FRIEDRICH

Ductless
Floating Air® Select
Single Zone
R- 32 Refrigerant

Service Manual

System	**115-Volt:**	FSHW091B, FSHW121B
	230-Volt:	FSHW183B, FSHW243B
Wall Mounted Unit	**115-Volt:**	FAHFW09A1A, FAHFW12A1A
	230-Volt:	FAHFW18A3A, FAHFW24A3A
Outdoor Unit	**115-Volt:**	FSHSR09B1B, FSHSR12B1B
	230-Volt:	FSHSR18B3B, FSHSR24B3B

THE EXPERTS IN ROOM AIR CONDITIONING

96121401_00

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INTRODUCTION

Important Safety Information

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

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

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

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

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

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

SAFETY IS IMPORTANT

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

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

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

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

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

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

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

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

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

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

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

INTRODUCTION

Personal Injury Or Death Hazards

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

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

ELECTRICAL HAZARDS:

- Unplug and/or disconnect all electrical power to the unit before performing inspections, maintenance, or service.
- Make sure to follow proper lockout/tag out procedures.
- Always work in the company of a qualified assistant if possible.
- Capacitors, even when disconnected from the electrical power source, retain an electrical charge potential capable of causing electric shock or electrocution.
- Handle, discharge, and test capacitors according to safe, established, standards, and approved procedures.
- Extreme care, proper judgment, and safety procedures must be exercised if it becomes necessary to test or troubleshoot equipment with the power on to the unit.
- Do not spray water on the air conditioning unit while the power is on.
- Electrical component malfunction caused by water could result in electric shock or other electrically unsafe conditions when the power is restored and the unit is turned on, even after the exterior is dry.
- Use air conditioner on a single dedicated circuit within the specified amperage rating.
- 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.
- Do not remove ground prong of plug.
- Do not cut or modify the power supply cord.
- Do not use extension cords with the unit.
- 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-32 Refrigerant

Refrigerant Safety Group A2L

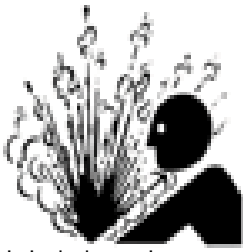
Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.

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. R-32 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 And Serial Number Location

Indoor Unit
On side of Unit

Early Production models of the A2L Indoor heads are marked as R-454B. These heads are compatible with both R-32 and R-454B Refrigerant. Later models have the R-454B designation removed.

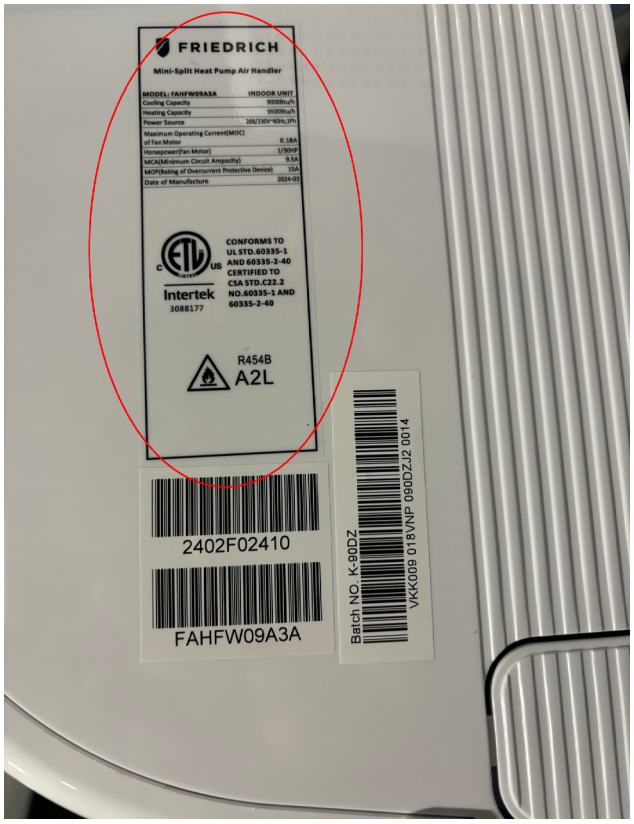


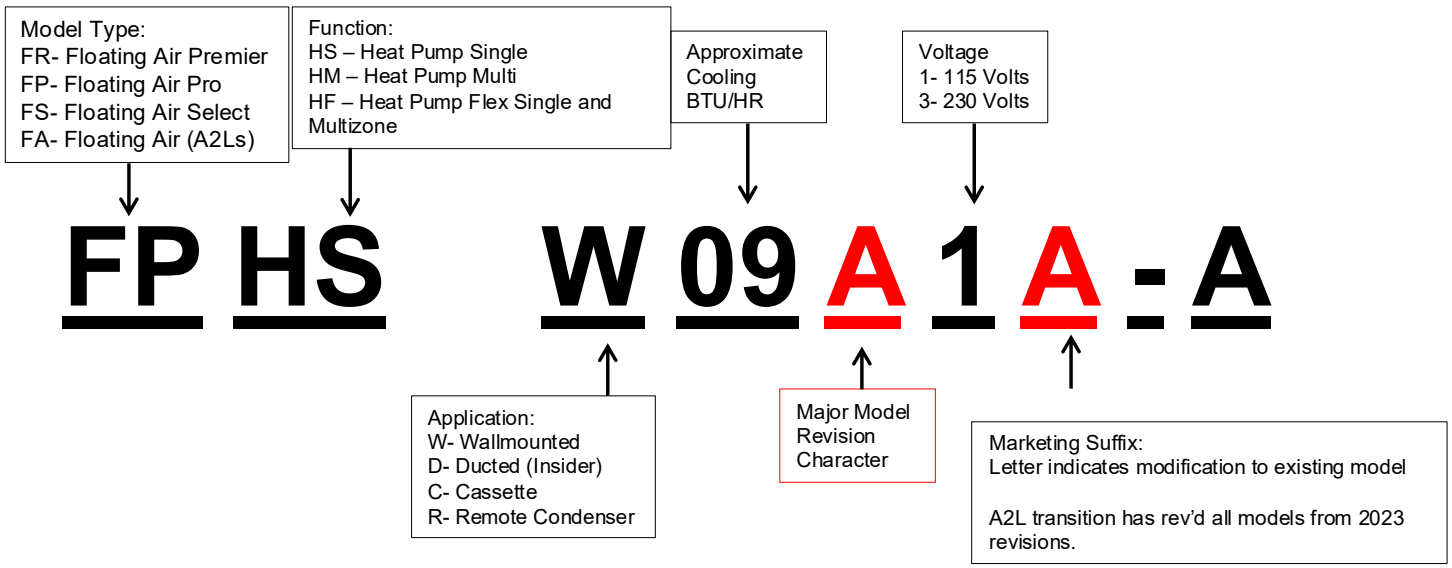
Figure 101 (Indoor Unit Model Nameplate location)

Outdoor Unit
On side of Unit

Figure 102 (Indoor Unit Model Nameplate location)

INTRODUCTION

Model Identification Guide



Serial Number Reference Guide

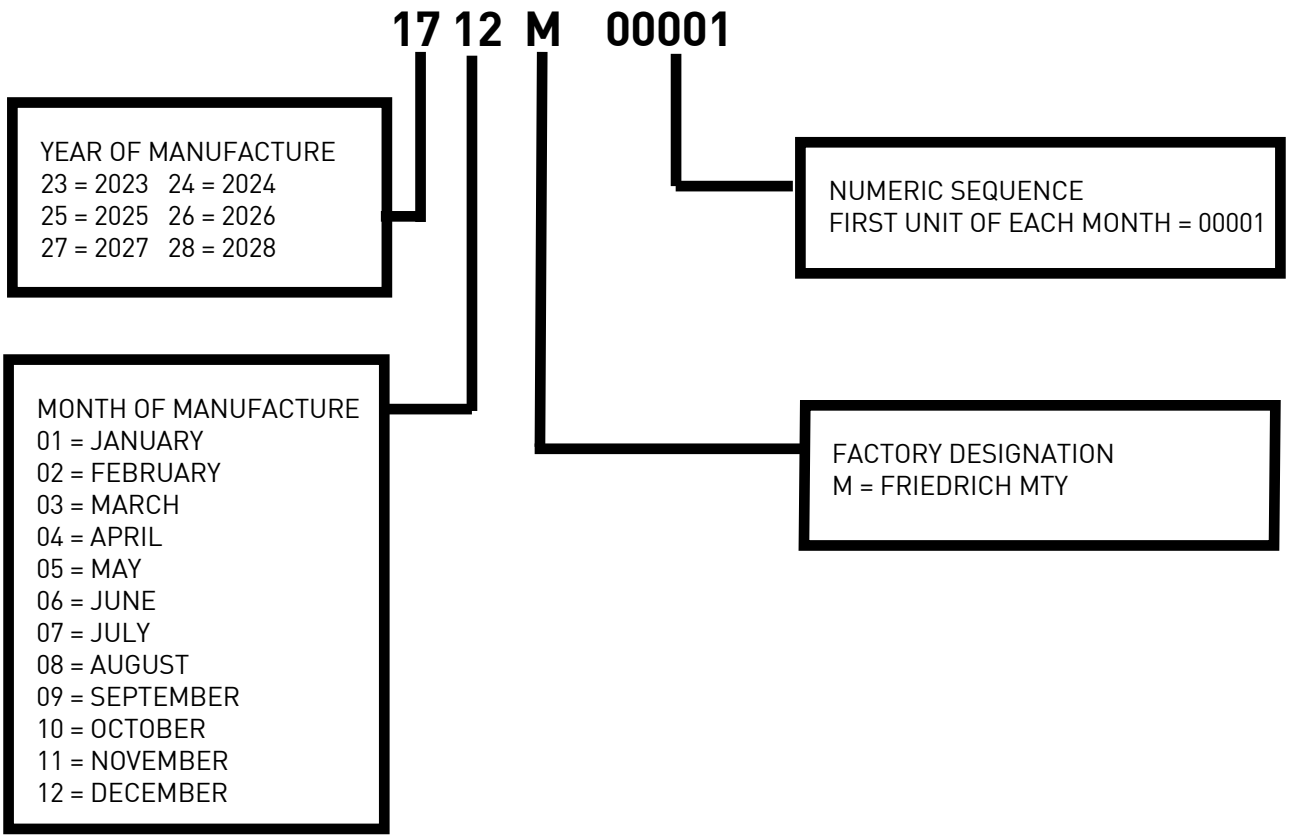


Figure 104 (Serial Number Reference Guide)

SPECIFICATION

Figure 201

9-24k

Model No.		FAHFW09A1A FSHSR09B1B	FAHFW12A1A FSHSR12B1B	FAHFW18A3A FSHSR18A3B	FAHFW24A3A FSHSR24A3B
Type		T1, INVERTER	T1, INVERTER	T1, INVERTER	T1, INVERTER
Performance					
Cooling Capacity (95 °F) '	Btu/h	9000	12000	18000	24000
Heating Capacity (47 °F) '	Btu/h	9500	12000	18000	24000
Heating Capacity (17 °F) '	Btu/h	6800	8800	14800	21000
Cooling Capacity Range	Btu/h	3600-10000	4000-13000	6500-19000	8000-25000
Heating Capacity Range	Btu/h	3600-10000	4000-13000	6500-19000	8000-25000
Rated Input-Cooling	W	720	1176	1506	2264
Rated Input-Heating	W	679	1034	1349	2131
SEER2	Cooling	20	18	21	19.5
HSPF2(IV)	Heatling	9	8.	9.8	8.5
EER2 for Cooling (95 °F)	Btu/W	12.5	10.2	12.0	10.6
COP2 for Heating (47 °F)	W/W	4.1	3.4	3.9	3.3
COP2 for Heating (47 °F)	Btu/W	14.0	11.6	13.3	11.3
Heating at 17°F Capacity: Rated	Btu/h	6800	8800	14800	21000
Heating Capacity: Max -15 °C 5 °F	Btu/h	6000	7500	15000	18500
COP at 5 °F	W/W	2	1.9	2.4	1.9
Heating Max Capacity -4 °f	Btu/h	4500	5800	8200	13000
Heating Max Capacity -13 °F	Btu/h	/	/	/	/
E-STAR__V6.1	1、Certified Residential Heat Pumps、SEER2≥15.2, EER2≥11.7, HSPF2≥7.8 2、Certified Residential Cold Climate Heat Pumps、SEER2≥15.2, HSPF2≥8.5、COP at 5° F ≥ 1.75,Heating Capacity at 5°F ≥ 70% of that at 47°F	Yes	No	Yes	No
Moisture Removal	pints/hr	1.9	2.5	3.2	4.6
Air Circulation(Max)	CFM	382	394	647	705

SPECIFICATIONS

9-24k

Model No.		FAHFW09A1A FSHSR09B1B	FAHFW12A1A FSHSR12B1B	FAHFW18A3A FSHSR18A3B	FAHFW24A3A FSHSR24A3B
Air Circulation(high)	CFM	341	364	588	647
Air Circulation(medium)	CFM	294	311	482	558
Air Circulation(low)	CFM	247	252	382	441
Air Circulation (high) for Outdoor	CFM	1059	1059	1411	1765
Refrigerant		R32	R32	R32	R32
Refrigerant charge volume	oz	21.2	21.9	45.9	47.6
Indoor Sound Pressure(Max/hi/med/low/quiet	dB (A)	42/39/37/35/32	42/39/37/35/32	48/45/41/39/36	50/48/43/41/39
Outdoor Sound pressure	dB (A)	51	51	56	60
Voltage, Frequency, Phase	V	115V~,60Hz,1P	115V~,60Hz,1P	208V/230V~,60Hz,1P	208V/230V~,60Hz,1P
Rated Current	Cooling (A)	6.7	10.7	6.4	10
	Heating (A)	6.2	9.6	8.1	9.5
MOP(Rating of Overcurrent Protective Device	A	25	25	20	35
MCA (Minimum Circuit Ampacity)	A	14.6	15.4	14.5	21
Power and Communication Cable		4 x 14 AWG	4 x 14 AWG	4 x 14 AWG	4 x 14 AWG
System					
Compressor type		Rotary	Rotary	Rotary	Rotary
Compressor MFG		GMCC	GMCC	GMCC	LANDA
Compressor model #		KSK75D15UDZ3	KSN98D34UEZ3	KSN140D33UFZ3	QXFS-B212ZX030A
Expansion Device		capillary	capillary	capillary	capillary
Indoor DC motor		NO	NO	Yes	Yes
Outdoor DC motor		Yes	Yes	Yes	Yes
Evaporator material		Copper tube and Aluminum Fin	Copper tube and Aluminum Fin	Copper tube and Aluminum Fin	Copper tube and Aluminum Fin
Condenser material		Copper tube and Aluminum Fin	Copper tube and Aluminum Fin	Copper tube and Aluminum Fin	Copper tube and Aluminum Fin
Connecting Pipe Diameter					
Liquid Pipe	inch	1/4	1/4	1/4	3/8
Gas Pipe	inch	3/8	3/8	1/2	5/8
Max. Pipe Length (Total)	ft	66	66	100	100
Max. Elevation (indoor units higher than outdoor unit)	ft	50	50	50	50
Pre-charge Pipe Length	ft	25	25	25	25
additional refrigerant charge per foot after 25 ft	ounces/foot	0.2	0.2	0.2	0.3
Others					
Dimensions	Indoor Unit/ in	33 7/8x11 3/16x8 1/2	33 7/8x11 3/16x8 1/2	45 3/16x13 1/8x9 15/16	45 3/16x13 1/8x9 15/16
	Outdoor Unit/ in	28 1/2x21 1/4x9 1/2	28 1/2x21 1/4x9 1/2	33 7/8x25 9/16x12 3/16	35 3/8x13 1/2x29 1/2
Net Weight	Indoor Unit(/lbs.)	22.1	22.1	34.2	34.2
	Outdoor Unit(/lbs.)	52.9	57.3	75	101.4
Package Dimensions	Indoor Unit/ in	36 9/16x15 x11 3/16	36 9/16x15 x11 3/16	47 13/16x15 3/16x13	47 13/16x15 3/16x13
	Outdoor Unit/ in	32 5/8x23 1/5 x13 3/8	32 5/8x23 1/4 x13 3/8	37x25 3/16x15 3/16	39 3/16x28 3/4x17 1/2

SPECIFICATIONS

9-24k

Model No.		FAHFW09A1A FSHSR09B1B	FAHFW12A1A FSHSR12B1B	FAHFW18A3A FSHSR18A3B	FAHFW24A3A FSHSR24A3B
Gross Weight	Indoor Unit (lbs.)	26.5	26.5	37.4	37.4
	Outdoor Unit (lbs.)	57.3	61.7	82.7	110.2
One Set Loading Capacity (20GP/40GP/40'HQ)		115/250/280	115/250/280	90/185/170	50/115/130
Outdoor Unit Loading Capacity (20GP/40GP/40'HQ)		192/392/486	192/392/486	108/222/296	93/185/189
Indoor Unit Loading Capacity (20GP/40GP/40'HQ)		310/623/698	310/623/698	173/368/406	173/368/406
Features		Yes	Yes	Yes	Yes
LED Display on Front Panel		Yes	Yes	Yes	Yes
LED Dimmer		Yes	Yes	Yes	Yes
5 Indoor Fan Speed		Yes	Yes	Yes	Yes
LCD Wireless Remote Controller		Yes	Yes	Yes	Yes
"I feel" in remote controller		Yes	Yes	Yes	Yes
Back lighting remote controller		Yes	Yes	Yes	Yes
-25°C (-13°F) Heating		No	No	No	No
-15°C (5°F) Cooling		Yes	Yes	Yes	Yes
Working Temperature Range - Cooling (°F)		5-118	5-118	5-118	5-118
Working Temperature Range - Heating (°F)		-4-75	-4-75	-4-75	-4-75
Remote Control Adjustable Temperature Range - Cooling		61-86	61-86	61-86	61-86
Remote Control Adjustable Temperature Range - Heating		61-86	61-86	61-86	61-86
8°C (46°F) Heating to avoid freezing water pipe in Kitchen		Yes	Yes	Yes	Yes
°C & °F convertible		Yes	Yes	Yes	Yes
2 Ways Draining Connection (Left or Right)		Yes	Yes	Yes	Yes
Compressor Intelligent Pre-heating		Yes	Yes	Yes	Yes
Smart Function		Yes	Yes	Yes	Yes
Super Function		Yes	Yes	Yes	Yes
Auto Restart		Yes	Yes	Yes	Yes
Auto Defrost		Yes	Yes	Yes	Yes
Auto Cleaning		Yes	Yes	Yes	Yes
Quiet Mode		Yes	Yes	Yes	Yes
24 Hours Timer		Yes	Yes	Yes	Yes
Removable and washable Panel		Yes	Yes	Yes	Yes
Louver Position Memory		Yes	Yes	Yes	Yes
Washable High Definition Filter		Yes	Yes	Yes	Yes
Horizontal Auto Swing Louver		Yes	Yes	Yes	Yes
Chassis Electric heater function		Yes	Yes	Yes	Yes
Vertical Auto Swing Louver		Yes	Yes	Yes	Yes
Test Standard		AHRI 210/240	AHRI 210/240	AHRI 210/240	AHRI 210/240
Approvals		ETL/AHRI	ETL/AHRI	ETL/AHRI	ETL/AHRI
is A2L sensor included in Unit		No	No	No	No

SPECIFICATIONS

Room Size Restriction

Minimum room size (R-32 refrigerant) is determined by total refrigerant charge in system. Use this chart to determine the minimum room size the indoor head can be installed in.

	Height of installation(ft and inches)				
	6'	6' 6"	7' 2"	7' 10"	8' 2"
Refrigerant charge (oz)	**Room (sq ft)**				
64 oz.	71	64	58	53	51
65-71 oz.	78	71	64	59	57
72-77 oz.	86	78	71	65	62
78-85 oz.	94	85	77	71	68
86-92 oz.	102	92	83	77	74
93-99 oz.	110	99	90	82	79
100-106 oz.	117	105	96	88	85

Prior to installing the unit use the chart below to determine the total refrigerant charge for the unit. **If the total charge is less than 64 oz. there is no room size restriction. If the total charge is over 64 oz. refer to the chart above.** Use the total charge, the height of the bottom of the unit, and the chart above to determine the minimum square footage of the room the indoor unit can be installed in. If rooms are connected by opening that people can walk through but with no door installed, those areas can be considered one space.

-		Pre-Charge w/ 25 ft of line set	Charge w/ 25-50 ft of line set	Charge w/ 50-75 ft of line set	Charge- w/ add 75-100 ft of line set
Indoor Unit Model	Outdoor Unit Model	Charge Oz			
FAHSW09A1A	FSHSR09B1B	21.2	27.7	33.2	N/A
FAHSW12A1A	FSHSR12B1B	21.9	27.4	32.9	N/A
FAHSW18A3A	FSHSR18B3B	45.9	51.4	56.9	62.4
FAHSW24A3A	FSHSR24B3B	47.6	55.6	63.6	71.6

When adding refrigerant to the system for additional line set, refer to the model nameplate and the outdoor unit installation instructions for proper charge amount.

