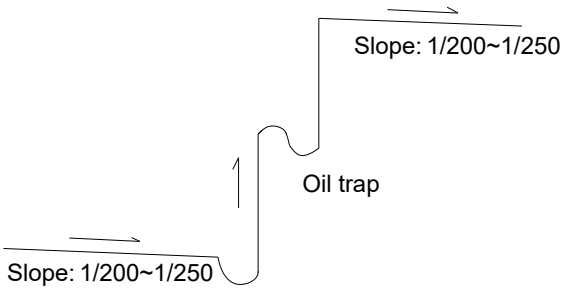
Model	Max. Pipe length (L)	Max. Height difference (H)	Add. Refrigerant [exceed 25ft 7.6m]
24K	98ft. (30m)	66ft. (20m)	0.38(oz/ft) [35(g/m)]
36K	115ft. (35m)	82ft. (25m)	0.38(oz/ft) [35(g/m)]
48K/60K	131ft. (40m)	98ft. (30m)	0.38(oz/ft) [35(g/m)]

⚠ CAUTION

It is better with the shorter refrigerant piping length to maintain the capacity. So the connecting pipe should be as short as possible.

Oil trap

When the indoor unit is lower than outdoor unit and the height difference is larger than 32.8 ft. (10m), an returned oil elbow should be installed on the vertical gas pipe for every 20 ft.(6m).



NOTE:

1) To avoid storing too much oil in the oil trap, the oil trap should be as short as possible.
2) The horizontal piping should slope down along the refrigerant flow direction, to bring the oil back to compressor, the slope is about 1/200 to1/250.
3) In order to ensure better cooling/heating performance, the refrigerant piping should be as short and straight as possible.

R-454B SEALED SYSTEM REPAIRS

Adjust Refrigerant Level

Using service equipment, add or recover refrigerant according to the refrigerant calculation. Allow system to stabilize for 20 minutes after adjusting charge level.

MEASURE SUBCOOLING TO VERIFY PROPER CHARGE

If you want to adjust charging by checking “Subcooling”, please follow below.

NOTE: Charging equipment must use dedicated VG74 oil gauges and hoses.

(1) Purge gauge lines.

(2) Connect service gauge manifold to liquid base valve service ports.

(3) Convert the liquid pressure to temperature using a temperature/pressure chart.

(4) Temporarily install a thermometer on the liquid line at the liquid line service valve. Ensure the thermometer makes adequate contact and is insulated for best possible readings.

(5) Subtract the liquid line temperature from the converted liquid pressure to determine subcooling.

(6) Before starting the subcooling adjustment, make sure the outdoor ambient temperature is in a below range and the unit is operating at 100% capacity(TEST MODE, indoor and outdoor should all be same tons, for example, 24K indoor and 24K outdoor. Press S1 to make V1 display P. Press S2 and S3 to adjust to P.40, the digital tube V2 will display 0, and then adjust 0 to

1. Press S2 and S3 to adjust to P.41, the digital tube V2 will display 0, and then adjust 0 to1. Press S2 and S3 to adjust to P.42, the digital tube V2 will display 28, which means 28℃ frequency lock.)

(7) If the unit is operating at 100% capacity which is ready for charge by subcooling as last page.

(8) If the system subcooling is not within the range as shown in the following table, adjust subcooling according to the following procedure.

a. If subcooling is low, add charge to adjust the subcooling as specified in the following table.

b. If subcooling is high, remove charge to lower the subcooling to below charging table value.

SUBCOOLING = (SAT. LIQUID TEMP.) - (LIQUID LINE TEMP.)

<table>
<tr><td rowspan="2">OD Ambient Temp (degF)</td><td rowspan="2"><65°F</td><td>65°F to 105°F</td><td rowspan="2">>105°F</td></tr>
<tr><td>HP(Heat pump)</td></tr>
<tr><td rowspan="4">Subcooling (degF)</td><td rowspan="4">Weigh in Charge</td><td>24K 17±1°F</td><td rowspan="4">Weigh in Charge</td></tr>
<tr><td>36K 19±1°F</td></tr>
<tr><td>48K 16±1°F</td></tr>
<tr><td>60K 16±1°F</td></tr>
</table>

Saturated liquid pressure temperature chart	
Liquid pressure (PSIG)	R454B (°F)
200	75
210	78
220	81
225	83
235	86
245	88
255	91
265	94
275	96
285	99
295	101
305	103

Saturated liquid pressure temperature chart	
Liquid pressure (PSIG)	R454B (°F)
325	108
355	114
375	118
405	124
415	126
425	128
435	129
445	131
475	136
500	140
525	144
550	148

Note:

1. Subcooling information is valid only while the unit is entering test mode
2. Not more than 3/8 lb. (6 oz.) of refrigerant be added to the system at a time to achieve the target subcooling. It recommended adding 1 oz. refrigerant each time, then wait 10 minutes to stabilize the system.
3. Check the schrader ports for leaks and tighten valve cores, if necessary, install caps finger.
4. Do not adjust the charge based on suction pressur

R-454B SEALED SYSTEM REPAIRS

Compressor Replacement 24-36k

⚠ 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.

⚠ 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.

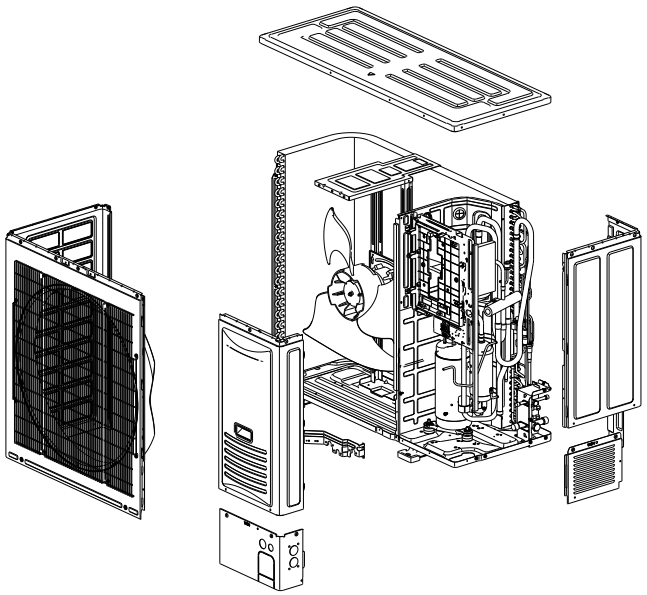
1. Be certain to perform all necessary electrical and refrigeration tests to be sure the compressor is actually defective before replacing.

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

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

3. Remove the top cover and handle;

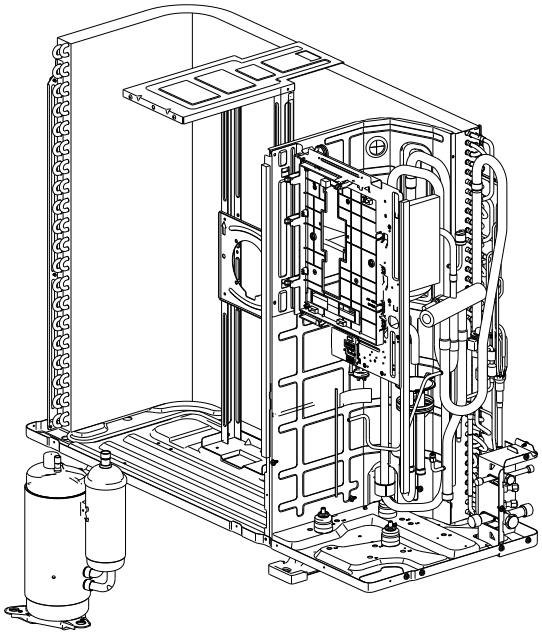
4 .Remove the outer case and valve mounting plate



5. Remove the compressor mounting bolts.

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

7. Carefully remove the compressor from chassis.

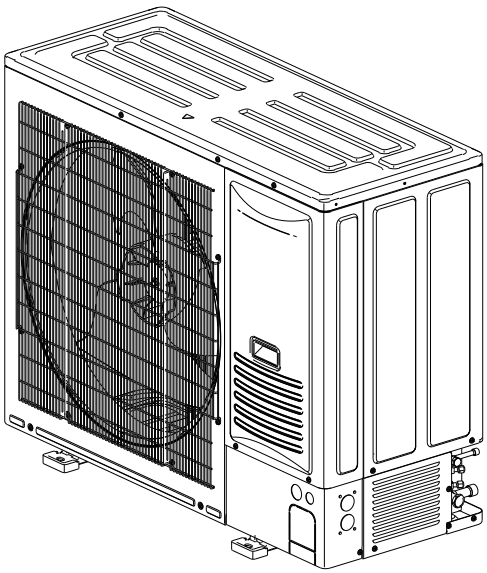


8. Install the replacement compressor.

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.

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

10. Assemble the unit in the reverse order of disassembly.



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

R-454B SEALED SYSTEM REPAIRS

Compressor Replacement 48-60k

⚠ 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.

⚠ CAUTION

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

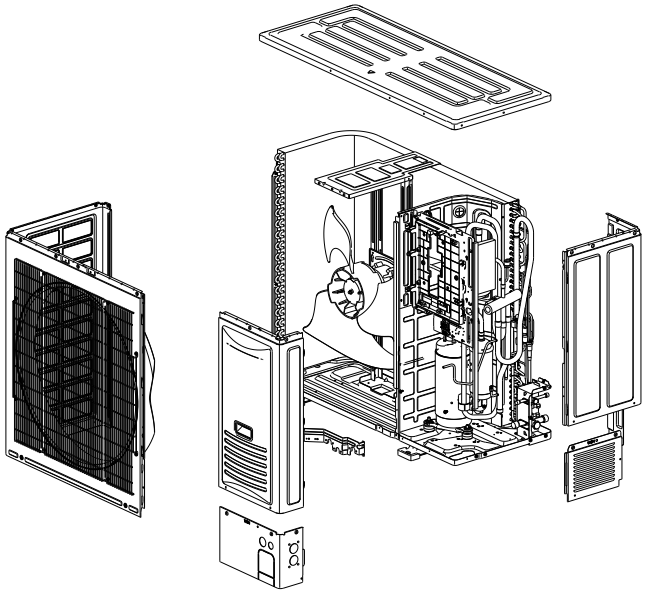
Failure to follow these procedures could result in minor to moderate injury.

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

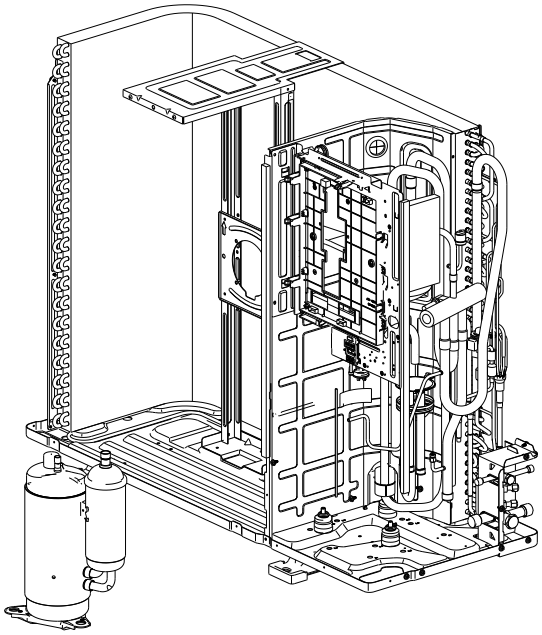
2. Recover all refrigerant from the system though the process tubes. Refer to Refrigerant Removal, Recovery, and Evacuation Section of this manual).

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

3. Remove the top cover and handle;
4 .Remove the outer case and valve mounting plate



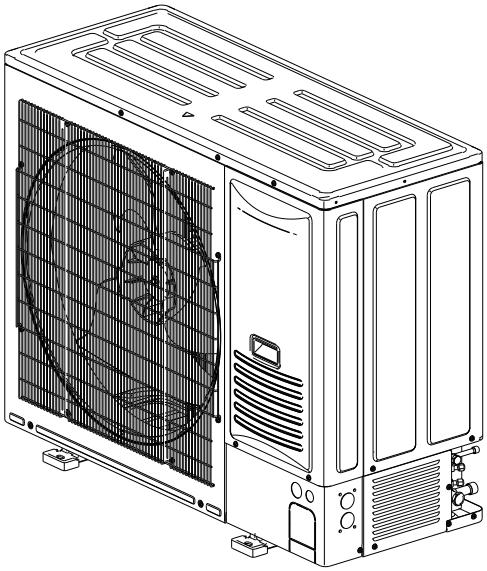
5. Remove the compressor mounting bolts.
6. After all refrigerant has been recovered, cut and remove compressor. Be certain to have both suction and discharge process tubes open to atmosphere.
7. Carefully remove the compressor from chassis.



8. 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.

9. Braze all connections. Refer to the Component Replacement/Brazing section of this manual.
10. Assemble the unit in the reverse order of disassembly.



11. 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 process tubes. 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.

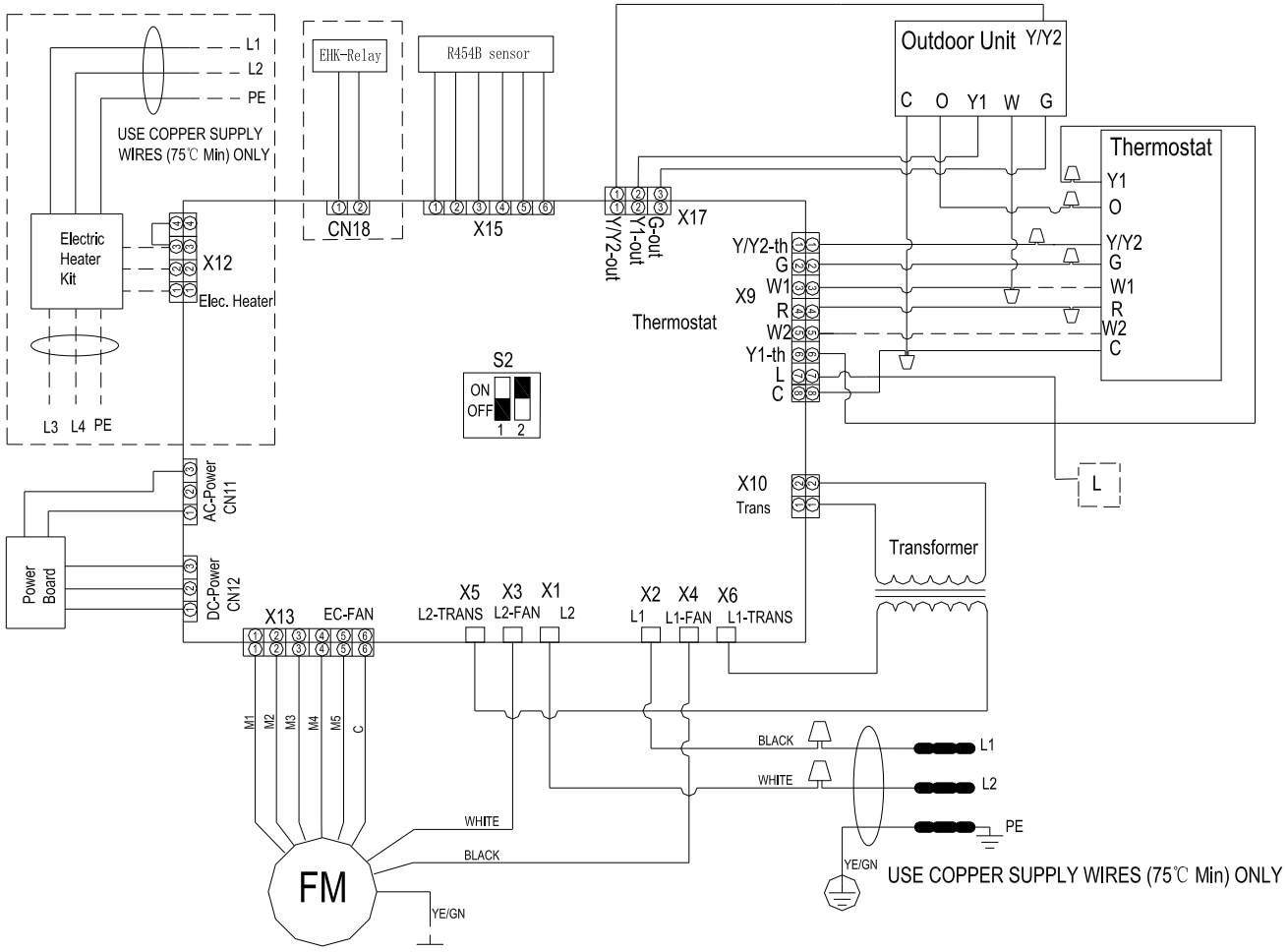
9. Pressurize with nitrogen to 550 psi and leak test all connections with a leak detection fluid. Repair any leaks found.