Table 202

SPECIFICATIONS

Indoor Unit Clearances

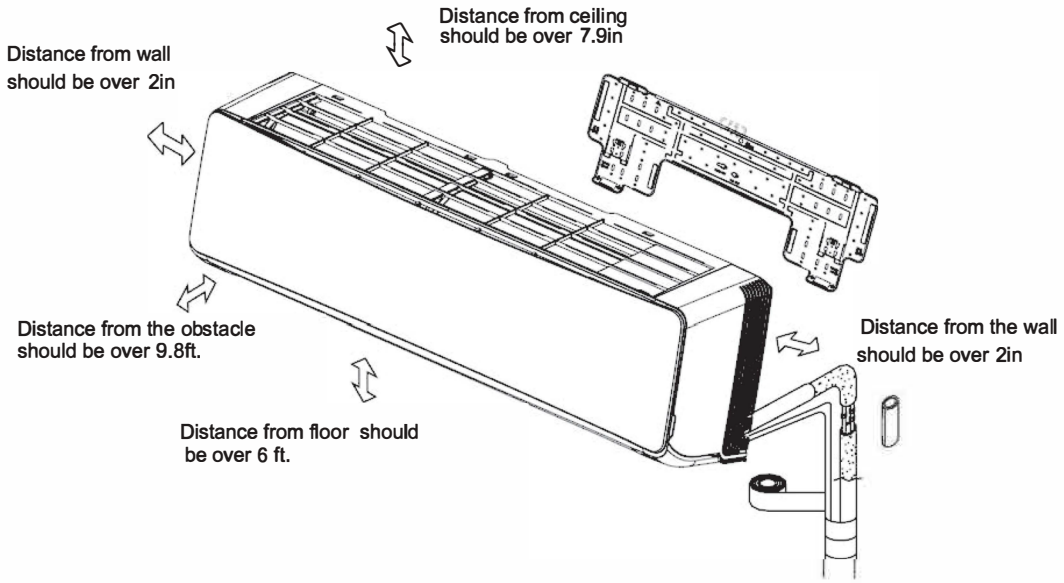


Figure 203 (Indoor Unit Clearances)

Outdoor Unit Clearances

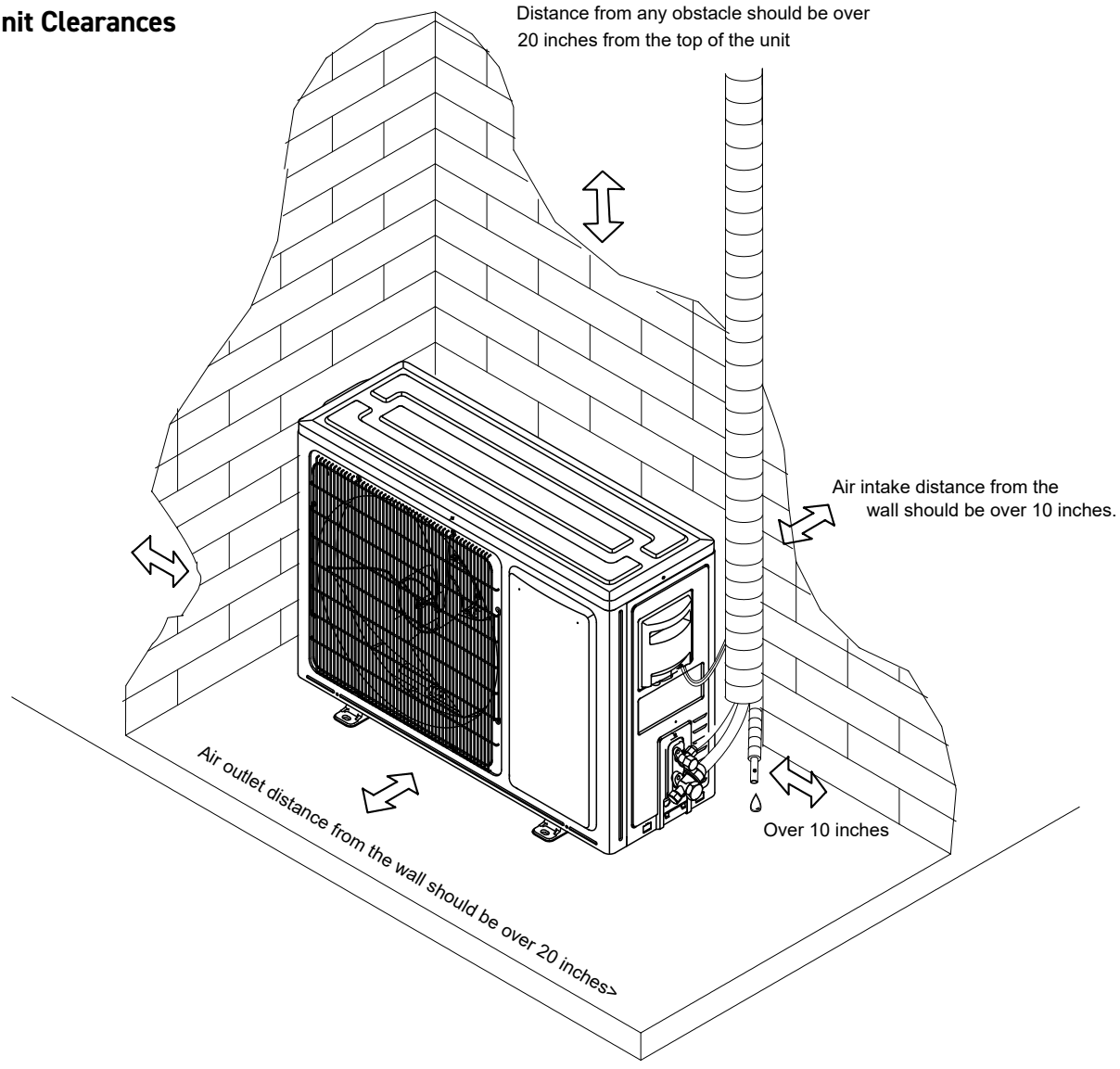


Figure 204 (Outdoor Unit Clearances)

SPECIFICATIONS

Dimensions FAHFW09A1A, FAHFW12A1A

	W	H	D
FAHFW09A3A	33 7/8"	11 3/16"	8 1/2"

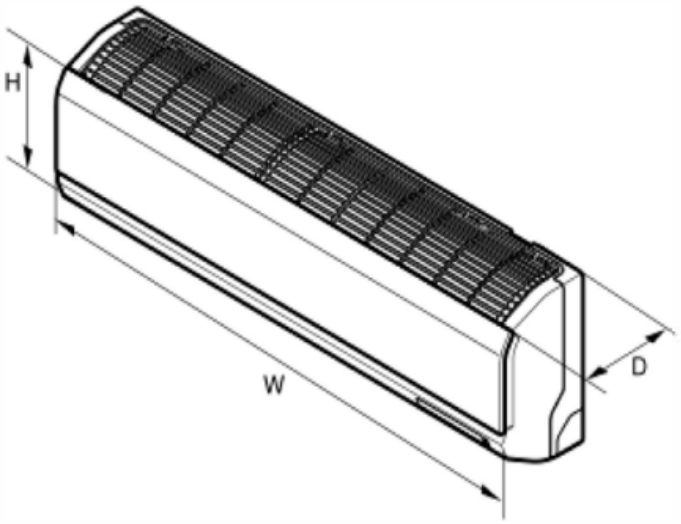


Figure 204

Dimensions FAHFW18A3A,

	W	H	D
FAHFW12A3A	45 3/16"	13 1/8"	9 15/16"

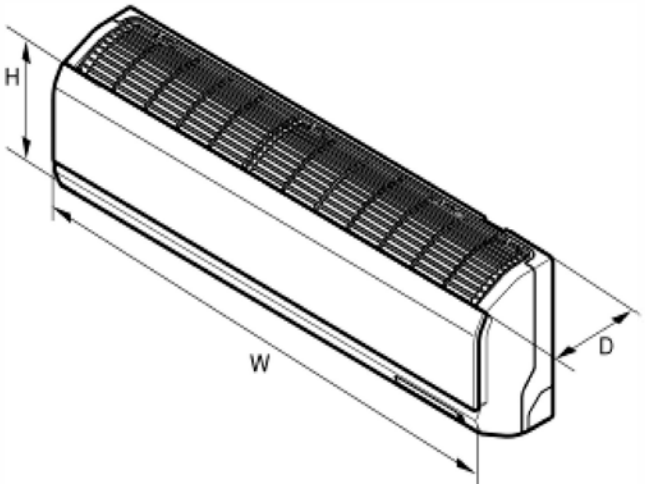


Figure 205

Dimensions FAHFW24A3A,

	W	H	D
FAHFW24A3A	45 3/16"	13 1/8"	9 15/16"

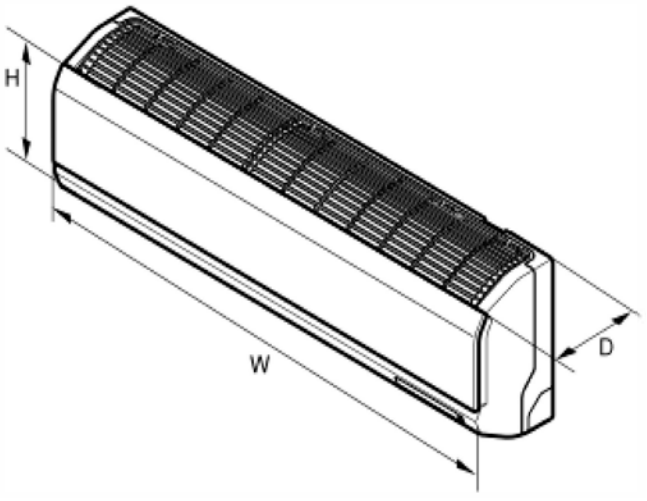
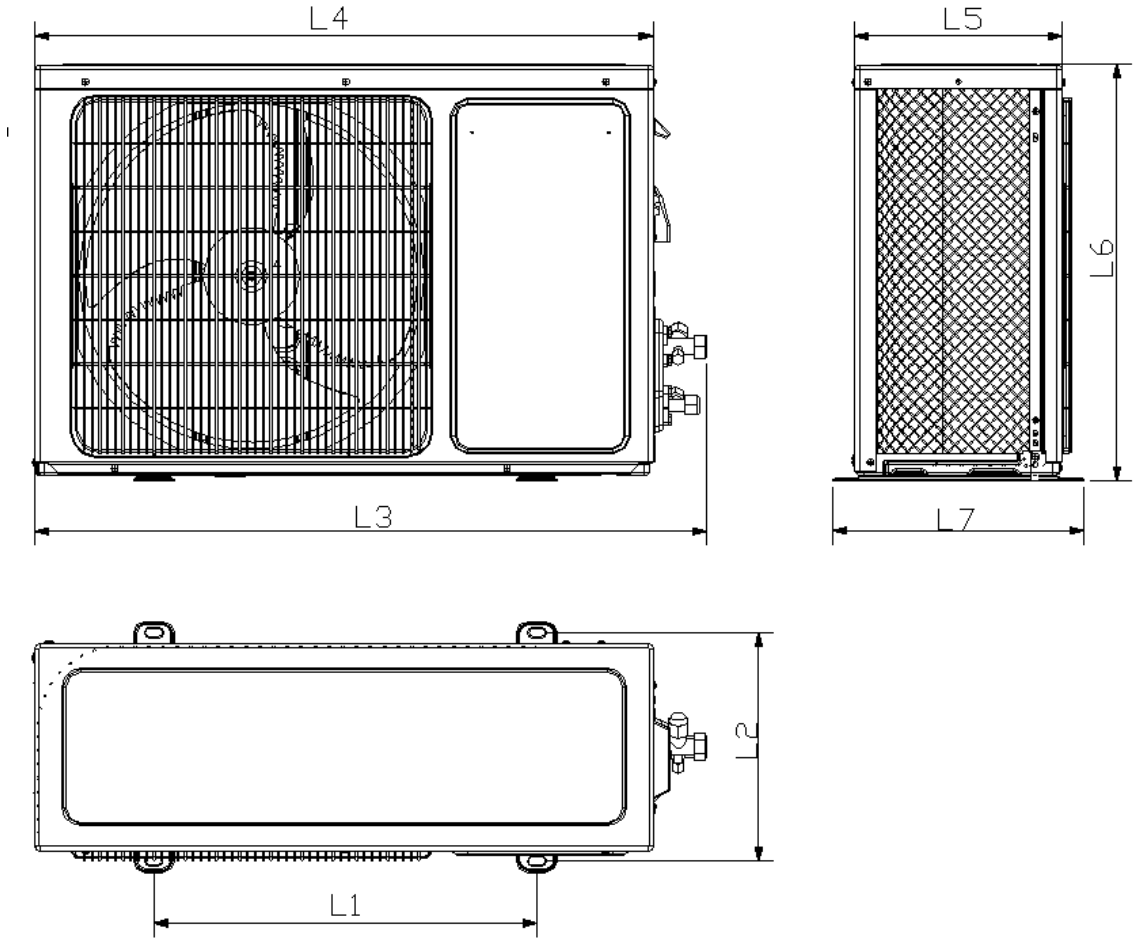


Figure 206

SPECIFICATIONS

Dimensions FSHSR09A1B, FSHSR12A1B

Outdoor units:



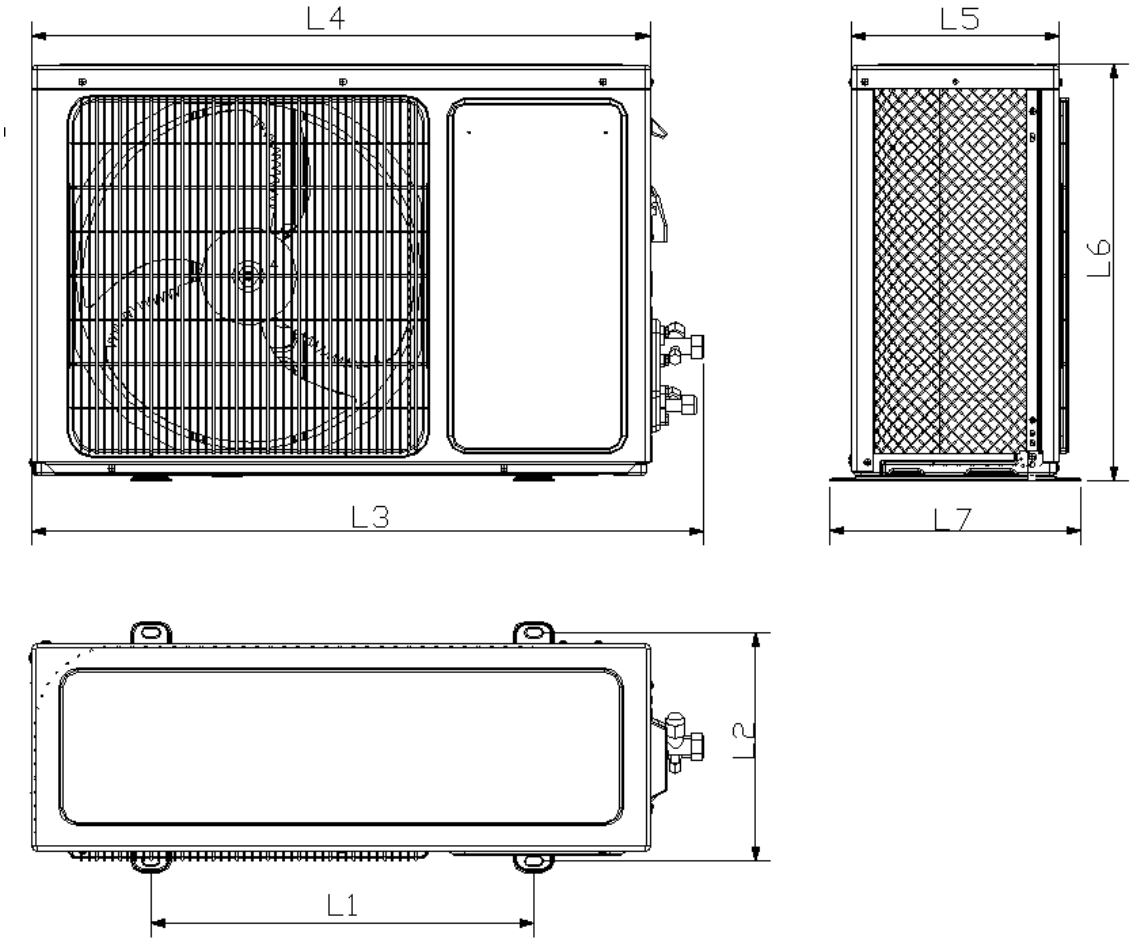
				Width	Depth	Height	
Model	L1 (in.)	L2 (in.)	L3 (in.)	L4 (in.)	L5 (in.)	L6 (in.)	L7 (in.)
FSHSR09A1B	18 7/8	10 5/8	30 1/2	28 1/8	9 7/16	21 1/4	11 3/4
FSSHR12A1B	18 7/8	10 5/8	30 1/2	28 1/8	9 7/16	21 1/4	11 3/4

Figure 207 (9-12k Outdoor Unit Dimensions)

SPECIFICATIONS

Dimensions FSHSR18A3B

Outdoor units:



				Width	Depth	Height	
Model	L1 (in.)	L2 (in.)	L3 (in.)	L4 (in.)	L5 (in.)	L6 (in.)	L7 (in.)
FPHSR18A3B	21 11/32	12 19/32	34 7/8	33 7/8	12 1/4	25 5/8	13

Figure 208 (18k Outdoor Unit Dimensions)

SPECIFICATIONS

Dimensions FSHSR24A3B

Dimensions are in inches (")

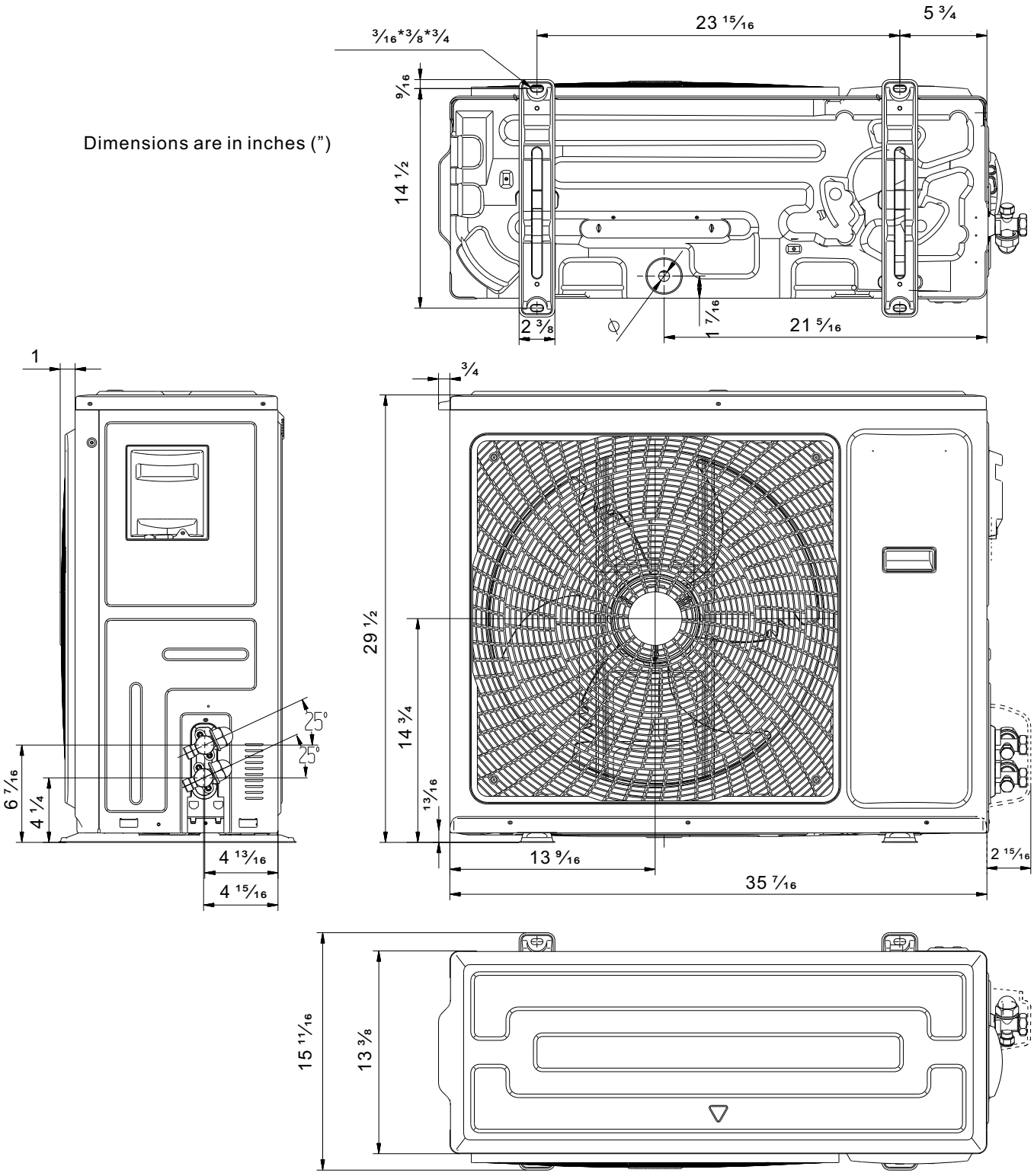


Figure 209 (24k Outdoor Unit Dimensions)

INSTALLATION OF THE INDOOR UNIT

Pre-Installation Checkpoints

1. Ensure there are no obstacles near the air outlet and air can be easily blown to every corner.
2. Where piping and wall hole can be easily arranged.
3. Keep the required space from the unit to the ceiling and wall according to the installation diagram on previous page.
4. Where the air filter can be easily removed.
5. Keep the unit and remote controller 3 ft or more apart from television, radio etc.
6. Keep as far as possible from fluorescent lamps.
7. Do not put anything near the air inlet to obstruct it from air absorption.
8. Install on a wall that is strong enough to bear the weight of the unit.
9. Install in a place that will not increase operation noise and vibration.
10. Refer to Table 403 for max line set length and max elevation.
11. Refer to the Outdoor Unit Installation and operation manual for piping requirements, refrigerant charging, and operational checks.

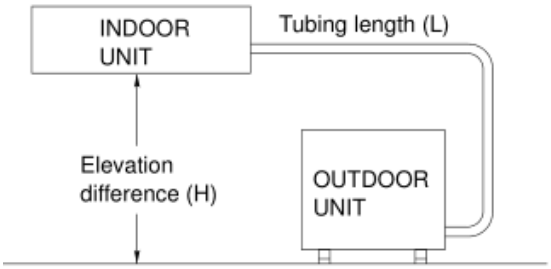


Figure 401

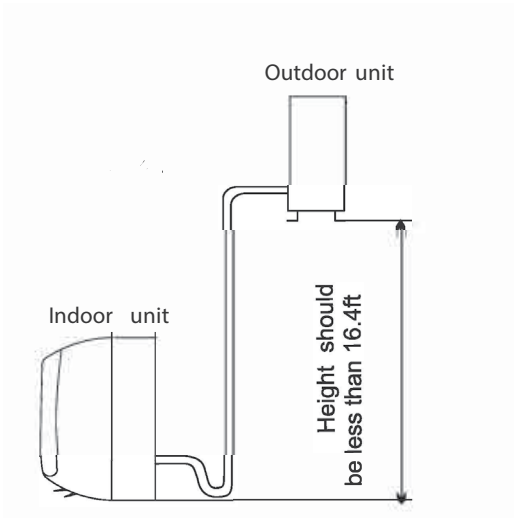


Figure 402

Capacity (Btu/h)	Pipe Size		Standard Length (ft)	Max. Elevation H (ft)	Max. Length L (ft)	Additional Refrigerant (oz/ft)
	LIQUID	GAS				
9k	1/4"	3/8"	25	50	66	.22
12k	1/4"	3/8"	25	50	66	.22
18k	1/4"	1/2"	25	50	100	.22
24k	3/8"	5/8"	25	50	100	.32

Table 403

⚠WARNING

Fire Hazard

A2L refrigerant is classified as mildly flammable. Temperatures on surfaces that may be exposed to leakage of FLAMMABLE REFRIGERANTS shall not exceed 1292°F

⚠WARNING

Refigeration System Under High Pressure

Do not puncture, heat, expose to flame or incinerate.
Only certified refrigeration technicians should service this equipment.
R-32 and R-454B systems operate at higher pressures than R22 equipment.
Appropriate safe service and handling practices must be used.
Only use gauge sets designed for use with R32 and R-454B.
Do not use standard R22 gauge sets..

INSTALLATION OF THE INDOOR UNIT

Install Mounting Plate

1. Installing the Mounting Plate

1) Decide an installing location for the mounting plate according to the indoor unit location and piping direction.
2) Find the center of the mounting plate according to the mark on it. Then Install a screw to fix it preliminary.
3) Keep the mounting plate horizontally with a horizontal ruler or dropping line.
4) Drill holes of 1 1/4" in depth on the wall for fixing the plate.
5) Fix the mounting plate with as least 7 self-tapping screws. For some mounting plates with a holder in the middle , at least 8 screws are required. (Fig. C.4.1).
6) Inspect if the mounting plate is well fixed. Then drill a hole for piping.

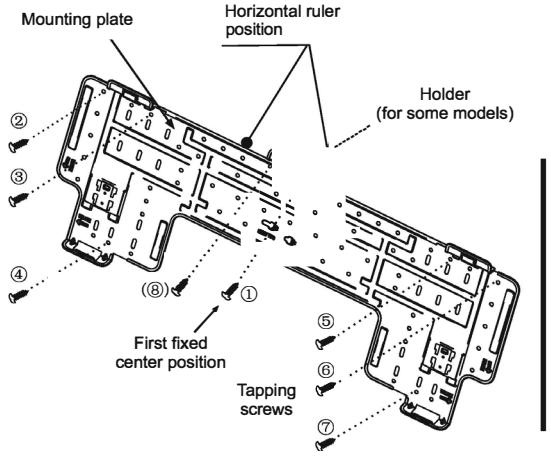


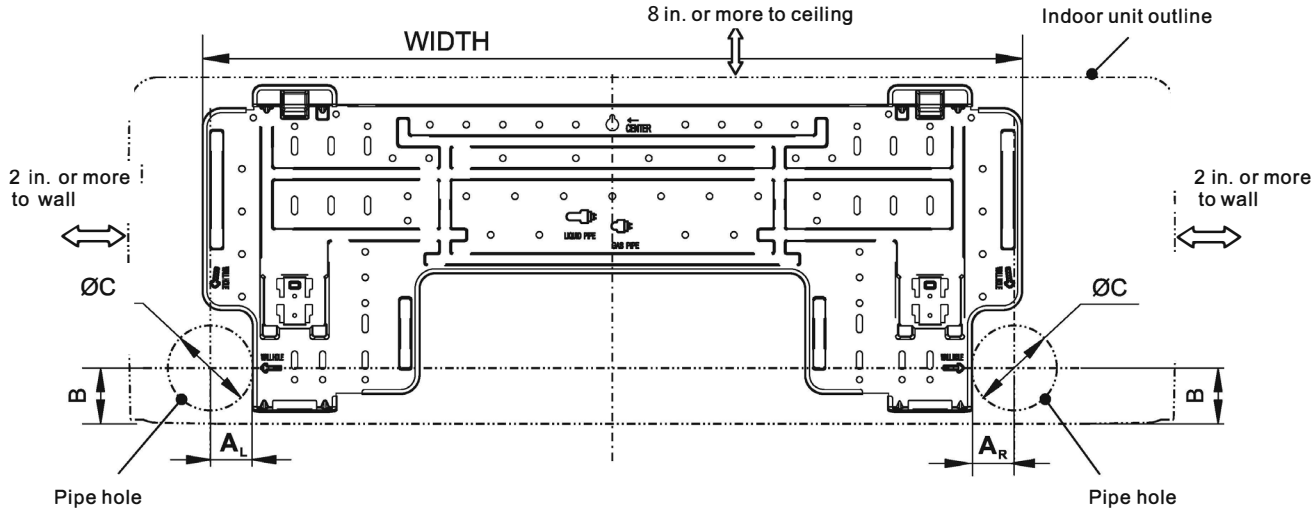
Fig. C.4.1

Note: It is recommended to install screw anchors for sheet rock, concrete block, brick and such type of wall.

Note: The center of the mounting bracket may be not the center of the indoor unit.

Note: The shape of your mounting plate may be different from the one above, but installation method is similar.

- ***THE MOUNTING PLATE DIAGRAMS AND DIMENSIONS (Recommended)***

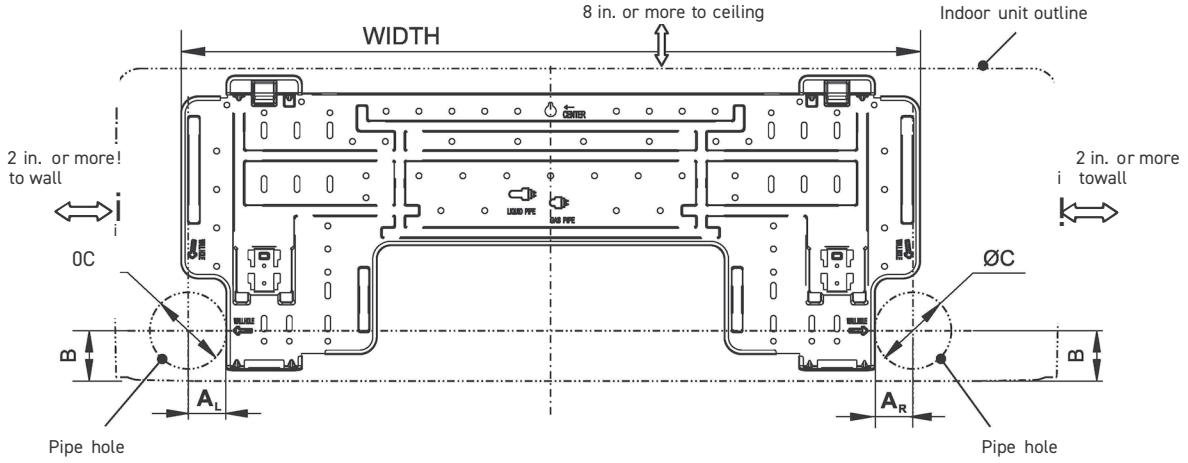


For 7K/9K/12K Series Models, WIDTH: 26 5/8 in.

C.4.2

INSTALLATION OF THE INDOOR UNIT

Install Mounting Plate



For 18K/ 24K Series Models, WIDTH: 37 5/8in.

C. 4.3

Drill Hole for Piping

Table of Wall Hole Mounting size per Unit Size

Unit Model	Size A_L	Size A_R	Size B	Size C
	in	in	in	in
7K/9K/12K Series	1 3/8 in	1 3/8 in	1 3/4 in	2 3/4 in
18K/24K Series	4 7/8 in	6 1/2 in	2 in	2 3/4 in

2. Drill a Hole for Piping

1) Decide the position of hole for piping according to the location of mounting plate.
2) Drill a hole on the wall. The hole should tilt a little downward toward outside.
3) Install a sleeve through the wall hole to keep the wall tidy and clean. (Fig. C.5)

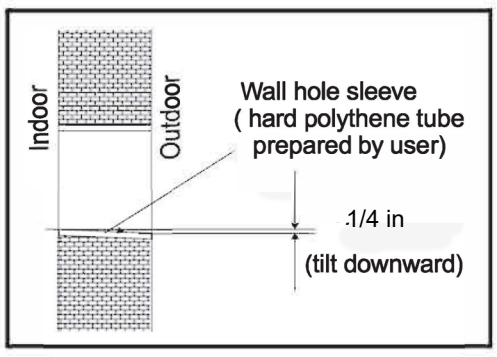
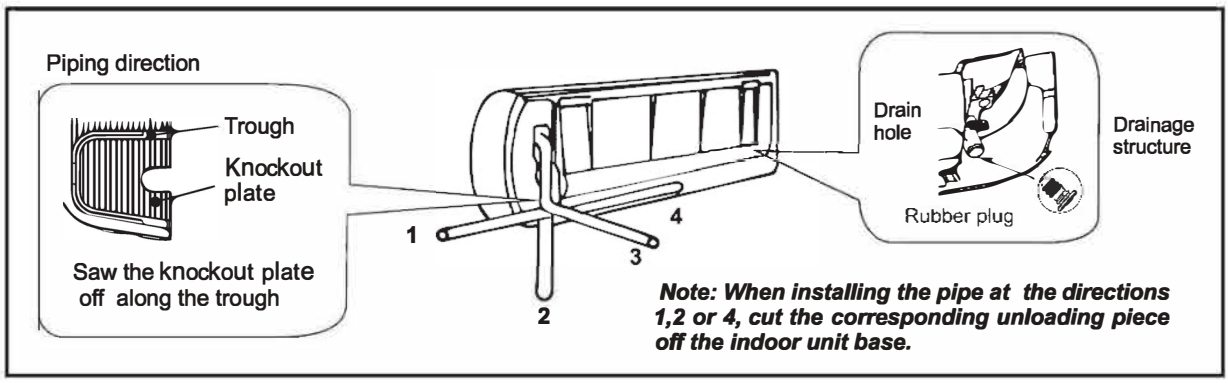


Fig. C.5

INSTALLATION OF THE INDOOR UNIT

Piping Provisions

1) Put the piping (liquid and gas pipe) and cables through the wall hole from outside or put them through from inside after indoor piping and cables connection is complete to connect to the outdoor unit.
2) Decide whether to cut the knockout plate in accordance with the piping direction. (Fig. C.6.1)



Note:Drain hose can be installed on either side of the unit. If choosing both sides drainage connection, another proper drain hose is needed as there is only one drain hose attached to the unit. If choosing one side drainage connection, make sure the drain hole on the other side is well plugged.

- Put the piping (liquid and gas pipe) and cables through the wall hole from outside.

1 Cut the liquid pipe and gas pipe to the right length according to the position mark on the wall mounting plate (Fig. C.6.2). Ensure that the cut is flat (Fig. C.6.3).

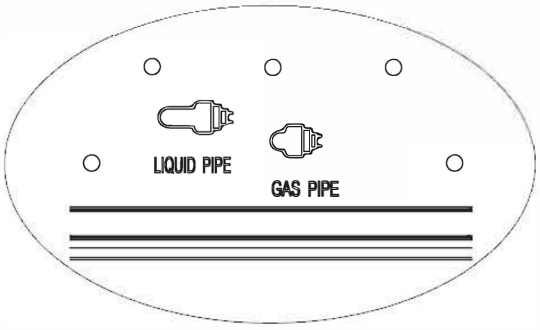


Fig.C.6.2

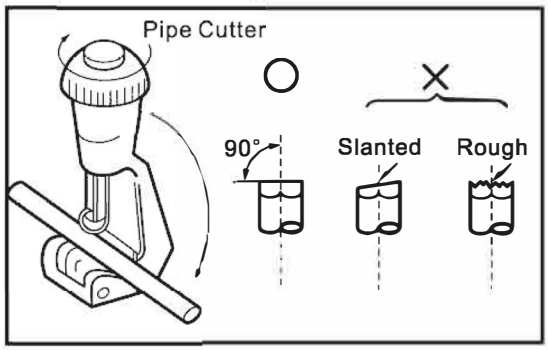


Fig.C.6.3

2 Remove burrs on the cutting edges. Keep the pipe outlet down to avoid getting the metal burrs into the pipe(Fig. C.6. 4).

3 Flare the pipes. Insert the pipe outlet into the copper nut before flaring the pipe. Ensure that the hole is flat with sound surface and even thickness. (Fig. C.6.5)

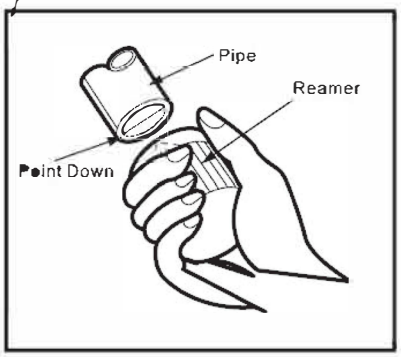


Fig. C.6. 4

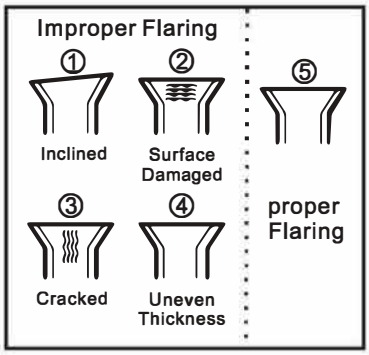


Fig. C.6.5

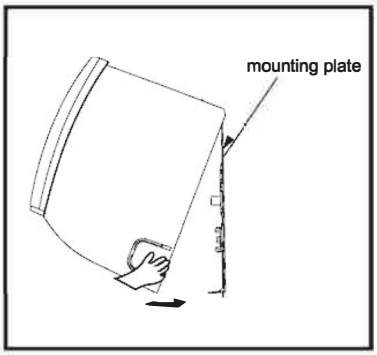


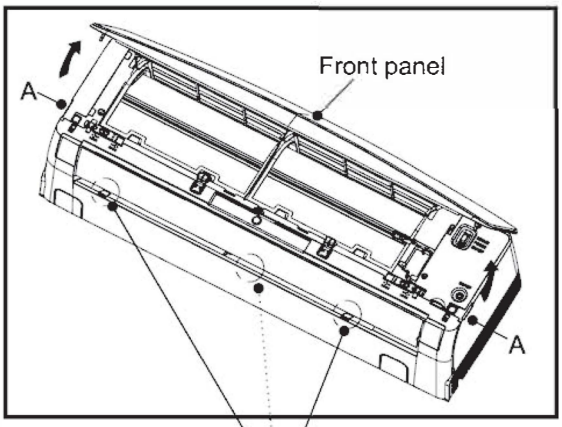
Fig. C.7.1

INSTALLATION OF THE INDOOR UNIT

Indoor Unit Installation

1 Hang the unit onto mounting plate (Fig. C.7.1).

2) In the A position, open the front panel as shown in Fig. C. 7.2.
3) In the B position, open the screw covers as shown in Fig. C.7.3 and remove the screws. (Note: For some models, you need to remove 3 screws.)
4) In the C position, open the front shell as shown in Fig. C. 7.4 . Then in the D position, push the baffles to prevent the front shell from falling as shown in Fig. C. 7.5.



C.7.2

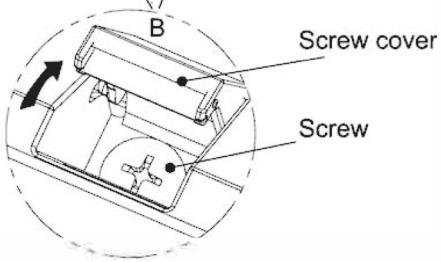


Fig.C.7.3

C.7.4

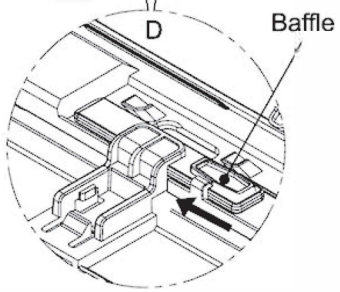


Fig.C.7.5

5) Use the support plate to move the unit step by step to reach the best location. (Fig. C. 7.6 and Fig. C. 7.7).

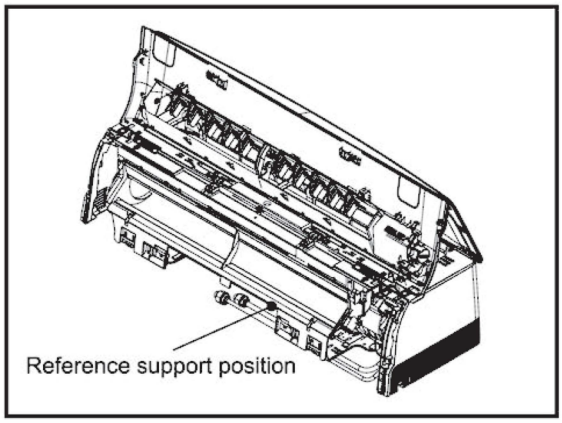


Fig. C. 7.6

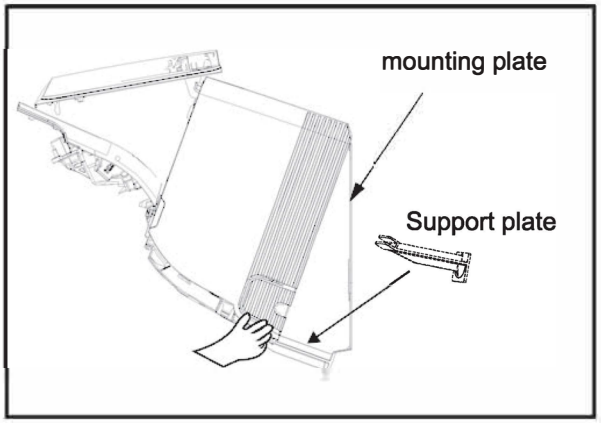


Fig. C. 7.7

Note: The appearance of the model in this manual may differ from that of the air conditioner you have selected.