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

Indoor Unit



NOTES:

1. Use copper wire (75℃ Min) only between disconnect switch and unit.
2. To be wired in accordance with NEC and local codes.
3. If any of the original wire supplied must be replaced, use the same or equivalent type.
4. Connect R to R, G to G,etc. See Installation Instruction for details.
5. Check airflow table to ensure appropriate operations.
6. The EHK is optional . If EHK needs to be installed, please see Wiring Diagram of EHK for wiring details.
7. The dashed line means that the component or wire are optional.
8. The DIP switch S2 in the diagram is the factory default configuration. In actual use, please set S2 to choose blower speed according to the value of static pressure.
9. Please don't connect the wire(W1) from controller to indoor, if there is no EHK.
10. When the refrigerant leakage sensor detects that its concentration reaches the alarm threshold, the AHU Control Board will force the indoor Blower into a High Speed Condition and remove 24v from Y2 OUT/Y1-OUT/G-OUT to thethe outdoor unit stopping its compressor and fan.

11. Explanation of Terminals

Y1 - Cooling/Heating (Low Range)
Y2 -Cooling Heating (High Range)
Y1 - th - Cooling/Heating Low Range (From Thermostat)
Y2 - th - Cooling/Heating High Range (From Thermostat)
L - 24v Alarm Signal
O - Reversing Valve Signal (Energize for Cool)
C - Common
R - 24v AC
G - Indoor Fan Signal
W - Defrost Signal
W1/W2 Electric Aux Heat Signal
Y1 Out - Cooling/Heating Low Range (to outdoor Unit)
Y2 Out - Cooling/Heating High Range (to outdoor Unit)
G-Out: Cooling/Heating Cycle purge Signal to Outdoor Unit