INSTALLATION OF THE INDOOR UNIT

Indoor Unit Installation

6) Connect the piping .

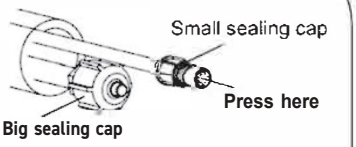
Piping Connection:

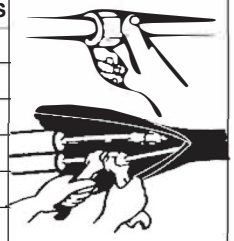
a.Before unscrewing the big and the small sealing caps, press the small sealing cap with the finger until the exhaust noise stops, and then loosen the finger.

b.Connect indoor unit pipes with two wrenches. Pay special attention to the allowed torque as shown below to prevent the pipes, connectors and flare nuts from being deformed and damaged.

c. Pre-tighten them with fingers at first, then use the wrenches.

If you don't hear the exhaust noise, please contact customer service.





Model	Pipe size (inches)	Torque (ft lbs	Nut width	Min.thickness
9K-18K	LiquidSide (1/4)	11-15ft-lbs	5/8"	0.02 "
24K-36K	Liquid Side (3/8)	22-26ft-lbs	7/8"	0.024"
9K-12K	GasSide(cl> 9.53 or 3/8)	22-26ft-lbs	7/8"	0.024"
18K	GasSide(cl>12 or1/2)	37-41ft-lbs	15/16"	0.024"
24K-36K	GasSide(cl>16or 5/8)	44-48ft-lbs	1 1/8"	0.024"
36K	Gas Side (ϕ 19 or 3/4)	52-55ft-lbs	1 1/4"	0.039"

Table C.7.8

7) After connecting piping as required, install the drain hose. Then connect the power cords. After connecting, wrap the piping, cords and drain hose together with thermal insulation materials(Fig. C.7.9-C.7.11).

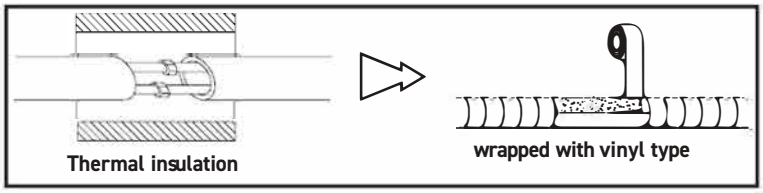


Fig. C.5.9

Note: Wrap the piping joints with thermal insulation materials and then wrap with a vinyl tape.

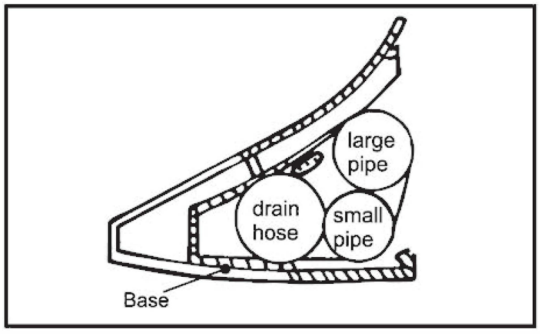


Fig. C.5.10

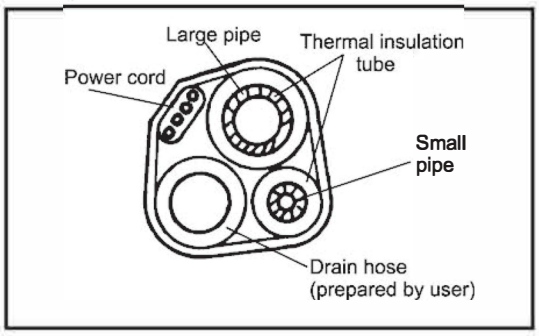


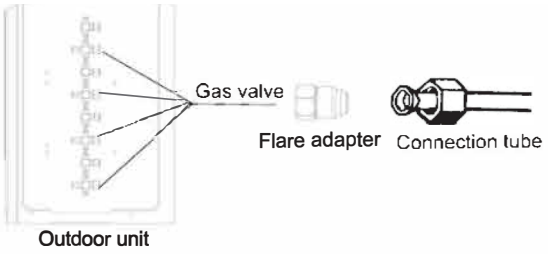
Fig. C.5.11

Note: Place the drain hose under the pipes.
Note: Insulation material uses polythene foam over 1/4" (6) mm *in thickness.*
Note: Drain hose Is prepared by user.
Note: Note: The appearance of the model in this manual may differ from that of the air conditioner you have selected.

INSTALLATION OF THE INDOOR UNIT

Indoor Unit Installation

The 18K/24K indoor unit include the switch tie-in accessory only for 18K/24K indoor if required. It may switch 3/8" gas connection tube into 1/2" or 5/8" connection tube.
It is installed outdoor unit.



8) Connect the power connecting cord (Fig. C.5.12).

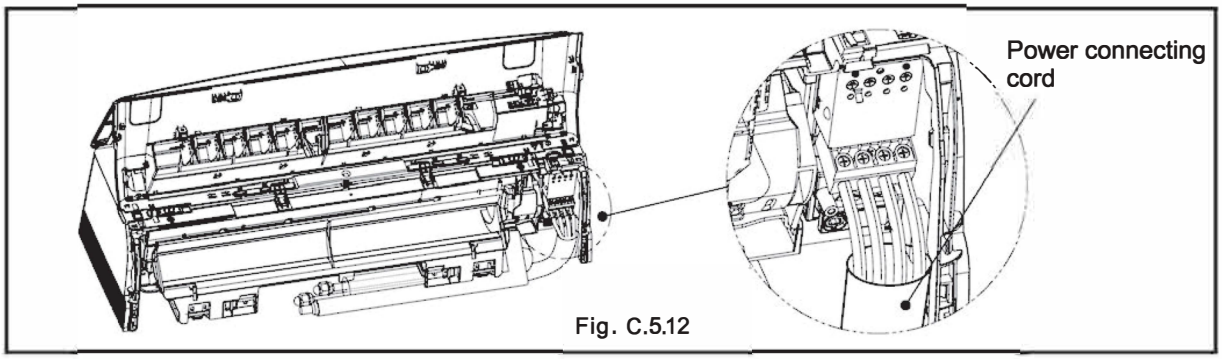


Fig. C.5.12

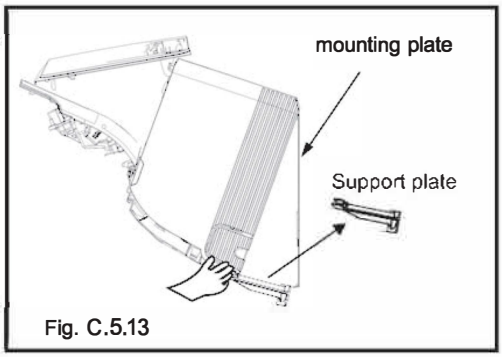


Fig. C.5.13

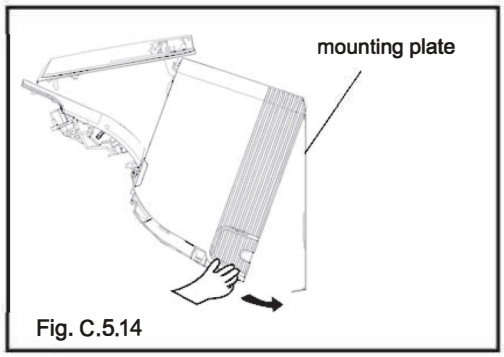
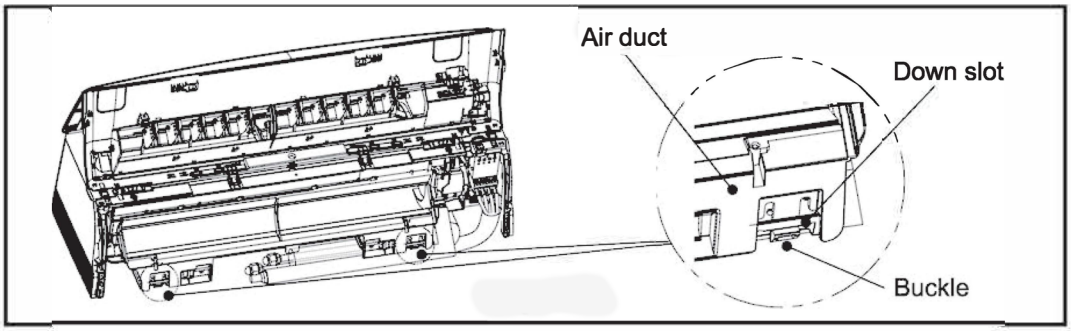


Fig. C.5.14

9) Remove the support plate as shown in Fig. C.5.13 Then move the unit step by step to reach the best installation, then press the 2 buckles of the air duct into 2 down slots of the mounting plate.(Fig. C.5.14 and Fig.C.5.15)



C.5.15

INSTALLATION OF THE INDOOR UNIT

Indoor Unit Installation

10) Pull the baffles as shown in Fig. C.5.20 Close the front shell as shown in Fig. C.5.21 . Then press the E position to fasten the front shell as shown in Fig. C.5.22

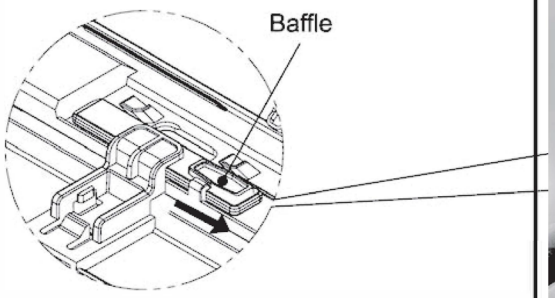


Fig. C.5.20

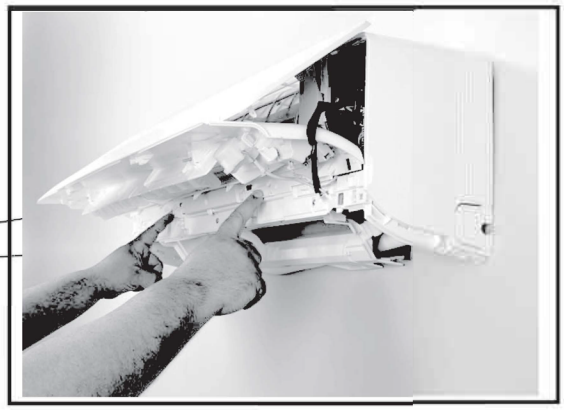
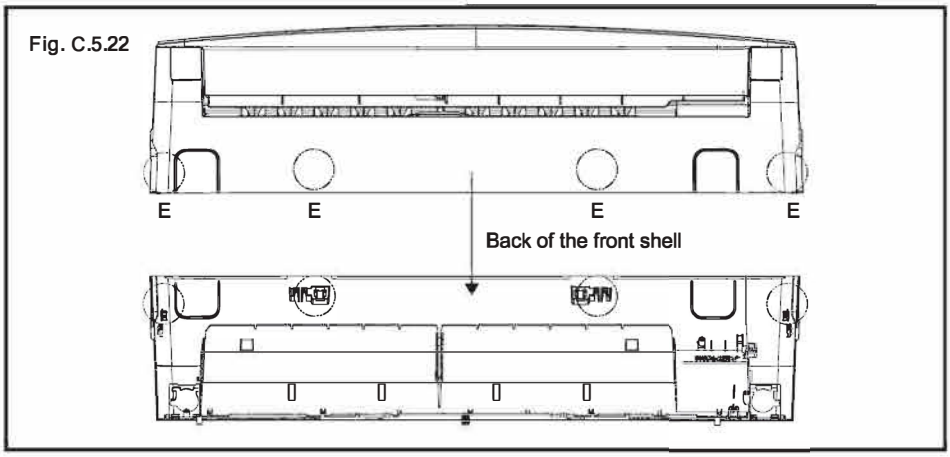


Fig.C.5.21

Fig. C.5.22



11) Install the screws and close the screw covers as shown in Fig. C.5.23 (Note: For some models, you need to install 3 screws.)

12) Close the front panel as shown in Fig. C.5.24

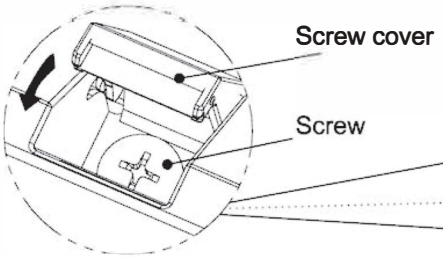


Fig.C.5. 23

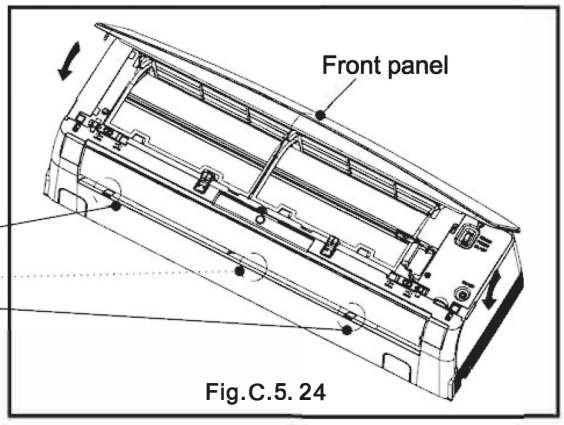


Fig.C.5. 24

Note: The appearance of the model in this manual may differ from that of the air conditioner you have selected.

INSTALLATION OF THE INDOOR UNIT

Electrical

⚠WARNING

Electrical Shock Hazard

Always ensure power is disconnected before attempting to connect wires.

GROUNDING	Unit MUST be grounded from branch circuit to unit, or through separate ground wire. Be sure that branch circuit or general purpose outlet is grounded. Do NOT use an extension cord.
ELECTRICAL DISCONNECT	If national or local electrical codes require an electrical disconnect for the indoor unit, use a 3 pole disconnect.

Model	Wire Diameter(AWG) Interconnecting Wire
9k	14-4 AWG 600V THHN
12k	14-4 AWG 600V THHN
18k	14-4 AWG 600V THHN
24-36K	14-4 AWG 600V THHN

Table E.1

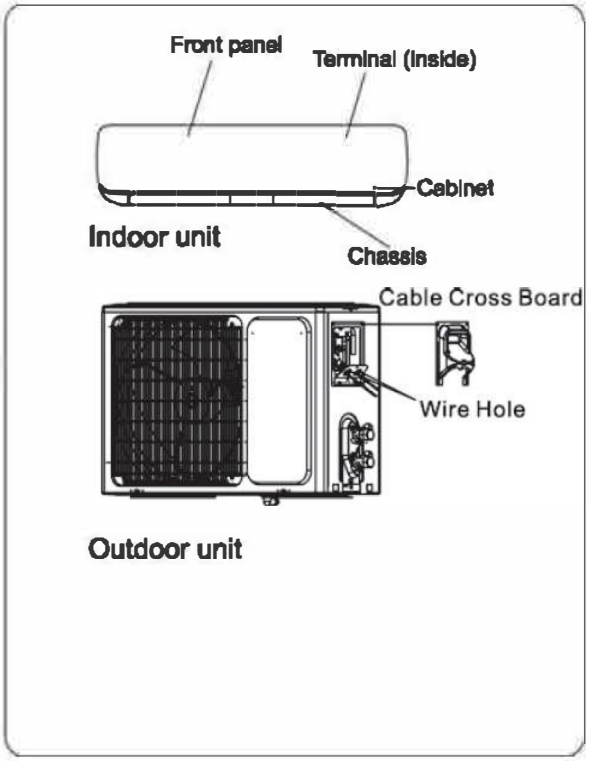


Figure E.2

Indoor Unit

Connect the power cord to the indoor unit by connecting the wires to the terminals on the control board individually in accordance with the outdoor unit connection.

Note: For some models, it is necessary to remove the cabinet to connect to the indoor unit terminal.

•Outdoor Unit

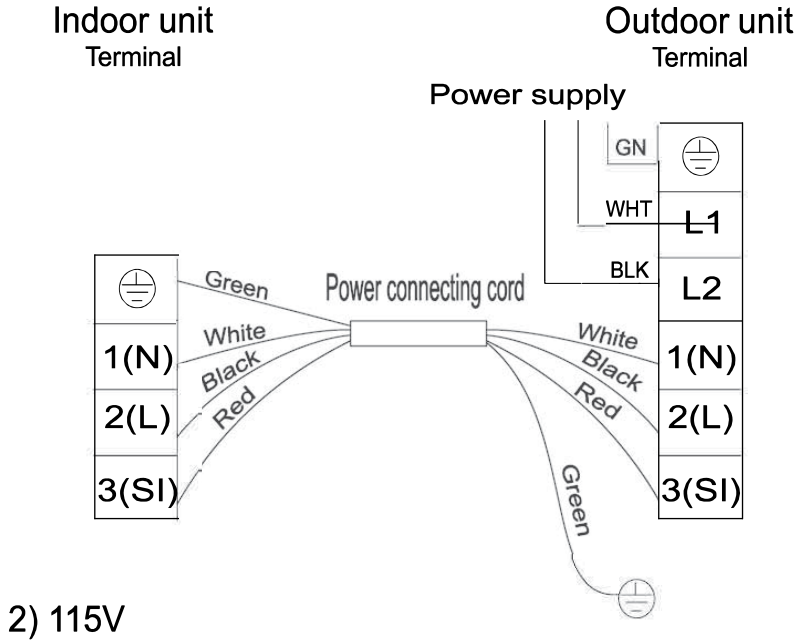
1. Remove the cable cross board from the unit by loosening the screw. Connect the wires to the terminals on the control board individually per circuit diagram posted on inside of access door. Refer to Figure E.2.
2. Secure the power cord onto the control board with cable clamp.
3. Reinstall the cable cross board to the original position with the screw.

INSTALLATION OF THE INDOOR UNIT

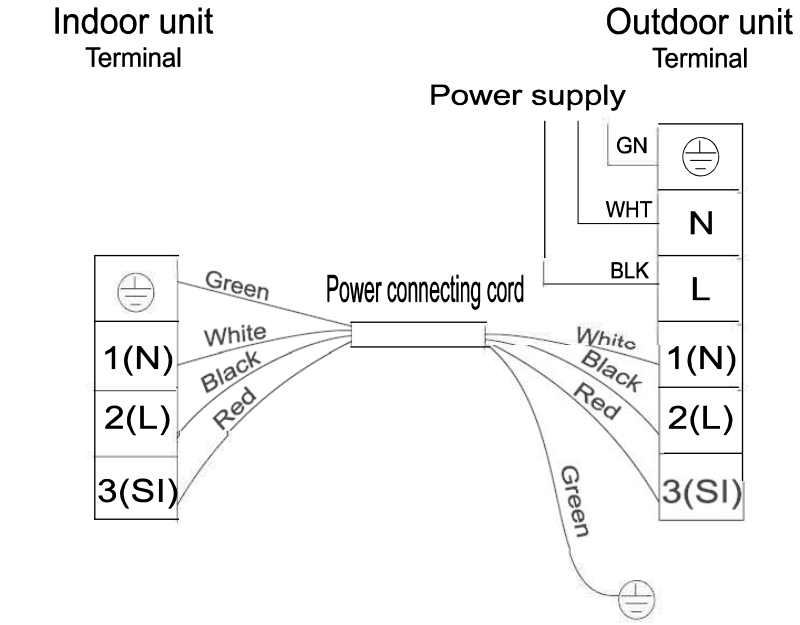
Indoor Unit Wiring Connection Diagram

Make sure that the color of the wires in the outdoor unit and terminal No. are the same as those of the indoor unit.

1) 208/230V



2) 115V



☑ **Diagram is reference only, actual product terminals should be followed.**

INSTALLATION OF THE OUTDOOR UNIT

Tools

Verify with tool manufacturers that all tools used during servicing of the refrigerant 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-32 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.
- 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-32 refrigerant.
- Gauge Manifold (Right handed threads).
- A2L compatible Vacuum Gauge capable of 300 microns or less.
- Nitrogen regulator for purging and testing, rated to 800 psi. (Capable of low psi flow)
- Pipe tubing cutter.
- Refrigerant recovery cylinder. (Flammable A2L label)
- Ventilation fan.
- Class ABC fire extinguisher.
- Purge hose fittings
- Flaring tool

ABC Fire Extinguisher

Recovery Machine

Vaccum Pump

Nitrogen

Guage Manifold

Nitrogen Regulator

Vacuum Guage

Figure C.1 (Tools)

INSTALLATION OF THE OUTDOOR UNIT

Clearances

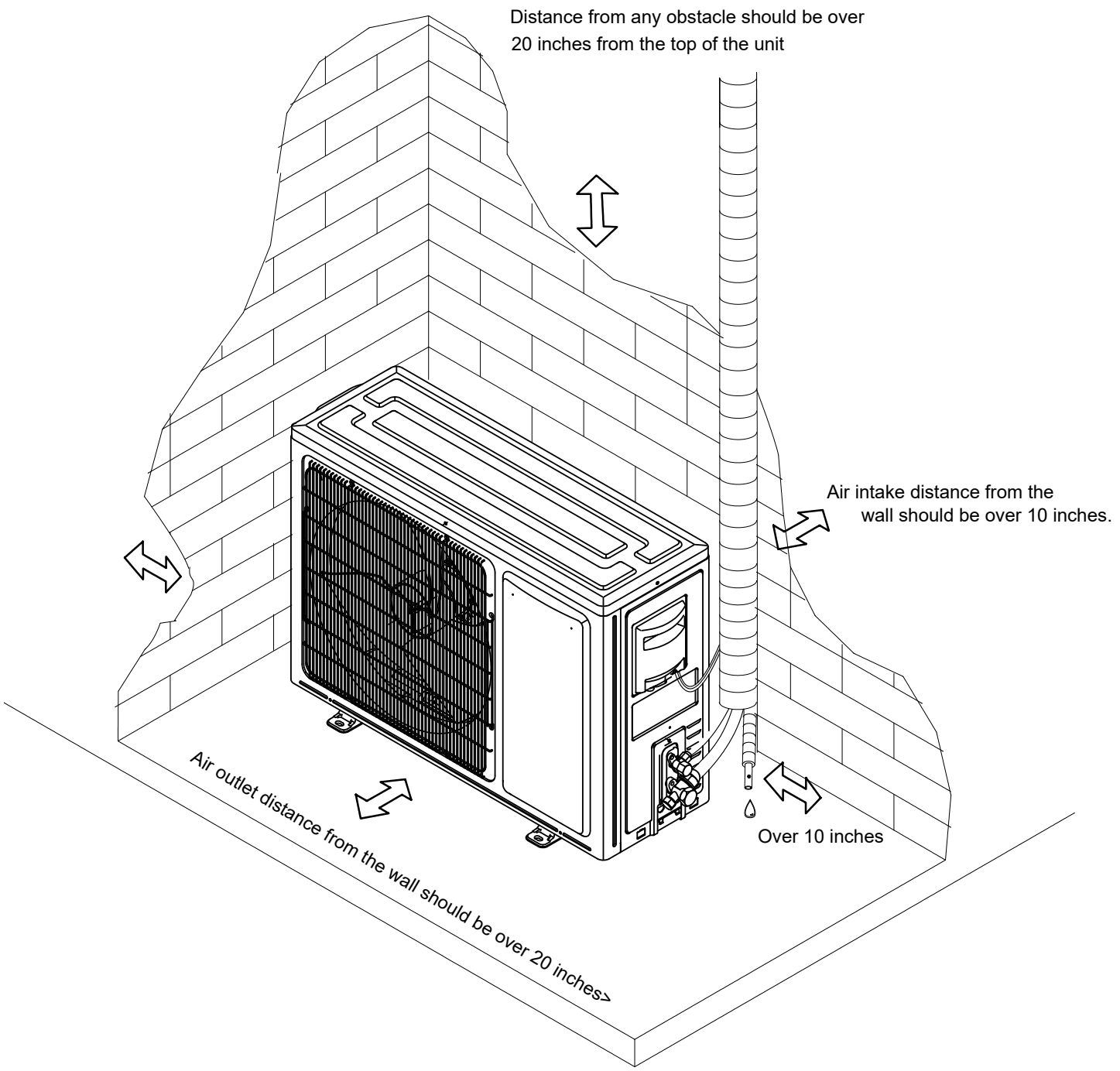


Figure C.2

INSTALLATION OF THE OUTDOOR UNIT

Pre-Installation Checkpoints

- Location is convenient to install and well ventilated.
- Avoid installing it where flammable gas could leak.
- Keep the required distance from walls and other obstacles.
- Keep the outdoor unit away from grease and debris.
- Avoid installing it by the roadside where there is a risk of muddy water.
- Install on a fixed base where it is not subject to increased operation noise.
- Ensure there is no blockage of the air outlet.
- Avoid installing under direct sunlight, in an aisle or sideway, or near heat sources and ventilation fans.
- Keep away from flammable materials, thick oil fog, and wet or uneven places.
- Outdoor unit comes pre-charged with refrigerant for 25 ft of line set.
- If the indoor unit is installed more than 16 ft in elevation below the outdoor unit, an oil trap should be installed every 16 ft in elevation drop.

NOTE:

1. To avoid storing too much oil in the oil bend, the oil bend should be as short as possible.
2. The horizontal piping should be sloped down along the refrigerant flow direction, to bring the oil back to compressor. The slope should be between 1/200 and 1/250.

- Indoor unit can not be installed more than 50 feet in elevation above the outdoor unit.
- Refer to refrigerant Leak Check, Charging, and Evacuation section of the manual.

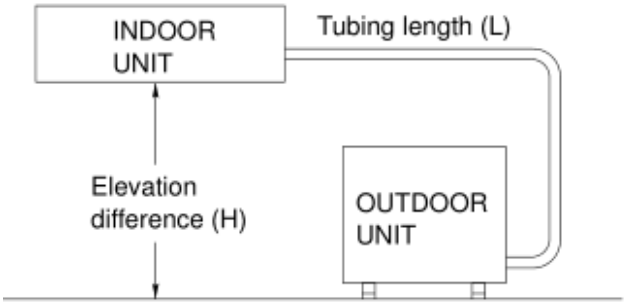


Figure C.3.1

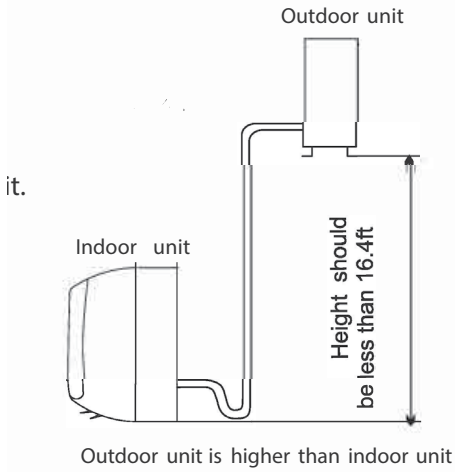


Figure C.3.2

Model	Refrigerant Pre-Charge	Pipe Size		Standard Length (ft)	Max. Elevation H (ft)	Max. Length L (ft)	Additional Refrigerant (oz/ft)
		LIQUID	GAS				
FSHSR09B1B	21.2 oz	1/4"	3/8"	25	50	66	.22
FSHSR12B1B	21.9 oz	1/4"	3/8"	25	50	66	.22
FSHSR18A3B	45.9 oz	1/4"	1/2"	25	50	100	.22
FSHSR24A3B	47.6	3/8"	5/8"	25	50	100	.32

Table C.3.3

⚠WARNING

Fire Hazard

A2L refrigerant is classified as mildly flammable. Temperatures on surfaces that may be exposed to leakage of FLAMMABLE REFRIGERANTS shall not exceed 1292°F

⚠WARNING

Refigeration System Under High Pressure

Do not puncture, heat, expose to flame or incinerate.
Only certified refrigeration technicians should service this equipment.
R-32 and R-454B systems operate at higher pressures than R22 equipment.
Appropriate safe service and handling practices must be used.
Only use gauge sets designed for use with R32 and R-454B.
Do not use standard R22 gauge sets..

INSTALLATION OF THE OUTDOOR UNIT

Install Condensate Drain

Install Condensate Drain for Outdoor Unit

The condensate drains from the outdoor unit when the unit operates in heating mode.

Install a drain port and a drain hose to direct the condensate water. Just install the drain port and rubber washer to the chassis of the outdoor unit, then connect a drain hose to the port. See Figure C.3.1.

CAUTION: Condensate is subject to freezing.

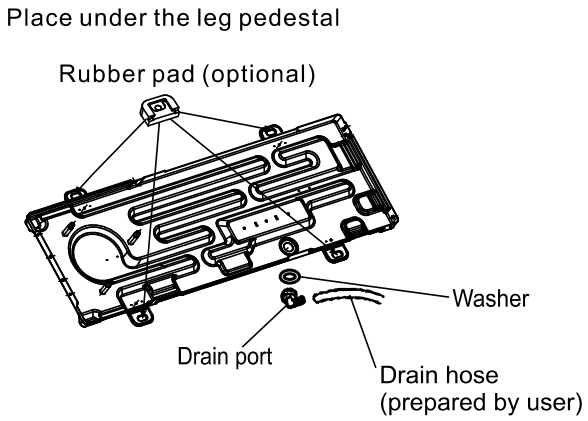


Figure C.4

Install Ground Pad or Wall Hangers

1. Refer to Section C.2 to identify proper unit location.
2. Follow all instructions provided by manufacturer for installing wall hangers rubber pad .
3. Verify the wall hangers or rubber pad can safely support the weight of the outdoor unit.
4. Verify the wall hangers or rubber pad is level and meets all outdoor dimensional clearance.
5. Attach with bolts and nuts tightly on a flat and strong floor.

If installed on the wall or roof, make sure to attach the support well to prevent it from shaking due to serious vibration or strong wind .

⚠WARNING

Florida wind load requirements state that outdoor unit must be anchored to concrete pad using four 3/8-in diameter power wedge bolt plus(or equivalent) with 1-in diameter fender washers. Anchor bolts must be embedded into 3000 PSI minimum concrete at a distance of 41/2- in from any concrete edge. The concrete thickness must exceed 1.5 times the anchor depth.

Piping Connections to Outdoor Unit

1. Remove service valve cover(if provided) to access the service valves and refrigerant ports.
2. Carefully bend and adjust length of refrigerant pipes to meet outdoor unit service valves connection with proper tools to avoid kinks.
3. Apply a small amount of refrigerant oil to the flare connection on the refrigerant pipe.
4. Properly align piping and tighten flare nut using a standard wrench and a torque wrench as shown in the indoor piping section.
5. Carefully tighten flare nuts to correct torque level referring to the following Torque Table:

"Pipe diameter /inch"	"Nut Size /inch"	Tightening Torque	
		ft-lbs	N-m
1/4	1/4	11 to 15	15 to 20
3/8	3/8	22 to 26	30 to 35
1/2	1/2	37 to 41	50 to 55
5/8	5/8	44 to 48	60 to 65
3/4	3/4	52 to 55	70 to 75
Caution: Over tightening may damage flare connections and cause leaks.			

Table C.6

INSTALLATION OF THE OUTDOOR UNIT

Specifications

Model	Wire Diameter(AWG) Interconnecting Wire between Indoor and Outdoor Unit	Main Power Supply To Outdoor Unit		
		Wire Size	MOP (Rating of Over current Device)	MCA (Minimum Circuit Ampacity)
FSHSR09B1B	14-4 AWG 600V THHN		20A	14.6A
FSHSR12B1B	14-4 AWG 600V THHN		20A	15.4
FSHSR18A3B	14-4 AWG 600V THHN		20A	14.5A
FSHSR24A3B	14-4 AWG 600V THHN		35A	21A
Table E.1				

Indoor Unit

Connect the power cord to the indoor unit by connecting the wires to the terminals on the control board individually in accordance with the outdoor unit connection.

Note: For some models, it is necessary to remove the cabinet to connect to the indoor unit terminal.

Outdoor Unit

1. Remove the cable cross board from the unit by loosening the screw. Connect the wires to the terminals on the control board individually per circuit diagram posted on inside of access door. Refer to Figure E.2.
2. Secure the power cord onto the control board with cable clamp.
3. Reinstall the cable cross board to the original position with the screw.
4. Use a recognized circuit breaker between the power source and the unit. (Refer to Table E.1. An electrical disconnect must be installed according to local and national codes. Refer to Table E.1.

WIRE SIZE	Use ONLY wiring size recommended by the National Electric Code (NEC) for single outlet branch circuit.
FUSE/CIRCUIT BREAKER	Use ONLY type and size fuse or HACR circuit breaker indicated on unit's rating plate. Proper current protection to the unit is the responsibility of the owner.
GROUNDING	Unit MUST be grounded from branch circuit to unit, or through separate ground wire. Be sure that branch circuit or general purpose outlet is grounded. Do NOT use an extension cord.
ELECTRICAL DISCONNECT	Ensure an electrical disconnect is installed according local and national electrical codes

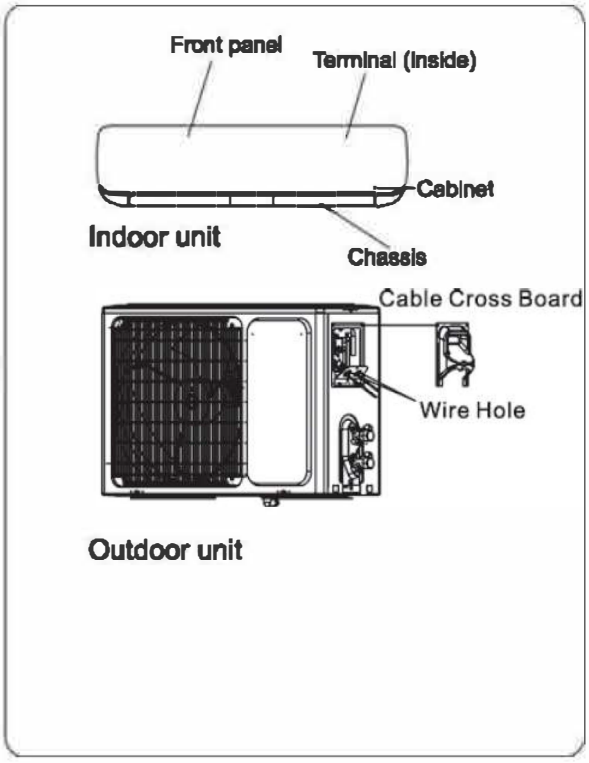


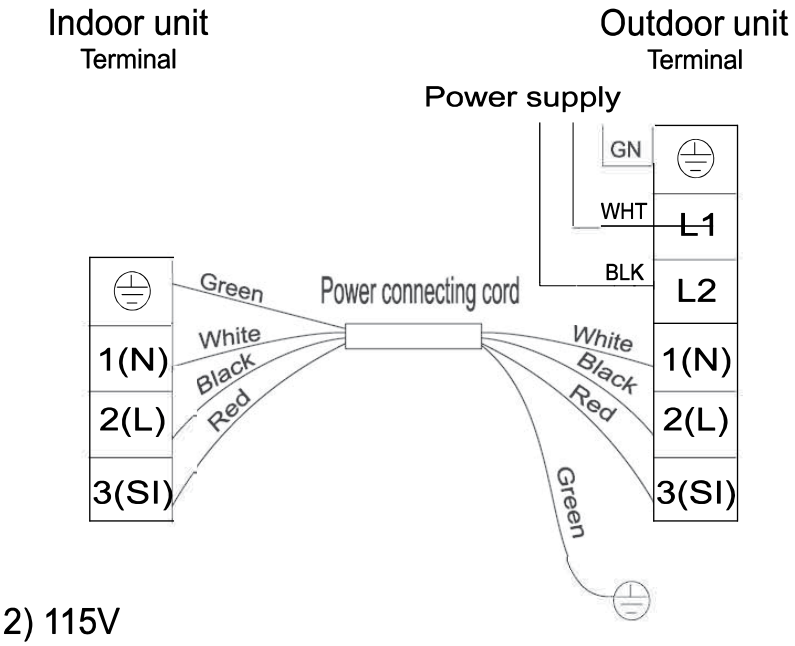
Figure E.2

INSTALLATION OF THE OUTDOOR UNIT

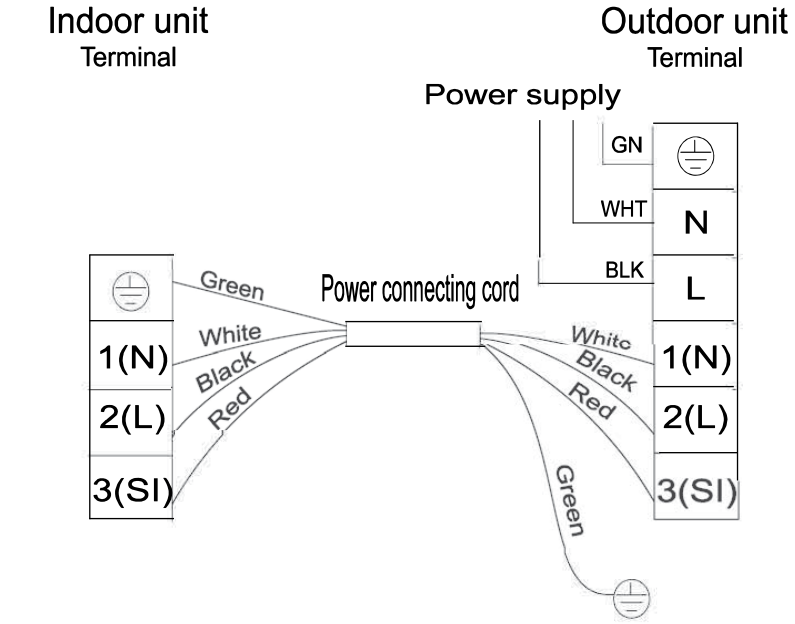
Wiring Diagrams

Make sure that the color of the wires in the outdoor unit and terminal No. are the same as those of the indoor unit.

1) 208/230V



2) 115V



☑ **Diagram is reference only, actual product terminals should be followed.**

INSTALLATION OF THE OUTDOOR UNIT

Leak Check, Evacuation, and Charging

⚠ 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-32 equipment:

- R-32 pressure is similar to R-410A and approximately 60% higher than R-22 pressure.
- R-32 cylinders must not be allowed to exceed 125˚F, they may leak or rupture.
- R-32 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-32 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-32 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.

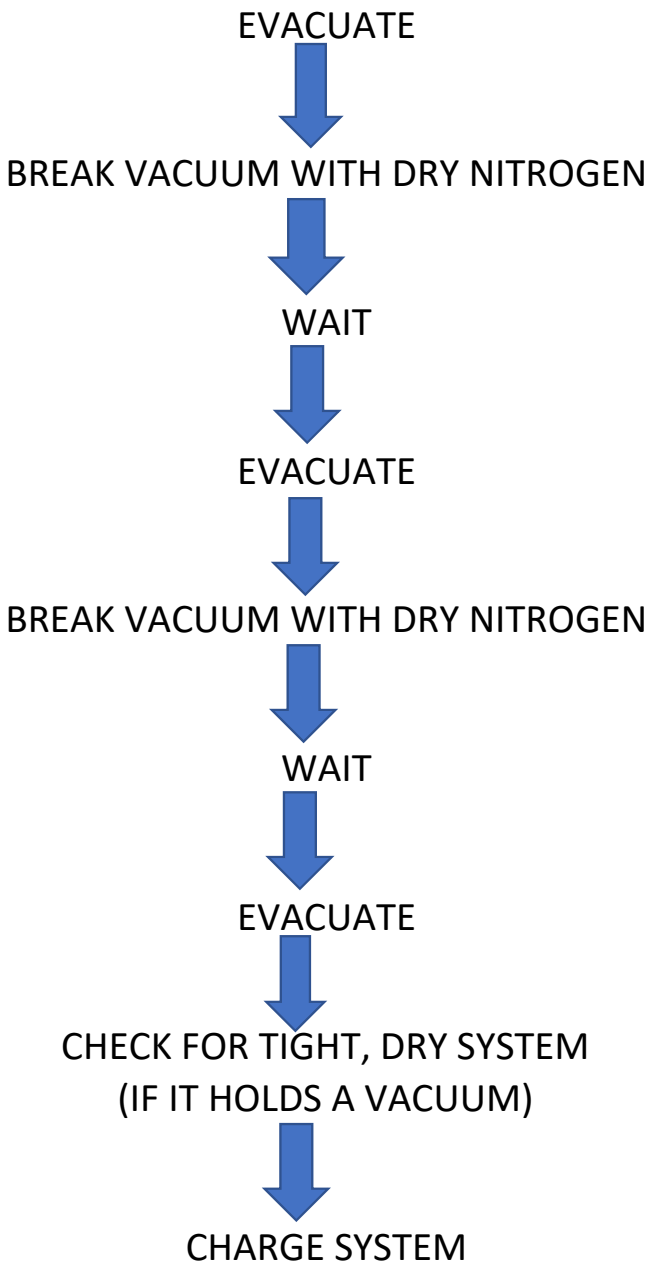


Figure G.1

INSTALLATION OF THE OUTDOOR UNIT

Leak Check, Charging And Triple Evacuation

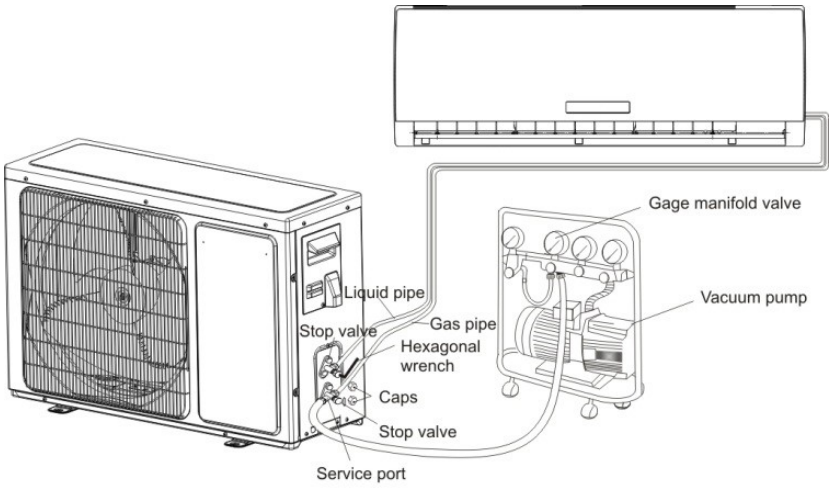
Friedrich requires all installations are Leak Checked and Evacuated in accordance to the "triple evacuation" process. This process promotes a dry tight refrigeration system before opening the service valves. It recommended that a single port refrigeration manifold and hoses rated over 750 psi be used. 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 550psi. 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. Charging the system:
Unscrew Service Valve Caps to expose the inner hexagon head. Use an allen-head spanner or service wrench with appropriate adapter to release the refrigerant into the system. If the calculated line set length is over 25 ft, weight in the additional charge with an approved refrigerant scale as needed. Refer to Table G.1.