Figure 801

WIRING DIAGRAMS

24k-36k BTU Outdoor Unit

WFPU17Y243D, WFPU17Y363D

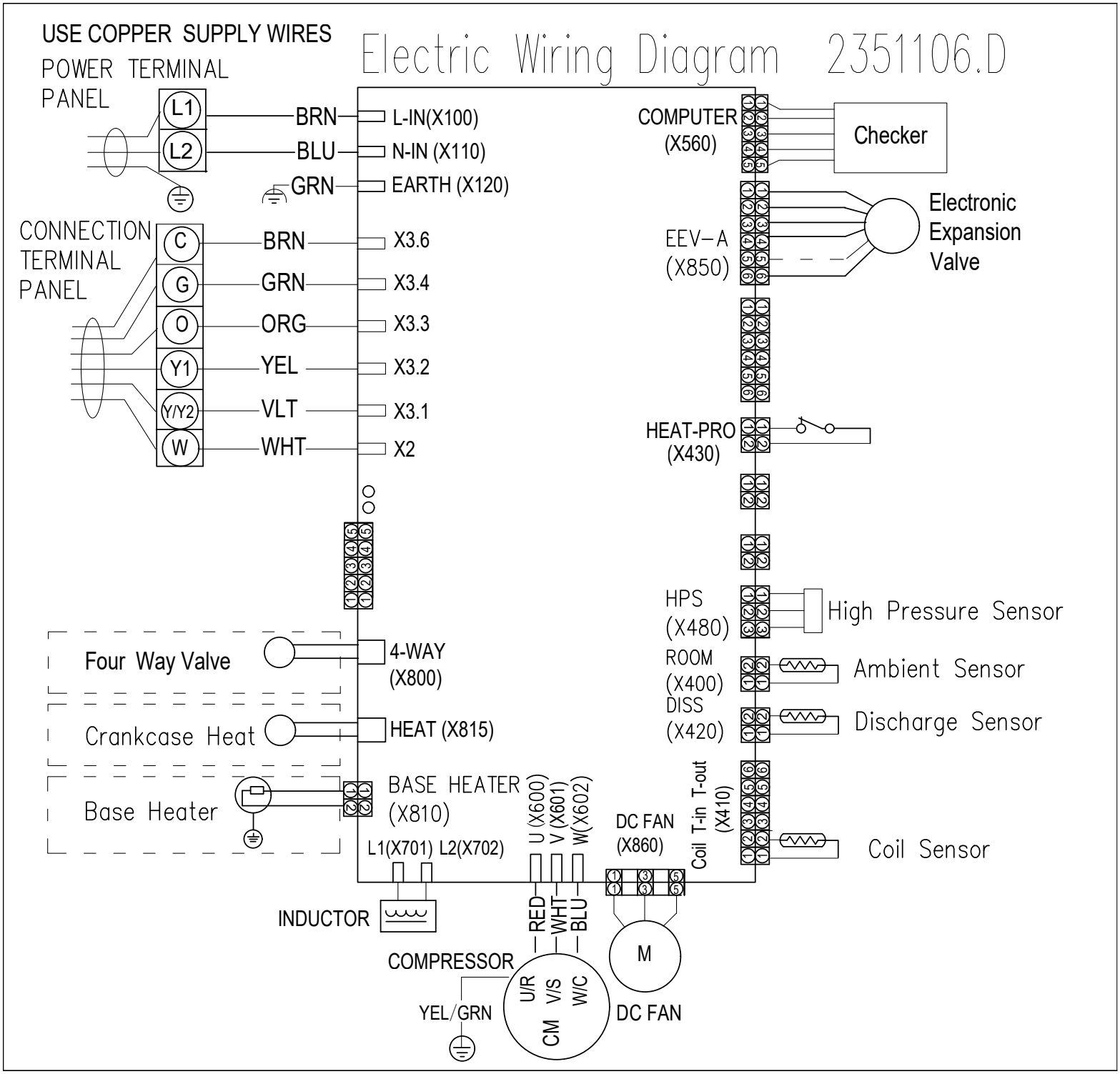


Figure 804

WIRING DIAGRAMS

48k-60k BTU Outdoor Unit

WFPU17Y483D, WFPU17Y603D

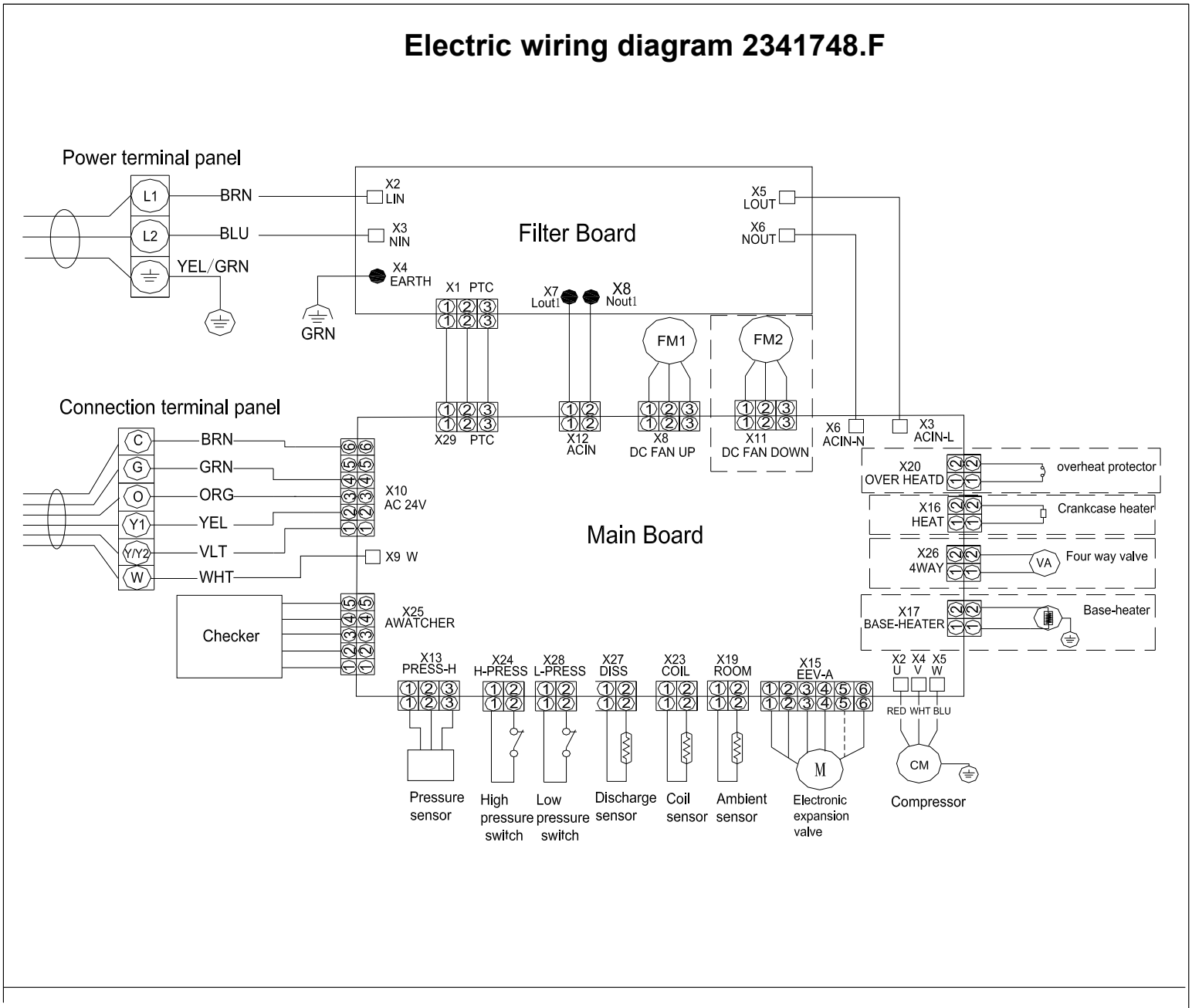
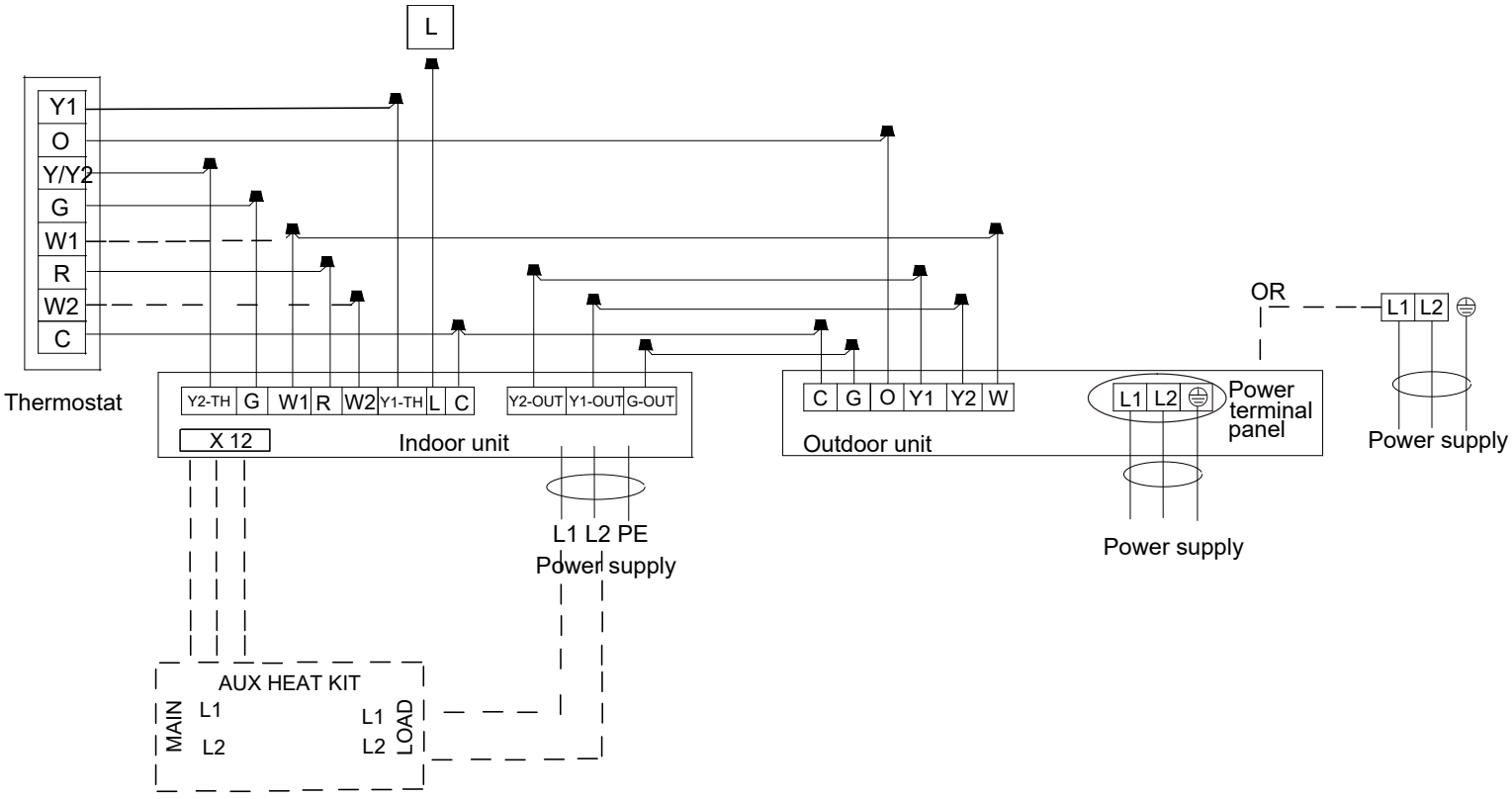