Capacity (Btu/h)	Refrigerant Pre-Charge	Pipe Size		Standard Length (ft)	Max. Elevation H (ft)	Max. Length L (ft)	Additional Refrigerant (oz/ft)
		LIQUID	GAS				
FSHSR09B1B	21.2 oz	1/4"	3/8"	25	50	66	.22
FSHSR12B1B	21.9 oz	1/4"	3/8"	25	50	66	.22
FSHSR18A3B	45.9 oz	1/4"	1/2"	25	50	100	.22
FSHSR24A3B	47.6	3/8"	5/8"	25	50	100	.32

Table G.2

Figure G.3



INSTALLATION OF THE OUTDOOR UNIT

Startup And Operation

Present the owner or operator of the equipment with the Installation & Operation Manual, all accessory installation instructions, and the name, address, and telephone number of the Authorized Friedrich Warranty Service Company in the area for future reference if necessary. Inspect the unit for any damage to the coils and tubing that could cause a leak.

NOTICE

This unit is certified to operate in cooling mode under these maximum conditions. Any operation beyond these conditions may result in intermittent operation.
Indoor temperature: 90 °F (45% relative humidity)
Outdoor temperature: 110 °F (25% relative humidity)
If unit is heat pump equipped, it is certified to operate in heating mode under these maximum conditions. Any operation beyond these conditions may result in intermittent operation.
Indoor temperature: 80 °F (humidity does not affect operation)
Outdoor temperature: 75 °F (60% relative humidity)

Test Operation

System Checks

1. Conceal refrigerant pipes where possible.
2. Make sure drain hose slopes downward along entire length at a slope of 1/4"(inch) per '(foot).
3. Ensure all refrigerant pipes and connections are properly insulated.
4. Fasten pipes to outside wall, when possible.
5. Seal and weatherproof wall hole which the interconnecting wires and refrigerant pipes pass through.

Perform test operation after completing gas leak and electrical safety check.
1. Turn on electrical disconnect to outdoor unit.
2. Push the "ON/OFF" button on Remote Controller to begin testing, or if remote is not available press auto start switch on indoor unit.
3. Push MODE button, select COOLING, HEATING, FAN mode to confirm all functions.

Indoor Unit

1. Do all Remote controller's buttons function properly?
2. Do the display panel lights work properly?
3. Does the swing louver function properly?
4. Does the drain work?

Outdoor Unit

1. Push the mode button to COOL and adjust the room setting to 61 °F. Wait up to 3 minutes for compressor time delay. Does compressor and outdoor fan turn on in cooling mode?

2. Push the mode button to HEAT and adjust the room setting to 85 °F(Wait up to 3 minutes for compressor time delay. Does compressor and outdoor fan turn on in heat mode?

Unit protection will prevent the unit from restarting for 3 minutes if operations stops, or modes are changed.

Preheat

At the beginning of the HEATING operation, the airflow from the indoor unit is discharged 2-5 minutes later.

Defrost

In HEATING operation the appliance will defrost (de-ice) automatically to raise efficiency. This procedure usually lasts 2-10 minutes. During defrosting, fans stop operation. After defrosting completes, it returns to HEATING mode automatically.

No.	Items to be checked	Possible malfunction
1	Has the unit been installed correctly?	The unit may drop, shake or emit noise.
2	Have you done the refrigerant leakage test?	It may cause insufficient cooling (heating) capacity.
3	Is heat insulation of pipeline sufficient?	It may cause condensation and water dripping.
4	Is water drained well?	It may cause condensation and water dripping.
5	Is the voltage of power supply according to the voltage marked on the nameplate?	It may cause malfunction or damage the parts.
6	Is electric wiring and pipeline installed correctly?	It may cause malfunction or damage the parts.
7	Is the unit grounded securely?	It may cause electric leakage.
8	Does the power cord follow the specification?	It may cause malfunction or damage the parts.
9	Is there any obstruction in air inlet and air outlet?	It may cause insufficient cooling (heating).
10	Are the dust and debris caused during installation removed?	It may cause malfunction or damaging the parts.
11	The gas valve and liquid valve of connection pipe are open completely?	It may cause insufficient cooling (heating) capacity.

OPERATION

Operation Range (Cooling and Heating)

Temperature		Cooling operation	Heating operation
Indoor temperature	Max	90˚F	81˚F
	Min	70˚F	45˚F
outdoor temperature	Max	115˚F	75˚F
	Min	5˚F	-4˚F

Figure 301

*Optimum performance will be achieved within these operating temperature. If air conditioner is used outside of the above conditions, the protective device may trip and stop the appliance.

When relative humidity is above 80%, if the air conditioner runs in COOLING or DRY mode with door or window opened for a long time, dew may drip down from the outlet.

OPERATION

Remote Control

The remote controller transmits signals to the system.

SMART(Multizone system not capable of auto change over function)
Used to enter auto change over operation directly, regardless if the unit is on or off.

POWER
System ON/OFF

SURGE
Used to start or stop the fast cooling/heating. (Fast cooling operates at high fan speed with 61°F set temp automatically ; Fast heating operates at auto fan speed with 86°F set temp automatically)

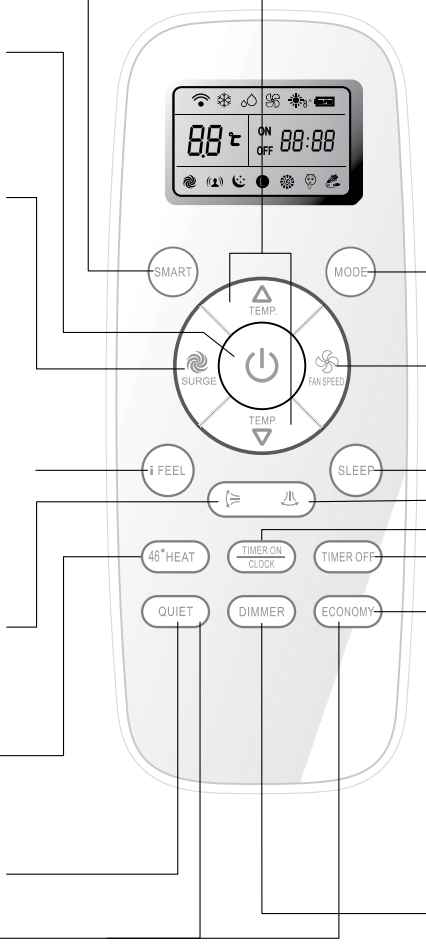
IFEEL
Used to set IFEEL mode operation. Press it once, the IFEEL function will be started. Press it again, the IFEEL function will be shut off. If the IFEEL function can't be shut off, please try to press this button about 5 seconds.

SWING
Used to stop or start vertical adjustment louver swinging and set the desired up/down airflow direction.

46° HEAT(optional)
Used to set 46° HEAT Mode.

QUIET
Used to set or cancel Quiet Mode operation.

Press both Quiet and Economy buttons for 5 seconds to disable the heat pump function



TEMP + -
Used to adjust the room temperature and the timer and time

MODE
Press this button to select the operation mode.

FAN
Used to select fan speed in sequence auto, highest, high, medium, low and lowest.

SLEEP
Used to set or cancel Sleep Mode operation.

SWING
Used to stop or start Horizontal adjustment louver swinging and set the desired left/right airflow direction.

TIMER ON/CLOCK
Used to set or cancel the timer operation and used to set the current time.

TIMER OFF
Used to set or cancel the timer operation.

ECONOMY
Used to set or cancel Economy Mode operation.

DIMMER
When you press this button, all the display of indoor unit will be closed. Press any button to resume display.

Indication symbols on LCD:

Cooling indicator	Dry indicator	Fan only indicator	46°Heating indicator	Heating indicator
Auto fan speed	Higher fan speed	High fan speed	Medium fan speed	Low fan speed
Lower fan speed	Sleep 1 indicator	Sleep 2 indicator	Sleep 3 indicator	Sleep 4 indicator
Smart indicator	Quiet indicator	Economy indicator	Super indicator	Display set timer / Display current time
Signal transmit	Ifeel	Display temperature		Battery power indicator

Note: Each mode and relevant function will be further specified in following pages.

Figure 302

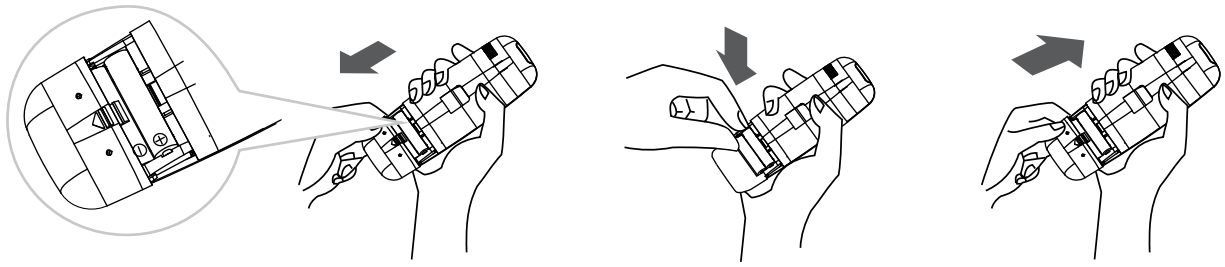
OPERATION

Remote Control

Remote controller

◆ *How to Insert the Batteries*

1. Remove the battery cover according to the arrow direction.
2. Insert new batteries making sure that the (+) and (-) of battery are matched correctly.
3. Reattach the cover by sliding it back into position.



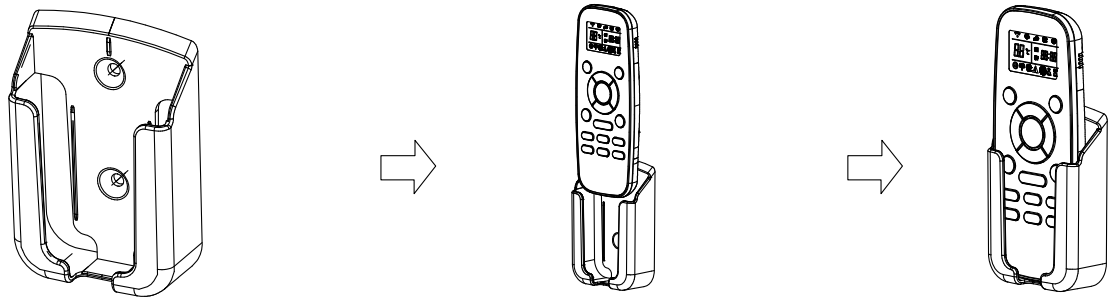
Note:

- ***Use 2 LR03 AAA(1.5volt) batteries. Do not use rechargeable batteries. Replace batteries with new ones of the same type when the display becomes dim.***

◆ *Storage and Tips for Using the Remote Controller*

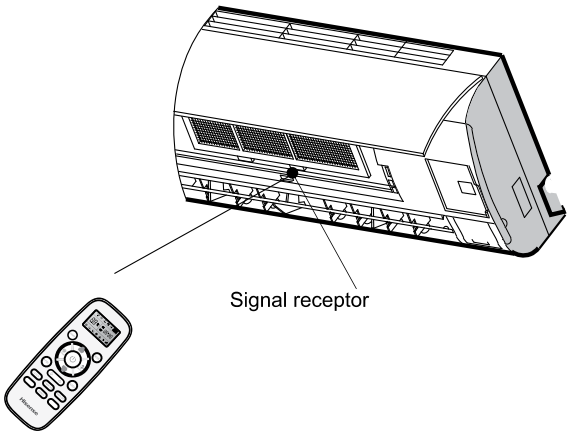
The remote controller may be stored mounted on a wall with a holder.

Note: The remote controller holder is an optional part.



◆ *How to Use*

To operate system, point remote directly at unit (audible beep should sound when buttons are pressed). The remote can operate system up to 23ft away without interference.



⚠ *CAUTIONS*

For appropriate signal transmission between remote controller and indoor unit, keep the signal receiver away from the following items:

- Direct sunlight or other strong lights or heat
- Flat panel television screen or other electrical appliances that react to the remote controller

Additionally, the air conditioner will not operate if curtains, doors or other materials block the signals from the remote controller to the indoor unit. If the signal may not be transmitted properly, either move these materials or consult your local dealer.

OPERATION

Remote Control

Operation modes

◆ Selecting mode

Press MODE button

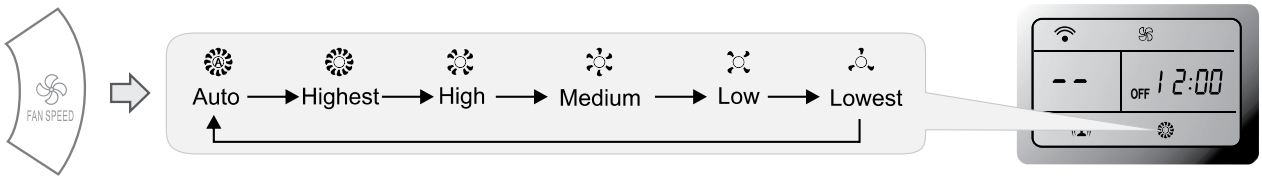
Result : The operation modes changed in sequence:

Heating mode is NOT available for cooling only air conditioner.

◆ FAN mode

Press FAN SPEED button

Result : The fan speed is changed in sequence:



At "FAN ONLY" mode, the "AUTO" is not available.
At "DRY" mode, Fan speed is set at "AUTO" automatically, "FAN" button is ineffective in this case.

◆ Setting temperature

Press TEMP. button once

Result : Raise temperature setting by 1°F

Press TEMP. button once

Result : Lower temperature setting by 1°F

Range of available set temperature	
*HEATING, COOLING	61°F~86°F
DRY	19°F~45°F
FAN ONLY	unable to set

***Note: Heating mode is NOT available for cooling only models.**
***Note: At "Dry" mode, a decrease or rise of up to 45°F can be set with Remote controller if you still feel uncomfortable.**

◆ Turning on

Press ⏻ button.

Result : The RUN indicator of the indoor unit lights up.

SWING, SMART, TIMER ON, TIMER OFF, CLOCK, 46°HEAT,SLEEP and SURGE operation modes will be specified in the following pages.

- ***Changing modes during operation, sometimes the unit does not response at once. Wait 3 minutes.***
- ***During heating operation, air flow is not discharged at the beginning. After 2—5 minutes, the air flow will be discharged until temperature of indoor heat exchanger rises.***
- ***Wait 3 minutes before restarting the appliance.***

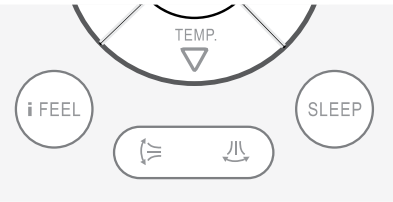
OPERATION

Remote Control

Airflow direction control

Vertical airflow(Horizontal airflow) Blade angle will adjust based on remote setting.

Operation mode	Direction of airflow
COOLING, DRY	horizontal
*HEATING, FAN ONLY	downward



The direction of airflow can be also adjusted by pressing the " " button of the remote controller.

Heating mode is only available for heat pump models.

◆ Vertical airflow control (with the remote controller)

Use remote to adjust blade/louver angles.

Press " " button once.

Result : The vertical adjustment louver will swing up and down automatically.

Press " " button again .

Result : The louvers swing to a suitable angle as desired.

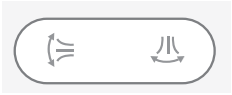
◆ Horizontal airflow control (with the remote controller)

Use remote to adjust blade/louver angles.

Press " " button once.

Result : The horizontal adjustment louver will swing left and right automatically.

Press " " button again .



Result : The louvers swing to a suitable angle as desired.

OPERATION

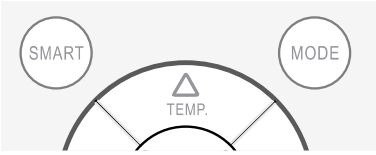
Remote Control

SMART mode(Multizone system not capable of auto change over function)

◆ *How to set SMART mode?*

Press the SMART button.

Result : Enters **SMART** mode(auto change over operation) regardless of the units ON/OFF status.
Temperature and fan speed are automatically set based on actual room temperature.



Heat pump models

Indoor temperature	Operation mode	Target temperature
70°F or below	HEATING	72°F
70°F-73°F	FAN ONLY	
73°F-79°F	DRY	Room temperature decrease 2°F after operate for 3 minutes
Over 79°F	COOLING	79°F

☑ ***SMART mode will not work when system is set to SURGE Mode.***

☑ ***Pressing MODE will cancel SMART mode.Pressing MODE will cancel SMART mode.***

Note: Temperature, airflow and direction are controlled automatically in SMART mode. However, you can choose an offset of -7 to 7 if SMART mode preset is not comfortable.

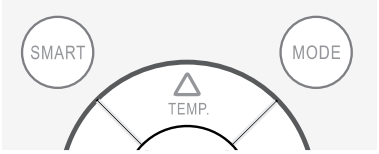
◆ *What you can do in SMART mode?*

Issue	Button	Adjust
Not enough air flow in SMART mode.		Indoor fan speed alternates among Highest, High, Medium, low and Lowest each time when this button is pressed.
Airflow is not directed properly.		Pressing SWING button once will change blade/louver position, pressing SWING again will stop swing function.

◆ *How to cancel the SMART mode?*

Press the MODE button.

Result : The SMART mode will be cancelled.



OPERATION

Remote Control

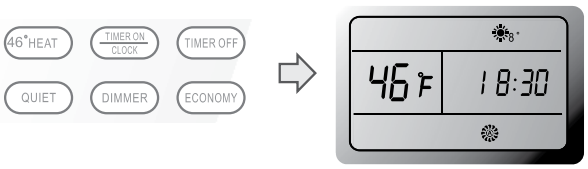
46°HEAT mode

46°HEAT mode is used to set 46° heating mode.
In **46°HEAT** mode, the fan speed is set at "AUTO" automatically.

- ***How to set 46°HEAT mode?***

Press (46°HEAT) button at the heating mode.

Result : The 46° heat mode will be started.



- ***How to cancel 46°HEAT mode?***

Press any button except for (TIMER ON CLOCK) , (TIMER OFF) and ( ) .

Result : The display will disappear and the 46°HEAT mode will be cancelled.

Note:

In 46°HEAT mode, the default temperature is set 46°F.
46°HEAT mode can be set only when the air conditioner works in the heating mode.

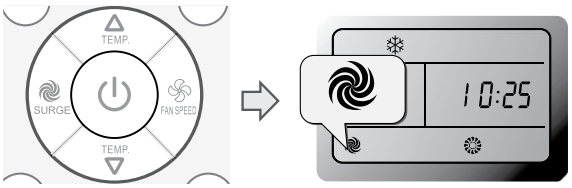
SURGE mode

SURGE mode is used to start or stop fast cooling or heating.
SURGE mode can be set when the appliance is in operation or in standby.
In SURGE mode, you can set airflow direction or timer.

- ***How to set SURGE mode?***

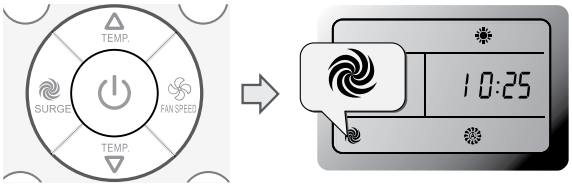
Press SURGE button in cool mode.

Result : At higher fan speed ,the set temperature automatically to 61°F



Press SURGE button in heat mode.