Figure 805

WIRING DIAGRAMS

Matched Set



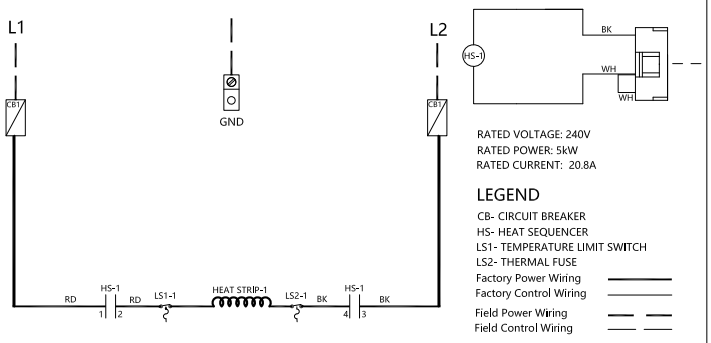
EXPLANATION OF TERMINALS
Y1: COOLING/ HEATING (LOW RANGE)
Y2: COOLING/ HEATING (HIGH RANGE)
Y1-th: COOLING/ HEATING (LOW RANGE FROM THERMOSTAT)
Y2-th: COOLING/ HEATING (HIGH RANGE FROM THERMOSTAT)
L: 24v ALARM SIGNAL
O - REVERSING VALVE SIGNAL (ENERGIZE TO COOL)
C- COMMON
R-24v AC
G- INDOOR FAN SIGNAL
W - DEFROST SIGNAL
W1/W2 ELECTRIC HEAT AUX SIGNAL
Y1 OUT: COOLING/ HEATING (LOW RANGE TO OUTDOOR UNIT)
Y2 OUT: COOLING/ HEATING (HIGH RANGE TO OUTDOOR UNIT)
G OUT: COOLING/ HEATING (CYCLE PURGE SIGNAL TO OUTDOOR UNIT)

NOTE 1: WHEN HEATER IS INSTALLED, CONNECT AHU POWER (WHITE/ BLACK PIGTAIL) TO LOAD SIDE OF APPROPRIATE BREAKER TO POWER AHU. FOR 15 kW/20kW TO CONNECT CB1 WHICH IS L1/L2 OF THE INCLUDED WIRING DIAGRAM
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: WHEN HEATER KIT IS INSTALLED, CONNECT 3 WIRE PIG TAIL FROM AUX HEAT KIT TO CONNECTOR X12 ON THE AHU CIRCUIT BOARD.

WIRING DIAGRAMS

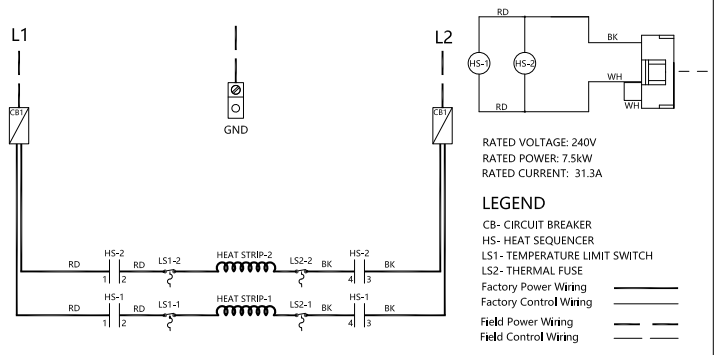
Auxiliary Heater kits

AUX5KWA SCHEMATIC DIAGRAM 5kW



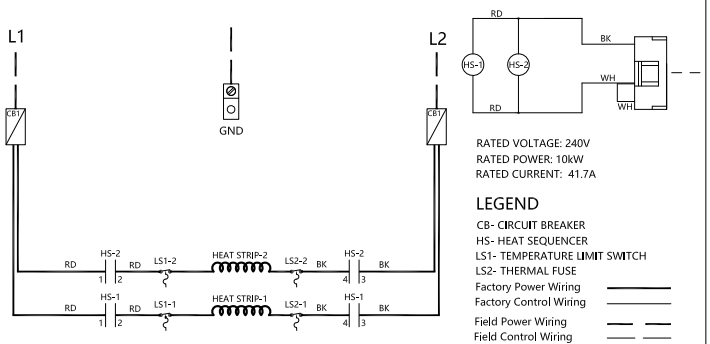
Notes:
1. For Air Handler with Electric Heater,connect the supply power to circuit Breaker.
2. Use Copper Wire（167℉/75℃ Min）Only Between Disconnect Switch And Unit.
3. Must Be Wired in Accordance with NEC And Local Codes.
4. If any of the Original Wire,as supplied,must be replaced, Use the same or equivalent type wire.

AUX7KWA SCHEMATIC DIAGRAM 7.5kW



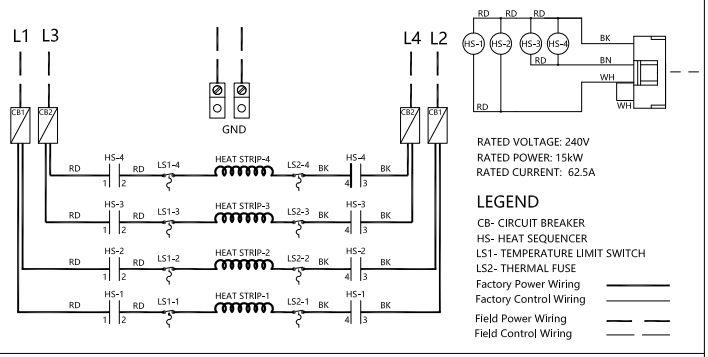
Notes:
1. For Air Handler with Electric Heater,connect the supply power to circuit Breaker.
2. Use Copper Wire（167℉/75℃ Min）Only Between Disconnect Switch And Unit.
3. Must Be Wired in Accordance with NEC And Local Codes.
4. If any of the Original Wire,as supplied,must be replaced, Use the same or equivalent type wire.

AUX10KWA SCHEMATIC DIAGRAM 10kW



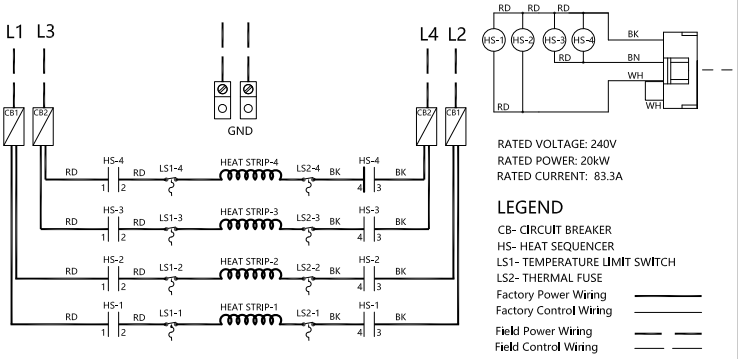
Notes:
1. For Air Handler with Electric Heater,connect the supply power to circuit Breaker.
2. Use Copper Wire（167℉/75℃ Min）Only Between Disconnect Switch And Unit.
3. Must Be Wired in Accordance with NEC And Local Codes.
4. If any of the Original Wire,as supplied,must be replaced, Use the same or equivalent type wire.

AUX15KWA SCHEMATIC DIAGRAM 15kW



Notes:
1. For Air Handler with Electric Heater,connect the supply power to circuit Breaker.
2. Use Copper Wire（167℉/75℃ Min）Only Between Disconnect Switch And Unit.
3. Must Be Wired in Accordance with NEC And Local Codes.
4. If any of the Original Wire,as supplied,must be replaced, Use the same or equivalent type wire.

AUX20KWA SCHEMATIC DIAGRAM 20kW



Notes:
1. For Air Handler with Electric Heater,connect the supply power to circuit Breaker.
2. Use Copper Wire（167℉/75℃ Min）Only Between Disconnect Switch And Unit.
3. Must Be Wired in Accordance with NEC And Local Codes.
4. If any of the Original Wire,as supplied,must be replaced, Use the same or equivalent type wire.

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

Thermistor Resistance Values

1. The parameter of outdoor compressor discharge temperature sensor:
   (R0=187.25K±6.3%；R_{100}=3.77K±2.5K；B0/100=3979K±1%)
   DR: Deviation Rate
   DR(MIN)%=（Rmin-Rnom）/Rnom*100%
   DR(MAX)%=（Rmax-Rnom）/Rnom*100%

T [℉]	T [℃]	Rmin [KΩ]	Rnom [KΩ]	Rmax [KΩ]	DR(MIN)%	DR(MAX)%
-22	-30	908.2603	985.5274	1065.1210	-7.84	7.47
-20.2	-29	855.3955	927.6043	1001.9150	-7.78	7.42
-18.4	-28	805.9244	873.4324	924.8368	-7.73	5.56
-16.6	-27	759.6097	822.7471	887.5944	-7.67	7.31
-14.8	-26	716.2320	775.3041	835.9165	-7.62	7.25
-13	-25	675.5881	730.8775	787.5529	-7.56	7.20
-11.2	-24	637.4902	689.2583	742.2720	-7.51	7.14
-9.4	-23	601.7645	650.2533	699.8601	-7.46	7.09
-7.6	-22	568.2499	613.6835	660.1191	-7.40	7.03
-5.8	-21	536.7970	579.3832	622.8658	-7.35	6.98
-4	-20	507.2676	547.1989	587.9307	-7.30	6.93
-2.2	-19	497.5332	516.9882	555.1565	-3.76	6.88
-0.4	-18	453.4748	488.6192	524.3977	-7.19	6.82
1.4	-17	428.9819	461.9693	495.5191	-7.14	6.77
3.2	-16	405.9517	436.9251	486.3954	-7.09	10.17
5	-15	384.2888	413.3808	442.9105	-7.04	6.67
6.8	-14	363.9047	391.2386	418.9563	-6.99	6.62
8.6	-13	344.7169	370.4072	396.4325	-6.94	6.56
10.4	-12	326.6497	350.8019	375.2461	-6.88	6.51
12.2	-11	309.6286	332.3441	355.3104	-6.83	6.46
14	-10	293.5903	314.9620	336.5448	-6.79	6.41
15.8	-9	278.4719	298.5822	318.3744	-6.74	6.22
17.6	-8	264.2156	283.1464	302.2294	-6.69	6.31
19.4	-7	250.7678	268.5936	286.5448	-6.64	6.26
21.2	-6	238.0783	254.8686	271.7603	-6.59	6.22
23	-5	226.1003	241.9200	257.8193	-6.54	6.17
24.8	-4	214.7903	229.6997	244.6593	-6.49	6.11
26.6	-3	204.1073	218.1630	232.2612	-6.44	6.07
28.4	-2	194.0135	207.2681	220.5495	-6.39	6.02
30.2	-1	184.4732	196.9759	209.4913	-6.35	5.97
32	0	175.4533	187.2500	199.0468	-6.30	5.93
33.8	1	166.8952	178.0255	189.1529	-6.25	5.88
35.6	2	158.8023	169.3067	179.8058	-6.20	5.84
37.4	3	151.1467	161.0633	170.9724	-6.16	5.80
39.2	4	143.9026	153.2667	162.6216	-6.11	5.75
41	5	137.0455	145.8905	154.7246	-6.06	5.71
42.8	6	130.5528	138.9097	147.2544	-6.02	5.67
44.6	7	124.4033	132.3011	140.1856	-5.97	5.62
46.4	8	118.5769	126.0429	133.4946	-5.92	5.58
48.2	9	113.0550	120.1146	127.1591	-5.88	5.54
50	10	107.8202	114.4973	121.1586	-5.83	5.50
51.8	11	102.8560	109.1728	115.4734	-5.79	5.46
53.6	12	98.1470	104.1246	110.0855	-5.74	5.41
55.4	13	93.6787	99.3367	104.9778	-5.70	5.37
57.2	14	89.4378	94.7946	100.1342	-5.65	5.33
59	15	85.4114	90.4842	95.5398	-5.61	5.29
60.8	16	81.5875	86.3926	91.1805	-5.56	5.25
62.6	17	77.9551	82.5076	87.0430	-5.52	5.21
64.4	18	74.5034	78.8177	83.1150	-5.47	5.17

APPENDIX

Thermistor Resistance Values

T [℉]	T [℃]	Rmin [KΩ]	Rnom [KΩ]	Rmax [KΩ]	DR(MIN)%	DR(MAX)%
66.2	19	71.2227	75.3122	79.3848	-5.43	5.13
68	20	68.1036	71.9808	75.8414	-5.39	5.09
69.8	21	65.1373	68.8141	72.4746	-5.34	5.05
71.6	22	62.3155	65.8032	69.2746	-5.30	5.01
73.4	23	59.6306	62.9395	66.2324	-5.26	4.97
75.2	24	57.0752	60.2152	63.3395	-5.21	4.93
77	25	54.6424	57.6227	60.5877	-5.17	4.89
78.8	26	52.3258	55.1551	57.9695	-5.13	4.85
80.6	27	50.1192	52.8058	55.4778	-5.09	4.82
82.4	28	48.0168	50.5684	53.1058	-5.05	4.78
84.2	29	46.0133	48.4371	50.8472	-5.00	4.74
86	30	44.1034	46.4046	48.6960	-4.96	4.71
87.8	31	42.2825	44.4711	46.6466	-4.92	4.66
89.6	32	40.5458	42.6261	44.6937	-4.88	4.63
91.4	33	38.8891	40.8668	42.8323	-4.84	4.59
93.2	34	37.3084	39.1890	41.0576	-4.80	4.55
95	35	35.7998	37.5883	39.3653	-4.76	4.51
96.8	36	34.3596	36.0609	37.7511	-4.72	4.48
98.6	37	32.9844	34.6030	36.2109	-4.68	4.44
100.4	38	31.6710	33.2113	34.7412	-4.64	4.40
102.2	39	30.4164	31.8823	33.3383	-4.60	4.37
104	40	29.2176	30.6130	31.9988	-4.56	4.33
105.8	41	28.0718	29.4004	30.7197	-4.52	4.29
107.6	42	26.9765	28.2417	29.4979	-4.48	4.26
109.4	43	25.9293	27.1342	28.3306	-4.44	4.22
111.2	44	24.9277	26.0755	27.2150	-4.40	4.19
113	45	23.9697	25.0632	26.1488	-4.36	4.15
114.8	46	23.0530	24.0950	25.1293	-4.32	4.12
116.6	47	22.1757	23.1688	24.1545	-4.29	4.08
118.4	48	21.3360	22.2826	23.2221	-4.25	4.05
120.2	49	20.5321	21.4345	22.3301	-4.21	4.01
122	50	19.7623	20.6226	21.4766	-4.17	3.98
123.8	51	19.0261	19.8468	20.6612	-4.14	3.94
125.6	52	18.3211	19.1040	19.8808	-4.10	3.91
127.4	53	17.6458	18.3926	19.1338	-4.06	3.87
129.2	54	16.9986	17.7113	18.4185	-4.02	3.84
131	55	16.3784	17.0537	17.7335	-3.96	3.83
132.8	56	15.7839	16.4332	17.0774	-3.95	3.77
134.6	57	15.2139	15.8338	16.4488	-3.92	3.74
136.4	58	14.6673	15.2592	15.8464	-3.88	3.71
138.2	59	14.1430	14.7083	15.2690	-3.84	3.67
140	60	13.6400	14.1799	14.7154	-3.81	3.64
141.8	61	13.1573	13.6730	14.1846	-3.77	3.61
143.6	62	12.6941	13.1868	13.6756	-3.74	3.57
145.4	63	12.2494	12.7202	13.1872	-3.70	3.54
147.2	64	11.8224	12.2723	12.7186	-3.67	3.51
149	65	11.4124	11.8424	12.2690	-3.63	3.48
150.8	66	11.0185	11.4295	11.8373	-3.60	3.45
152.6	67	10.6401	11.0331	11.4230	-3.56	3.41
154.4	68	10.2765	10.6522	11.0251	-3.53	3.38
156.2	69	9.9271	10.2863	10.6429	-3.49	3.35
158	70	9.5912	9.9348	10.2756	-3.46	3.32
159.8	71	9.2682	9.5968	9.9231	-3.42	3.29
161.6	72	8.9576	9.2720	9.5841	-3.39	3.26
163.4	73	8.6589	8.9597	9.2583	-3.36	3.23
165.2	74	8.3716	8.6594	8.9451	-3.32	3.19