Result : At auto fan speed ,the set temperature automatically to 86°F



- ***How to cancel SURGE mode?***

Press SURGE , MODE, FAN, ON/OFF,SLEEP or TEMPERATURE SETTING button.

Result : Display will return to previous mode
Exit from SURGE mode.

Note:
SMART button is not available in SURGE mode.
Surge mode will operate for 15 minutes unless user cancels the function.

OPERATION

Remote Control

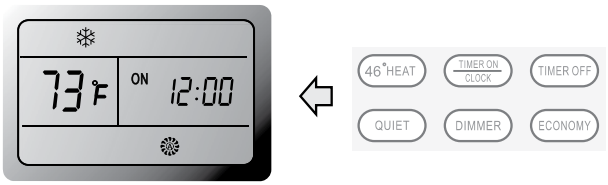
Timer mode

TIMER ON/CLOCK and TIMER off.

◆ *How to set TIMER ON?*

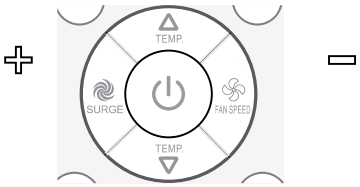
1. Press TIMER ON CLOCK button.

   Result : "ON 12:00" flashes on the LCD.



2. Press the TEMP △ or TEMP ▽ button.

   Result : Pressing UP/DOWN button once will change minutes, long press will adjust by block of tens. To set hours hold button to reach desired hour.



3. When your desired time displayed on LCD, press the TIMER ON button and confirm it.

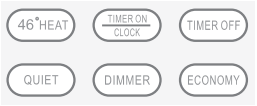
   Result : A "beep" can be heard.
   "ON" stops flashing.
   The TIMER indicator on the indoor unit lights up.

4. Timer will be displayed on the remote for 5 seconds and set time will reappear.

◆ *How to cancel TIMER ON?*

Press the TIMER ON CLOCK button again.

Result : A "beep" can be heard and the indicator disappears, the time on mode has been canceled.



Note: It is similar to set TIMER OFF, you can make the appliance switch off automatically at your desired time.

QUIET mode

In this mode, the air conditioner will work with low noise performance by low compressor frequency and low fan speed.

Note: Press MODE,FAN,SMART,SURGE button can cancel QUIET mode.

ECONOMY mode

In this mode, the air conditioner will bring you energy saving performance by lowering operating current.

OPERATION

Remote Control

CLOCK button

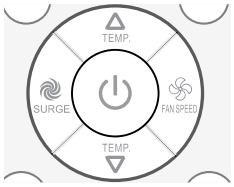
◆ ***How to adjust the real time?***

1. Press TIMER ON CLOCK button about 3 seconds.

   Result : The time flashes on the LCD.

2. Press TEMP. ▲ and TEMP. ▼ buttons.

   Result : Pressing UP/DOWN button once will change minutes, long press will adjust by block of tens. To set hours hold button to reach desired hour.



3. Press TIMER ON CLOCK button again about 3 seconds.

   Result : The real time is set.

IFEEL mode

The built temperature sensor will sense the surrounding temperature, and transmit this back to the unit. This temperature will be your set point until you make another adjustment to the set point.

◆ ***How to set IFEEL mode ?***

Press the i FEEL button.

Result : The transmit signal in the display will appear, and the IFEEL function will be started.

Note:

Place remote in a location where the signal will be well received by unit.
IFEEL should be used to adjust room temperature for momentary comfort.
To get the best efficiency from your system allow the unit to operate at a set point.
This will allow the system to fluctuate with the changing room loads.

◆ ***How to cancel IFEEL mode?***

Press the i FEEL button once again.

Result : The transmit signal in the display will disappear, and the IFEEL function will be shut off.

Note:

If IFEEL function fails to cancel, try holding button for 5 seconds.

Dimmer button

◆ ***How to set the DIMMER ?***

Press the DIMMER button to turn off the light and the display in the unit.

Note:

If light is set to off a request from the remote to change a function will turn it on again. User will need to turn it off if that is the desired condition.

OPERATION

Remote Control

SLEEP mode

SLEEP mode can be set in **COOLING ,HEATING** or **DRYING** mode.

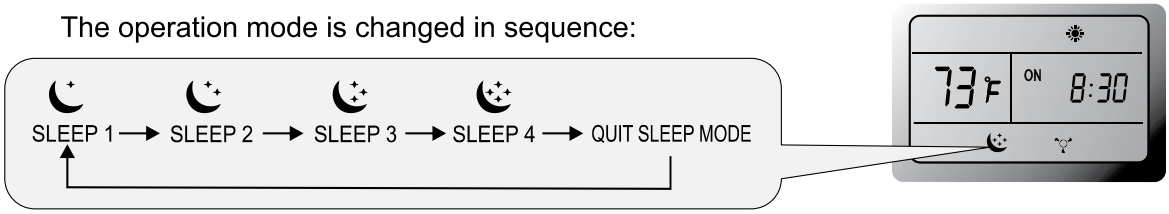
This function gives you a more comfortable environment for sleep.

- The appliance will stop operation automatically after operating for 8 hours.
- Fan speed is automatically set at low speed.

◆ *How to set SLEEP mode ?*

Each time SLEEP button is pressed.

Result : The operation mode is changed in sequence:



SLEEP mode 1:

- Set temperature will rise by 2°F at most if the appliance operates in cooling mode for 2 hours constantly, then keeps steady.
- Set temperature will decrease by 2°F at most if the appliance operates in heating mode for 2 hours constantly, then keeps steady.

SLEEP mode 2:

- Set temperature will rise by 2°F if the appliance operates in cooling mode for 2 hours constantly, decrease by 1°F after 6 hours, then decrease by 1°F after 7 hours.
- Set temperature will decrease by 2°F if the appliance operates in heating mode for 2 hours constantly, rise by 1°F after 6 hours, then rise by 1°F after 7 hours.

SLEEP mode 3:

- Set temperature will rise by 1°F if the appliance operates in cooling mode for 1 hour , rise by 2°F after 2 hours, then decrease by 2°F after 6 hours,
  decrease by 1°F after 7 hours.
- Set temperature will decrease by 2°F if the appliance operates in heating mode for 1 hour , decrease by 2°F after 2 hours, then rise by 2°F after 6 hours, rise by 2°F after 7 hours.

SLEEP mode 4:

- Set point will remain steady.

Note: Press SURGE ,SMART, MODE or FAN button cancel SLEEP mode.
Note: By pressing "Sleeping mode" four times, or selecting other modes like SURGE, SMART, OR FAN, you could cancel the sleeping function of those units without four sleeping curves.
Note: Heating is NOT available for cooling only air conditioner.

OPERATION

Unit Function

1. Major general technical parameters
- Remote receiver distance (front of the air conditioner): 25 feet.
- Remote receiver angle: Less than 60 degrees.
- Temperature control accuracy: ±2.4°F.
- Time error: Less than 1%.

2. Functions of the controller
- Display panel

Control functions of the remote controller
Display of the indoor unit
Information on the screen:

Displaying Scheme:

7-segment tube Display set temperature or indoor temperature , and diagnostic codes. A diagnostic code is displayed according to the signal from the indoor CPU. The error code will flash for 5 seconds while displayed.
Running LED It is on during operation. It is flashing when the unit defrost.
TIMER LED When the timer mode is on, the LED will be lit.
Sleep LED When the sleep mode is on, the LED will be lit, and after 10 seconds, the LED will be off.
Compressor LED lights up when compressor is running.
Remote control receiver This section receives signals from the remote control.

3. Control function

Auto Start switch

If the appliance under the Stand-by state, all the Operation Mode, Air volume, Temperature Setting , Forced Cooling function will be restored to the last setting when you press on the "ON/OFF" button, but will lose the Air flow direction setting.
When the appliance is connected to the power for the first time, it will operate in the auto mode, It will stay in stand-by state if you press the "ON/OFF" button during the normal operation.
When the appliance is in the Stand-by state, press and hold the auto start switch for 5 seconds, the buzzer rings once, it will operate in cooling mode, and the indoor fan speed is set to high-speed. Room temperature will not affect indoor fan speed in standby mode.
When the emergency switch is pressed or receives the signal of the remote control, it will exit this mode, and it will operate with the corresponding order.

- **Operator-machine communication**

If the unit has I feel function, when the I feel function is set by the remote control, the room temperature will depend on the remote control and it will be detected by the sensor of the remote control. Normally the remote control will automatically transmits a signal at an interval of 10 minutes only for H1 remote control, it is 9 minutes, but if the room temperature changed exceed 2.4˚F in a short period of time, the remote control will transmits a signal within 2 minutes. If the indoor unit has not received a remote signal within 30 minutes, the room temperature will depend on the room temperature sensor of indoor unit.

- Timer function

Real time of Timer setting
(1) The max Timer ranges is 24 hours.
(2) Timer ON/OFF
(3) Timer ON/OFF can be set available in turn.
(4) The Timer accurate by more than 97%
(5) The Timer can be adjusted by 1 min increments.
(6) The appliance can set the ON-Timer and OFF-Timer at the same time, but no timer setting indicated.

- Sleep

(1) The Sleep mode can only be set during Cool, Heat and Dry mode.
(2) When the appliance runs in Sleep mode, it will stop after 8 hours operation, then it will cancel the Sleep setting. When the appliance operates under the OFF-Timer setting condition, if the OFF-Timer setting less than 8 hours, it will keep the Sleep mode until the OFF-Timer setting; if the OFF-Timer setting is more than 8 hours, it will cancel the OFF-Timer setting after the Sleep mode is OFF.
(3) When the Sleep mode is selected in cooling mode, if the room temperature not less than 79°F, the set temperature will not be adjusted, otherwise, the setting temperature will be raised by 1˚F per hour, but the max setting temperature raise is 1˚F.
(4) When the Sleep mode is select with Heat mode, the setting temperature will be decreased by 1˚F per hour during the successive 3 hour, but the max setting temperature decrease is 3˚F.
(5) When the appliance operates in Sleep mode, the indoor fan runs in the LOW setting, and the air flow direction is same as the last setting and the temperature and air flow direction can be adjusted by user. The Running indicator will be flashed 10 times per 1 Hz frequency, then all the indicators turn OFF except the Sleep light after 5 min elapse. Those indicators will recover when the temperature or Time setting is adjusted, after the setting, the indicators will be lit for 10 sec, then turn OFF.

- Automatic run (SMART) mode

When the appliance operates in smart, the air flow direction can be adjusted.
(1) When the set temperature is 79°F, the appliance will run in cool mode if the room temperature exceeds 79°F.
(2) When the room temperature exceeds 73°F, but below 79°F, it will run in the Dry mode(It will turn on automatic setting after 3 min LOW air volume running.).
(3) When the room temperature exceeds 70°F, but below 73°F, it will operate in the Fan only mode, the air volume is set by LOW and the fan speed can be adjusted
(4) When the room temperature is not more than 70°F, it will operate in Heat mode, and the temperature is set to 72°F.

OPERATION

Unit Function

- ***Cooling-run mode***

Outdoor Fan

The outdoor fan's speeds except the single speed motor can be changed according to outdoor ambient temperatures.
When operating at a fixed frequency, the outdoor fan is forced to operate at the high speed.

Indoor fan

(1) When the indoor fan is running, this operation state could be controlled by the remote control with High, Medium, Low and Automatic setting.
(2) When the appliance is set to the automatic condition in the Cool mode for the first time, the fan speed will run at Low setting. After that, temperature and fan speed will run as shown in figure 303.
When the difference between the setting temperature and the room temperature is between 3.6˚F and 7.2˚F, the indoor fan speed will keep the current speed.

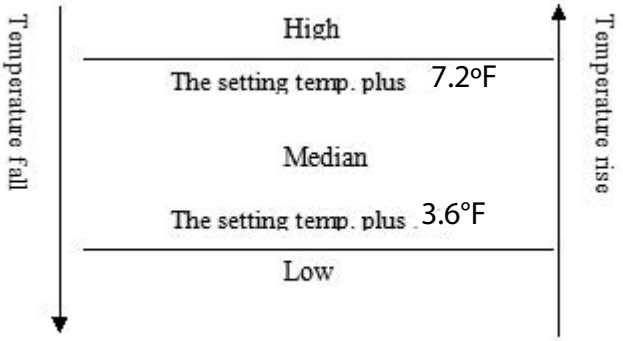


Figure 303

Air flow direction control

The louver is controlled by a step motor, and it swings the horizontal louver automatically. Press the SWING button to swing or stop the louver.
During the louver swing in normal operation, the current position will be stored. When the appliance turns off and louver swing automatically to the default position, it will position at the close position plus 5°.

Reversing valve

State: Power is removed for cooling
Switchover: When initially powered on for cooling, the reversing valve is interrupted immediately.
When the heating is changed to the cooling, it needs an interval of 50 seconds for the reversing valve to change over from being activated to being interrupted.

- ***Heating-run mode***

Temperature compensation

The temperature compensation is 5° in heating mode. For example, if the set temperature is 77°F by the remote control, when the room temperature is detected with 88°F, the compressor will turn off. The main reason is that the hot air is condensed at the top of the building.
Note: The compensation is available only if the room temperature sensor of indoor unit is used and it is not available when it is subject to the sensor on the remote control.

Indoor fan motor operation

Anti-cold air system:
When the appliance runs in Heat mode condition, the indoor fan motor operation is shown as following to prevent cold air from blowing out of the unit. Refer to figure 304.
When the anti-cold air system is activated by the system logic during compressor operation, the louver swings to the cold air protection position. The louver recovers to the original position after the air volume change to LOW. When the room temperature reaches the setting temperature, the compressor will turn off, and the air flow changes to LOW, the louver swings to the cold air protective position to prevent the air drop into human body directly. When the indoor pipe coil temperature drops continuously, it will turn on the cold air protective system in Extra-LOW or stop the fan motor.
The indoor fan motor is only controlled by the signal of indoor pipe coil temperature, regardless of compressor run status (ON/OFF), even during first heat mode sequence.
The indoor fan motor will operate according to the different settings (High, Median, Low and Automatic) by the remote control, but the anti-cold air system has priority.
When the unit runs in the heat mode with the automatic setting at first time, the fan speed will be in the LOW setting. Refer to Figure 304.
When the difference between the setting temperature and the room temperature between 3.6˚F and 7.2˚F, the indoor fan speed will keep in current speed. Refer to figure 305.

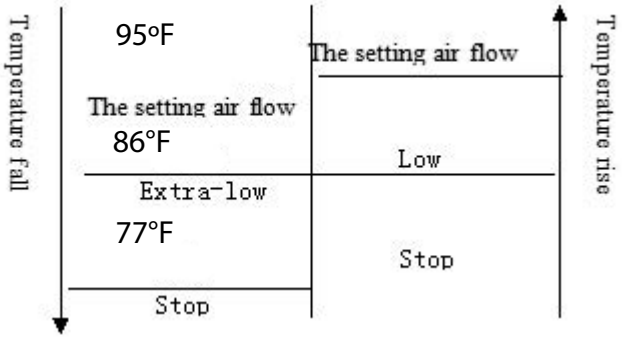


Figure 304

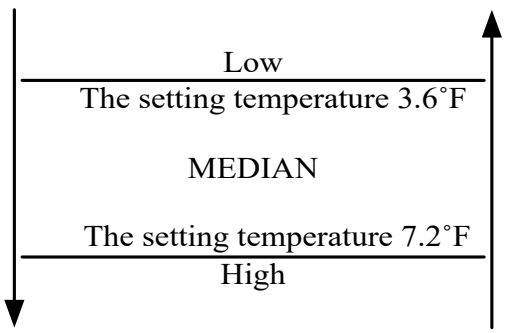


Figure 305

OPERATION

Unit Function

Air flow direction control

The horizontal louver is controlled by a step motor, press the SWING button to swing or stop the louver.

During the louver run in normal operation, the current position will be stored. When the appliance turns off and louver swings automatically to the default position, it will position at the default position plus 5º.

Outdoor fan

The outdoor fan speeds can be changed according to outdoor ambient temperatures.

Reversing Valve

State: It is energized in heating.

Switchover: When initially powered on for heating, the reversing valve is activated immediately.

In the change from cooling to heating, it needs an interval of 50 seconds for the reversing valve to change over from being interrupted to being activated.

The super function (option)

In cooling mode, when you press the SUPER button by remote control, the unit will operate for 15 minutes with the following setting:

The set temperature is 61°F;

The fan speed with highest speed;

The compressor runs with high frequency.

Dehumidifying mode

The dehumidifying mode is illustrated as follows:

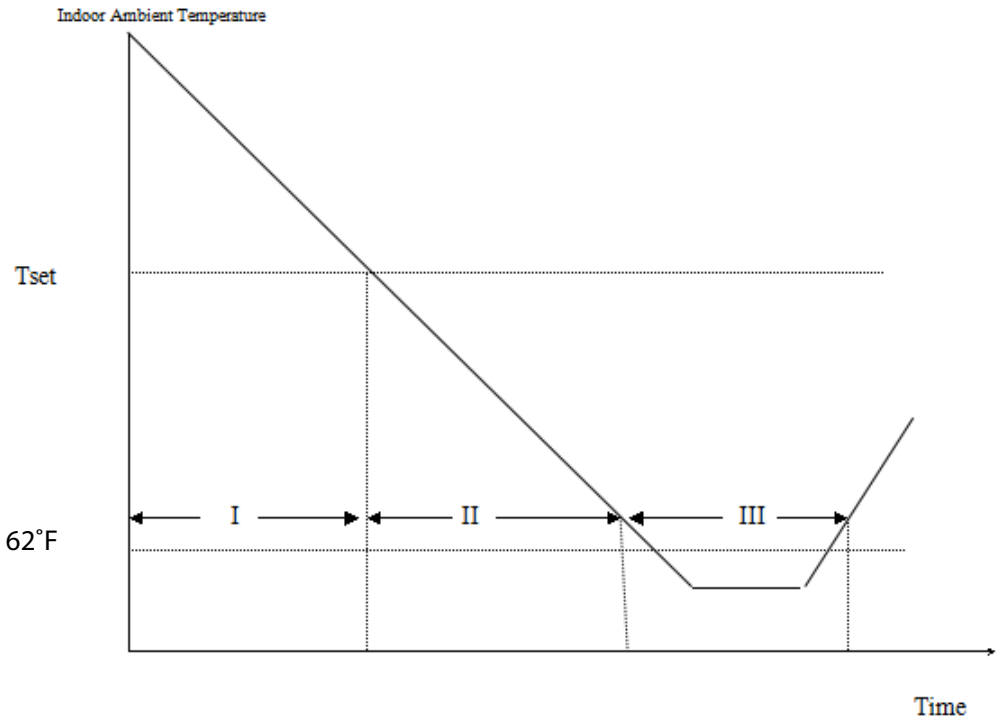


Figure 306

Dt(°F)	f(Hz)
32	30
33	30
34	40
35	50
36	60

Figure 307

Dehumidifying area I: Operation at the frequency in the range (30–60Hz) according to Dt (T indoor ambient-Tset).

Dehumidifying area II: The compressor stops for 5 minutes and then operates for 5 minutes at the lowest frequency.

Dehumidifying area III: The compressor stops.

Fan Only Mode Operation

During the appliance run in this mode, the compressor and outdoor fan stop, the indoor fan operate under the pre-setting of air volume, and the louver swing, and the indoor fan speed same as the Heating Mode.

OPERATION

Special Function Instruction

Conditions of anti-freezing prohibition of frequency rising:

Condition 1: in the case of anti-freezing frequency decreasing, the temperature of indoor heat exchanger rises to "anti-freezing frequency decreasing temperature".

Condition 2: in normal operation, the temperature of indoor heat exchanger reaches "anti-freezing prohibition of frequency rising temperature".

If either of the above two conditions is met, the product will enter anti-freezing prohibition of frequency rising state.

Anti-freezing prohibition of frequency rising operation:

The compressor is kept at the current frequency, which may decrease according to situations while cannot rise. The outdoor fan runs.

Condition for the end of anti-freezing prohibition of frequency rising state: when the temperature of indoor heat exchanger rises to "anti-freezing releasing temperature", the state of anti-freezing prohibition of frequency rising is released.

Conditions for defrosting:

A: When the heating compressor consecutively runs for 40 minutes (EEPROM setting value at the current operating mode);

B: If the ambient temperature minus the temperature of coiled pipe is equal to or higher than six degrees centigrade (EEPROM setting value in the current operating mode);

C: If the temperature of coiled pipe is equal to or lower than minus two degrees centigrade (EEPROM setting value in the current operating mode);

If the above three conditions are met simultaneously, defrosting begins.

Defrosting actions:

The compressor stops, and the outdoor fan stops after delay of 30 seconds; in 50 seconds the reversing valve is power off; and in 10 seconds the compressor starts and runs at "defrosting frequency".

Conditions for ending defrosting:

Defrosting is over if either of the below conditions is met.