APPENDIX

Thermistor Resistance Values

T [℉]	T [℃]	Rmin [KΩ]	Rnom [KΩ]	Rmax [KΩ]	DR(MIN)%	DR(MAX)%
167	75	8.0951	8.3705	8.6440	-3.29	3.16
168.8	76	7.8290	8.0926	8.3544	-3.26	3.13
170.6	77	7.5730	7.8252	8.0758	-3.22	3.10
172.4	78	7.3264	7.5679	7.8078	-3.19	3.07
174.2	79	7.0891	7.3202	7.5499	-3.16	3.04
176	80	6.8605	7.0818	7.3018	-3.12	3.01
177.8	81	6.6403	6.8522	7.0629	-3.09	2.98
179.6	82	6.4282	6.6311	6.8329	-3.06	2.95
181.4	83	6.2239	6.4182	6.6115	-3.03	2.92
183.2	84	6.0269	6.2131	6.3982	-3.00	2.89
185	85	5.8371	6.0154	6.1928	-2.96	2.86
186.8	86	5.6542	5.8249	5.9949	-2.93	2.84
188.6	87	5.4777	5.6413	5.8042	-2.90	2.81
190.4	88	5.3076	5.4644	5.6205	-2.87	2.78
192.2	89	5.1435	5.2937	5.4433	-2.84	2.75
194	90	4.9853	5.1292	5.2726	-2.81	2.72
195.8	91	4.8326	4.9705	5.1079	-2.77	2.69
197.6	92	4.6852	4.8174	4.9492	-2.74	2.66
199.4	93	4.5430	4.6697	4.7960	-2.71	2.63
201.2	94	4.4058	4.5272	4.6483	-2.68	2.61
203	95	4.2733	4.3896	4.5058	-2.65	2.58
204.8	96	4.1453	4.2568	4.3683	-2.62	2.55
206.6	97	4.0218	4.1287	4.2355	-2.59	2.52
208.4	98	3.9024	4.0049	4.1074	-2.56	2.50
210.2	99	3.7872	3.8854	3.9837	-2.53	2.47
212	100	3.6758	3.7700	3.8643	-2.50	2.44
213.8	101	3.5661	3.6585	3.7512	-2.53	2.47
215.6	102	3.4601	3.5509	3.6419	-2.56	2.50
217.4	103	3.3577	3.4468	3.5362	-2.59	2.53
219.2	104	3.2588	3.3463	3.4341	-2.61	2.56
221	105	3.1632	3.2491	3.3353	-2.64	2.58
222.8	106	3.0708	3.1551	3.2398	-2.67	2.61
224.6	107	2.9816	3.0643	3.1475	-2.70	2.64
226.4	108	2.8953	2.9765	3.0582	-2.73	2.67
228.2	109	2.8118	2.8915	2.9717	-2.76	2.70
230	110	2.7311	2.8093	2.8881	-2.78	2.73
231.8	111	2.6531	2.7299	2.8072	-2.81	2.75
233.6	112	2.5776	2.6530	2.7289	-2.84	2.78
235.4	113	2.5046	2.5785	2.6531	-2.87	2.81
237.2	114	2.4340	2.5065	2.5798	-2.89	2.84
239	115	2.3656	2.4368	2.5087	-2.92	2.87
240.8	116	2.2995	2.3693	2.4400	-2.95	2.90
242.6	117	2.2354	2.3040	2.3733	-2.98	2.92
244.4	118	2.1734	2.2407	2.3088	-3.00	2.95
246.2	119	2.1134	2.1795	2.2463	-3.03	2.97
248	120	2.0553	2.1201	2.1858	-3.06	3.01
249.8	121	1.9991	2.0626	2.1271	-3.08	3.03
251.6	122	1.9446	2.0070	2.0702	-3.11	3.05
253.4	123	1.8918	1.9530	2.0151	-3.13	3.08
255.2	124	1.8406	1.9007	1.9617	-3.16	3.11
257	125	1.7911	1.8500	1.9099	-3.18	3.14
258.8	126	1.7430	1.8009	1.8597	-3.22	3.16
260.6	127	1.6965	1.7533	1.8110	-3.24	3.19
262.4	128	1.6514	1.7071	1.7638	-3.26	3.21
264.2	129	1.6076	1.6623	1.7180	-3.29	3.24
266	130	1.5652	1.6189	1.6736	-3.32	3.27

APPENDIX

Thermistor Resistance Values

2. THE PARAMETER OF THE OTHER SENSOR: (R_0=15K±2%; B0/100=3450K±2%)

DR: Deviation Rate

DR(MIN)%=（Rmin-Rnom）/Rnom*100%　　DR(MAX)%=（Rmax-Rnom）/Rnom*100%

T [℉]	T [℃]	Rmin [KΩ]	Rnom [KΩ]	Rmax [KΩ]	DR(MIN)%	DR(MAX)%
-22	-30	60.78	64.77	68.99	-6.16	6.12
-20.2	-29	57.75	61.36	65.16	-5.88	5.83
-18.4	-28	54.89	58.15	61.58	-5.61	5.57
-16.6	-27	52.19	55.14	58.23	-5.35	5.31
-14.8	-26	49.63	52.30	55.08	-5.11	5.05
-13	-25	47.21	49.62	52.13	-4.86	4.81
-11.2	-24	44.92	47.10	49.37	-4.63	4.60
-9.4	-23	42.76	44.73	46.78	-4.40	4.38
-7.6	-22	40.71	42.49	44.34	-4.19	4.17
-5.8	-21	38.77	40.38	42.05	-3.99	3.97
-4	-20	36.93	38.39	39.90	-3.80	3.78
-2.2	-19	35.18	36.51	37.87	-3.64	3.59
-0.4	-18	33.53	34.74	35.97	-3.48	3.42
1.4	-17	31.96	33.06	34.17	-3.33	3.25
3.2	-16	30.48	31.47	32.49	-3.15	3.14
5	-15	29.07	29.97	30.89	-3.00	2.98
6.8	-14	27.73	28.56	29.39	-2.91	2.82
8.6	-13	26.46	27.22	27.98	-2.79	2.72
10.4	-12	25.26	25.95	26.64	-2.66	2.59
12.2	-11	24.11	24.75	25.38	-2.59	2.48
14	-10	23.03	23.61	24.19	-2.46	2.40
15.8	-9	21.99	22.53	23.06	-2.40	2.30
17.6	-8	21.01	21.51	22.00	-2.32	2.23
19.4	-7	20.08	20.54	20.99	-2.24	2.14
21.2	-6	19.19	19.62	20.04	-2.19	2.10
23	-5	18.35	18.74	19.14	-2.08	2.09
24.8	-4	17.55	17.92	18.29	-2.06	2.02
26.6	-3	16.78	17.13	17.48	-2.04	2.00
28.4	-2	16.06	16.38	16.71	-1.95	1.97
30.2	-1	15.36	15.67	15.98	-1.98	1.94
32	0	14.70	15.00	15.29	-2.00	1.90
33.8	1	14.08	14.36	14.64	-1.95	1.91
35.6	2	13.48	13.75	14.02	-1.96	1.93
37.4	3	12.91	13.17	13.43	-1.97	1.94
39.2	4	12.36	12.62	12.87	-2.06	1.94
41	5	11.85	12.09	12.34	-1.99	2.03
42.8	6	11.35	11.59	11.83	-2.07	2.03
44.6	7	10.88	11.11	11.35	-2.07	2.11
46.4	8	10.43	10.66	10.89	-2.16	2.11
48.2	9	9.999	10.230	10.450	-2.26	2.11
50	10	9.590	9.816	10.040	-2.30	2.23
51.8	11	9.199	9.422	9.647	-2.37	2.33
53.6	12	8.826	9.047	9.269	-2.44	2.40
55.4	13	8.470	8.689	8.910	-2.52	2.48
57.2	14	8.129	8.347	8.567	-2.61	2.57
59	15	7.804	8.021	8.240	-2.71	2.66
60.8	16	7.493	7.709	7.928	-2.80	2.76
62.6	17	7.196	7.412	7.630	-2.91	2.86
64.4	18	6.912	7.127	7.346	-3.02	2.98
66.2	19	6.640	6.855	7.074	-3.14	3.10
68	20	6.381	6.595	6.815	-3.24	3.23
69.8	21	6.132	6.347	6.567	-3.39	3.35
71.6	22	5.894	6.109	6.330	-3.52	3.49

APPENDIX

Thermistor Resistance Values

T [℉]	T [℃]	Rmin [KΩ]	Rnom [KΩ]	Rmax [KΩ]	DR(MIN)%	DR(MAX)%
73.4	23	5.667	5.882	6.103	-3.66	3.62
75.2	24	5.449	5.664	5.886	-3.80	3.77
77	25	5.240	5.456	5.678	-3.96	3.91
78.8	26	5.048	5.260	5.478	-4.03	3.98
80.6	27	4.864	5.072	5.286	-4.10	4.05
82.4	28	4.687	4.891	5.101	-4.17	4.12
84.2	29	4.517	4.717	4.924	-4.24	4.20
86	30	4.355	4.550	4.753	-4.29	4.27
87.8	31	4.198	4.390	4.589	-4.37	4.34
89.6	32	4.048	4.236	4.431	-4.44	4.40
91.4	33	3.904	4.089	4.280	-4.52	4.46
93.2	34	3.766	3.946	4.134	-4.56	4.55
95	35	3.663	3.810	3.994	-3.86	4.61
96.8	36	3.506	3.679	3.859	-4.70	4.66
98.6	37	3.383	3.552	3.729	-4.76	4.75
100.4	38	3.265	3.431	3.604	-4.84	4.80
102.2	39	3.152	3.314	3.484	-4.89	4.88
104	40	3.043	3.202	3.368	-4.97	4.93
105.8	41	2.938	3.094	3.257	-5.04	5.00
107.6	42	2.838	2.990	3.149	-5.08	5.05
109.4	43	2.741	2.890	3.046	-5.16	5.12
111.2	44	2.648	2.793	2.946	-5.19	5.19
113	45	2.558	2.701	2.850	-5.29	5.23
114.8	46	2.472	2.611	2.758	-5.32	5.33
116.6	47	2.389	2.525	2.669	-5.39	5.40
118.4	48	2.309	2.443	2.583	-5.49	5.42
120.2	49	2.232	2.363	2.500	-5.54	5.48
122	50	2.158	2.286	2.421	-5.60	5.58
123.8	51	2.087	2.212	2.344	-5.65	5.63
125.6	52	2.018	2.140	2.269	-5.70	5.69
127.4	53	1.952	2.072	2.198	-5.79	5.73
129.2	54	1.888	2.005	2.129	-5.84	5.82
131	55	1.827	1.941	2.062	-5.87	5.87
132.8	56	1.767	1.880	1.998	-6.01	5.91
134.6	57	1.710	1.820	1.936	-6.04	5.99
136.4	58	1.655	1.763	1.876	-6.13	6.02
138.2	59	1.602	1.707	1.818	-6.15	6.11
140	60	1.551	1.654	1.762	-6.23	6.13
141.8	61	1.502	1.602	1.709	-6.24	6.26
143.6	62	1.452	1.553	1.657	-6.50	6.28
145.4	63	1.409	1.505	1.606	-6.38	6.29
147.2	64	1.364	1.458	1.558	-6.45	6.42
149	65	1.322	1.413	1.511	-6.44	6.49
150.8	66	1.280	1.370	1.466	-6.57	6.55
152.6	67	1.241	1.328	1.422	-6.55	6.61
154.4	68	1.202	1.288	1.379	-6.68	6.60
156.2	69	1.165	1.249	1.339	-6.73	6.72
158	70	1.129	1.211	1.299	-6.77	6.77
159.8	71	1.095	1.175	1.261	-6.81	6.82
161.6	72	1.061	1.140	1.224	-6.93	6.86
163.4	73	1.029	1.106	1.188	-6.96	6.90
165.2	74	0.9977	1.073	1.153	-7.02	6.94
167	75	0.9676	1.041	1.120	-7.05	7.05
168.8	76	0.9385	1.011	1.088	-7.17	7.08
170.6	77	0.9104	0.9810	1.056	-7.20	7.10
172.4	78	0.8833	0.9523	1.026	-7.25	7.18

APPENDIX

Thermistor Resistance Values

T [℉]	T [℃]	Rmin [KΩ]	Rnom [KΩ]	Rmax [KΩ]	DR(MIN)%	DR(MAX)%
174.2	79	0.8570	0.9246	0.9971	-7.31	7.27
176	80	0.8316	0.8977	0.9687	-7.36	7.33
177.8	81	0.8071	0.8717	0.9412	-7.41	7.38
179.6	82	0.7834	0.8466	0.9146	-7.47	7.43
181.4	83	0.7604	0.8223	0.8888	-7.53	7.48
183.2	84	0.7382	0.7987	0.8639	-7.57	7.55
185	85	0.7167	0.7759	0.8397	-7.63	7.60
186.8	86	0.6958	0.7537	0.8161	-7.68	7.65
188.6	87	0.6755	0.7322	0.7933	-7.74	7.70
190.4	88	0.6560	0.7114	0.7712	-7.79	7.75
192.2	89	0.6371	0.6913	0.7498	-7.84	7.80
194	90	0.6188	0.6718	0.7291	-7.89	7.86
195.8	91	0.6011	0.6530	0.7051	-7.95	7.39
197.6	92	0.5840	0.6348	0.6897	-8.00	7.96
199.4	93	0.5674	0.6171	0.6709	-8.05	8.02
201.2	94	0.5514	0.6000	0.6527	-8.10	8.07
203	95	0.5359	0.5835	0.6350	-8.16	8.11
204.8	96	0.5209	0.5675	0.6179	-8.21	8.16
206.6	97	0.5064	0.5519	0.6014	-8.24	8.23
208.4	98	0.4923	0.5369	0.5853	-8.31	8.27
210.2	99	0.4787	0.5224	0.5698	-8.37	8.32
212	100	0.4655	0.5083	0.5547	-8.42	8.36
213.8	101	0.4528	0.4946	0.5401	-8.45	8.42
215.6	102	0.4404	0.4814	0.5259	-8.52	8.46
217.4	103	0.4284	0.4685	0.5121	-8.56	8.51
219.2	104	0.4168	0.4561	0.4988	-8.62	8.56
221	105	0.4056	0.4440	0.4859	-8.65	8.62
222.8	106	0.3947	0.4323	0.4733	-8.70	8.66
224.6	107	0.3841	0.4210	0.4611	-8.76	8.70
226.4	108	0.3739	0.4100	0.4493	-8.80	8.75
228.2	109	0.3640	0.3993	0.4379	-8.84	8.81
230	110	0.3544	0.3890	0.4267	-8.89	8.84
231.8	111	0.3450	0.3789	0.4159	-8.95	8.90
233.6	112	0.3360	0.3692	0.4055	-8.99	8.95
235.4	113	0.3272	0.3597	0.3953	-9.04	9.01
237.2	114	0.3187	0.3505	0.3854	-9.07	9.06
239	115	0.3104	0.3416	0.3758	-9.13	9.10
240.8	116	0.3024	0.3330	0.3665	-9.19	9.14
242.6	117	0.2947	0.3246	0.3574	-9.21	9.18
244.4	118	0.2871	0.3164	0.3468	-9.26	8.77
246.2	119	0.2798	0.3085	0.3401	-9.30	9.29
248	120	0.2727	0.3008	0.33	-9.34	9.34

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
1-800-541-6645
www.friedrich.com