A. The accumulated time of defrosting is longer than 12 minutes (EEPROM setting value in the current operating mode);

B. If the temperature of coiled pipe is equal to or higher than 14 degrees centigrade (EEPROM setting value in the current operating mode);

Actions of exiting the defrosting state:

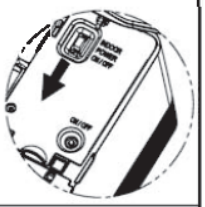
The compressor stops, and 50 seconds later the reversing valve opens, and another 10 seconds later the compressor and outdoor fan restart and begin normal operation.

MAINTENANCE

Front panel and shell maintenance

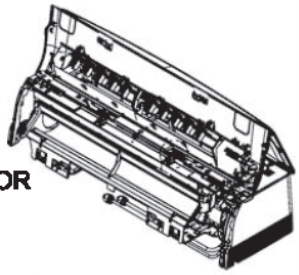
1 **Cut off the power supply by moving the power switch in the direction of the arrow.**

Note: Turn off the appliance first before cutting off the power supply.



2

Open the front panel and the front shell refer to Fig.9~Fig.12 of INDOOR UNIT INSTALLATION.



3 **Wipe with a soft and dry cloth.**

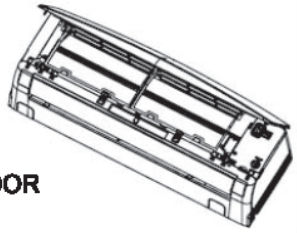
Use soft moisture cloth to clean if the front panel is very dirty.

4 **Never use volatile substance such as gasoline or polishing powder to clean the appliance.**

5 **Never sprinkle water onto the indoor unit**

6

Close the front panel and the front shell refer to Fig.22~Fig.26 of INDOOR UNIT INSTALLATION.



Air filter maintenance

It is necessary to clean the air filter after using it for about 200 hours.

Clean it as follows:

1 **Stop the appliance and remove the air filter.**

1.Open the front panel.
2.Press the handle of the filter gently from the front.
3. Grasp the handle and slide out the filter.

2 **Clean and reinstall the air filter.**

If the dirt is conspicuous, wash it with a solution of detergent in lukewarm water. After cleaning, dry well in shade.

3 **Close the front panel again.**

■ ***Clean the air filter every two weeks if the air conditioner operates in an extremely dusty environment.***

Fig. 501

MAINTENANCE

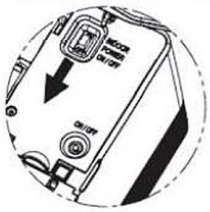
⚠ **The following is a deep cleaning and must be completed by a professional.**

⚠ **Users are strictly forbidden to operate privately, otherwise they will be at their own risk.**

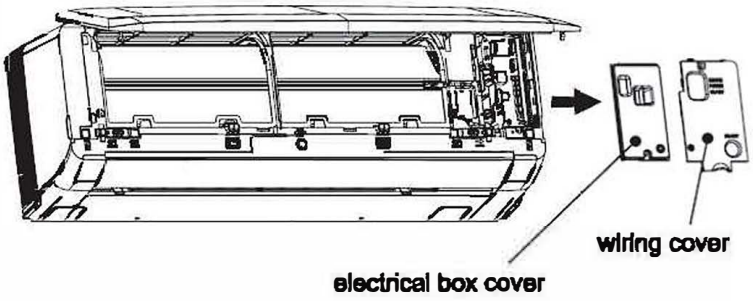
Front shell, air duct and fan maintenance

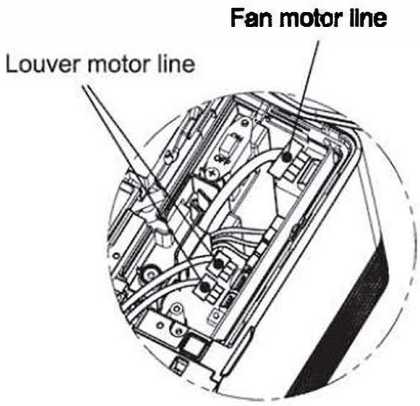
1 **Cut off the power supply by moving the power switch in the direction of the arrow.**

Note: Turn off the appliance first before cutting off the power supply.



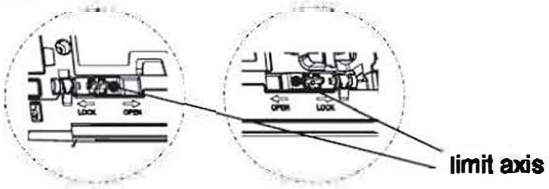
2 **1. Remove the wiring cover and the electrical box cover.**
2. Disconnect the fan motor line and the louver motor line.

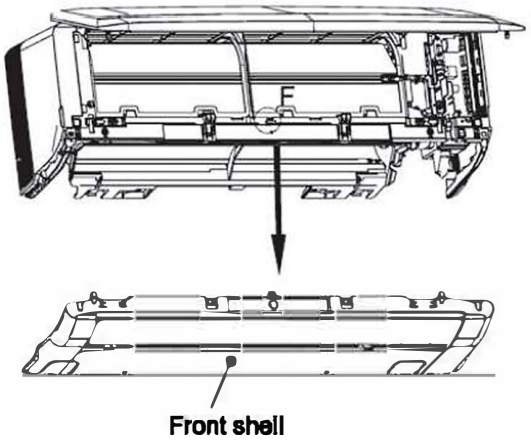




3 **1. Open the screw covers and remove the screws refer to Fig.414 of INDOOR UNIT INSTALLATION.**
2. Open the limit axes.
3. Remove the front shell for cleaning.

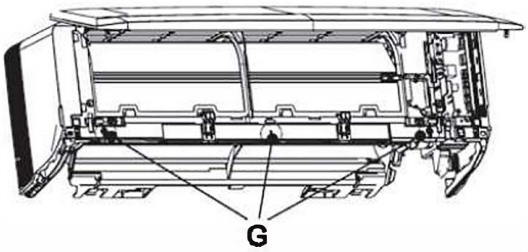
Note: Pay attention to the limit of F position, some models have two places.
Note: when you want to clean the front shell with clean water, you must first remove all the motors on the front shell.





4 **Remove the screws of the air duct.**
(G position and H position)

Note: Some models do not have H position screws.



MAINTENANCE

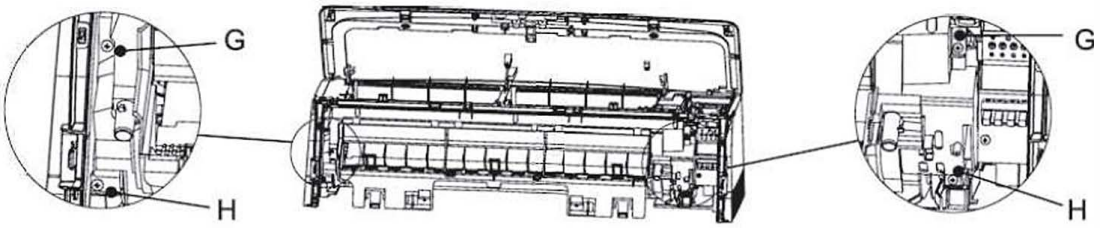
⚠ **The following is a deep cleaning and must be completed by a professional.**

⚠ **Users are strictly forbidden to operate privately, otherwise they will be at their own risk.**

Front shell, air duct and fan maintenance

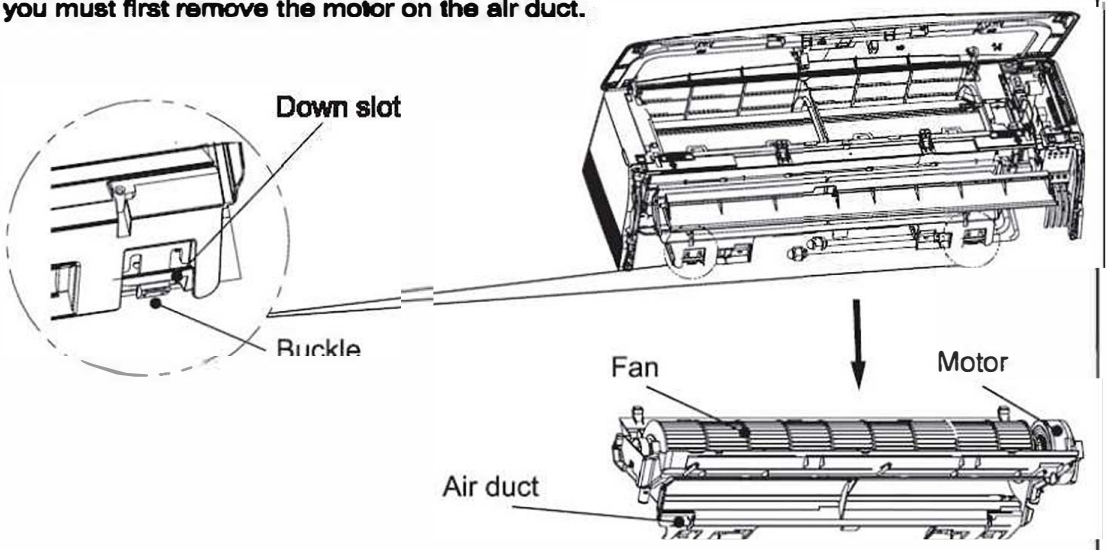
Remove the screws of the air duct. (G position and H position)

Note: Some models do not have H position screws.



5 **1. Press the 2 buckles of the air duct to disengage it from 2 down slots of the mounting plate.**
2. Remove the air duct.

Note: when you want to clean the air duct and the fan with clean water, you must first remove the motor on the air duct.



6 **After cleaning, install the machine against the disassemble sequence.**

Note: If the front shell, the air duct and the fan are washed with water, they must be thoroughly dried before they can be installed.

TROUBLESHOOTING

Outdoor Unit

Diagnostic Codes _ Unit Not Running

When the unit has the following trouble and the compressor stops running, The LED of outdoor control board will show the error sequence automatically:

Outdoor Failure Description	LED1	LED2	LED3	the root cause my be one of the following
Mark description: the lights flash every two seconds for the following faults				
Outdoor coil temperature sensor faulted	ON	OFF	ON	a. The outdoor coil sensor connector loose. b. The outdoor coil temperature sensor failed. c. The outdoor control board failed.
Compressor exhaust temperature sensor faulted	ON	OFF	OFF	a. The compressor exhaust temperature sensor connector loose. b. The compressor exhaust temperature sensor failed. c. The outdoor control board failed.
Communication failure between the indoor unit and outdoor unit	OFF	OFF	BLINKS	a. The communication cable connector loose. b. The communication cable failed. c. The connection between the filter board and the outdoor control board is incorrect or loose. d. The connection between the filter board and the terminal is incorrect or loose. e. The indoor control board failed. f. The PFC board failed. g. The power board failed. h. The outdoor control board failed.
Current overload protection	ON	BLINKS	OFF	a. The fan motor run abnormally. b. The condenser and evaporator is dirty. c. The air inlet and outlet is abnormal.
Maximum current protection	ON	BLINKS	ON	a. The outdoor control board is short circuited. b. The drive board is short circuited. c. The other components are short circuited.
Communication error between outdoor unit and driver	OFF	ON	ON	a. The connection wires are loose. b. The outdoor board or drive board failed.
Outdoor EEPROM faulted	ON	ON	ON	a. The EEPROM chip is loose. b. The EEPROM chip inserted in wrong direction. c. The EEPROM chip failed.
Compressor exhaust temperature too high protection	OFF	BLINKS	ON	a. The compressor exhaust temperature sensor failed. b. The refrigerant of the unit is low.
Outdoor ambient temperature sensor faulted	ON	ON	OFF	a. The outdoor ambient temperature sensor connecter loose. b. The outdoor ambient temperature sensor failed. c. The outdoor control board failed.
Compressor shell high temperature protection	OFF	ON	BLINKS	a. The compressor exhaust temperature sensor connector loose. b. The refrigerant of the unit is low.
Anti-freeze protection with cooling or overload protection with heating in indoor unit	OFF	BLINKS	BLINKS	a. The indoor coil temperature sensor connector loose. b. The indoor coil temperature sensor failed. c. The indoor control board failed. d. The refrigerant system is abnormal.
Compressor drive faulted	BLINKS	OFF	BLINKS	a. The outdoor drive board failed. b. The compressor failed. c. The outdoor control board failed.
Outdoor fan motor locked rotor protection	BLINKS	BLINKS	ON	a. The connection of the outdoor fan motor is loose. b. There is something blocking the outdoor fan. c. The fan motor failed. d. The outdoor control board failed.
Outdoor coil anti-overload protection with cooling	OFF	ON	OFF	a. There is too much refrigerant. b. The outdoor fan motor failed. c. The outdoor fan is broken. d. The condenser is dirty. e. The air inlet and air outlet of the indoor unit and the outdoor unit is not normal.

TROUBLESHOOTING

Outdoor Unit
Diagnostic Codes - Unit Not Running

Outdoor Failure Description	LED1	LED2	LED3	the root cause my be one of the following
IPM module protection	OFF	BLINKS	OFF	a. The IPM board failed. b. The outdoor fan is broken. c. The outdoor fan motor failed. d. The outdoor fan has been blocked. e. The condenser is dirty. f. The outdoor unit has been installed without standard.
PFC protection	BLINKS	OFF	OFF	a. The PFC failed. b. The outdoor drive board failed.
Compressor pre heating process	BLINKS	ON	BLINKS	it is normal mode in cold weather
Chip in outdoor board faulted	ON	OFF	BLINKS	a. Using the wrong drive board. b. Using the wrong compressor.
AC voltage higher or lower protection	ON	ON	BLINKS	a. The supply voltage is higher or lower than normal. b. The inner supply voltage of the unit is higher or lower than normal.
DC compressor start failure	BLINKS	BLINKS	OFF	a. The outdoor drive board failed. b. The compressor failed.
Outdoor ambient temperature too low or too high protection	BLINKS	OFF	OFF	a. Outdoor ambient temperature too low or too high.
There is a leak in the product.	BLINKS	ON	ON	a. There is a leak in the indoor b. There is a leak in the outdoor c. There is a leak in the connecting pipe
Mark description: the lights flash every two seconds for the following faults				
Protection against overheated outdoor radiator	BLINKS	OFF	OFF	a. Radiator sensors failed. b. Detection circuit of the sensor on the control panel fails
Protection of the system against too high pressure	BLINKS	BLINKS	OFF	a. The pressure switch fails b. The pressure detection switch on the control panel failed. c. The measured value of the system pressure exceeds the limit.
Protection of the system abnormal	OFF	BLINKS	ON	a. Check whether the outdoor valves are opened.

TROUBLESHOOTING

Outdoor Unit

Diagnostic Codes when Compressor is Running

THE FLASH IS 1 SECOND				
No.	LED 1	LED 2	LED 3	Reasons for the current operating frequency of the compressor is limited
1	BLINK	BLINK	BLINK	Normal frequency rising and decreasing, no limitation
2	OFF	OFF	ON	Frequency decreasing or prohibition of frequency rising caused by over-current
3	OFF	ON	ON	Frequency decreasing or prohibition of frequency rising caused by anti-freezing of refrigeration or anti-overload in heating
4	ON	OFF	ON	Frequency decreasing or prohibition of frequency rising caused by too high compressor discharge temperature
5	ON	ON	ON	Operation at fixed frequency (in the case of capability measuring or compulsory operation at fixed frequency)
6	BLINK	OFF	OFF	Protective frequency decreasing against outdoor overload (over-power, over frequency conversion rate, over torque, detection of DC under-voltage)
7	ON	OFF	OFF	Frequency decreasing caused by indoor and outdoor communication fault
8	OFF	ON	BLINK	Frequency decreasing or prohibition of frequency rising protection against overload of outdoor coiled pipe
9	OFF	ON	OFF	Frequency decreasing or prohibition of frequency rising for power-saving when it is being used simultaneously with other appliances

TROUBLESHOOTING

Indoor Unit

Diagnostic Codes

When the unit has the following trouble and the compressor stops running, The LED of outdoor control board will show the error sequence automatically:

The indoor display board will show the error code automatically when the unit has the following trouble:
When the unit has the following trouble and the compressor stops running, press the sleep button on the remote controller for 10 times in ten seconds and the 7-segment tube of the display board will show the error code as the following, if two malfunctions happened at the same time, the sleep button needs to be pressed 10 times again, the LED will show the other error code.
Refer to the remote controller which the sleep key can set into 4 different combination ways , when using to check the error codes only takes effect for pressing the sleep key 10 times in ten seconds instead of 4 times.
NOTE: If the troubleshooting inquiry display by 7-segment tube, then the error code will be displayed, otherwise only the LED of the display board can show.
The failure is detected when the room temperature sensor broken or shorted over 5 sec.
The failure is detected when the temperature sensor of heater exchange broken or shorted over 5 sec.
The failure is detected when each setting data is not match after the EEPROM self-check two times.
The failure occurs when the grounding signal is not detected after the appliance power ON.

Error Code	Content	The root cause is may be one of the following
EA	The error code will display when the communication between display board and control board is interrupted.	a. The connection between the display board and control board is loose. b. The indoor control board failed. c. The wiring of the display board failed
0	Normal	
1	The failure for temperature sensor of outdoor coil	a. The outdoor temperature sensor loose. b. The outdoor temperature sensor failed. c. The indoor control board failed.
2	Compressor exhaust temperature sensor in trouble	a. The compressor exhaust temperature sensor connector loose. b. The compressor exhaust temperature sensor failed. c. The outdoor control board failed.
5	IPM module protection	a. The IPM board failed. b. The outdoor fan is broken. c. The outdoor fan motor failed. d. The outdoor fan has been blocked. e. The condenser is dirty.
6	AC voltage higher or lower protection	a. the supply voltage is higher or lower than normal. b. The inner supply voltage of the unit is higher or lower than normal.
7	Communication failure between the indoor unit and outdoor unit	a. The communication cable is disconnected or loose. b. The connection between the filter board and the terminal is incorrect or loose c. The communication cable failed. d. The connection between the filter board and the outdoor control board is incorrect or loose. e. The indoor control board failed. f. The PFC board failed. g. The power board failed. h. The outdoor control board failed.
8	Current overload protection	a. The fan motor runs abnormally. b. The condenser and evaporator is dirty. c. The air inlet and outlet are abnormal.
9	Maximum current protection	a. The outdoor control board is short circuited. b. The drive board is short circuited. c. Other components are short circuited.
10	Communication trouble between outdoor unit and driver	a. The connection wires loose. b. The outdoor board or drive board failed.
11	Outdoor EEPROM in trouble	a. The EEPROM chip is loose. b. The EEPROM chip inserted incorrectly. c. The EEPROM chip failed.

TROUBLESHOOTING

Diagnostic Codes
Indoor Unit

Error Code	Content	The root cause is may be one of the following
12	Outdoor ambient temperature too low or too high protection	Outdoor ambient temperature too low or too high.
13	Compressor exhaust temperature too high protection.	a. The compressor exhaust temperature sensor failed. b. The unit refrigerant charge is low
14	Outdoor ambient temperature sensor failure.	a. The outdoor ambient temperature sensor connector loose. b. The outdoor ambient temperature sensor failed. c. The outdoor control board failed.
15	Compressor shell temperature too high protection	a. The compressor exhaust temperature sensor connector loose. b. The unit refrigerant charge is low.
16	Anti-freeze protection with cooling or overload protection with heating in	a. The indoor coil temperature sensor connector loose; b. The indoor coil temperature sensor failed.. c. The indoor control board failed.. d. The refrigerant system is abnormal
17	PFC protection	a. The PFC failed.; b. The outdoor drive board failed.
18	DC compressor start failure	a. The outdoor drive board failed.; b. The compressor failed.
19	Compressor drive failure.	a. The outdoor drive board failed.; b. The compressor failed. c. The outdoor control board failed.
20	Outdoor fan motor locked rotor protection.	a. The connection of the outdoor fan motor is loose. b. There is something blocking the outdoor fan. c. The fan motor failed. d. The outdoor control board failed.
21	Outdoor coil anti-overload protection with cooling.	a. The unit refrigerant charge is excessive. b. The outdoor fan motor failed. c. The outdoor fan is broken. d. The condenser is dirty. e. The air inlet and air outlet of the indoor unit and the outdoor unit is not normal.
22	Compressor pre heating process	It is normal mode in cold weather.
23	There is a leak in the product	a. There is a leak in the indoor b. There is a leak in the outdoor c. There is a leak in the connecting pipe
24	Outdoor board chip failure.	a. Using the wrong drive board; b. Using the wrong compressor
26	Overheated outdoor radiator	a. Radiator sensor fails. b. Detection circuit of the sensor on the control panel fails.
27	Protection against too high system pressure	a. The pressure switch fails. b. The pressure detection switch on the control panel fails. c. The measured value of system pressure exceeds the limit.
33	The failure for temperature sensor of indoor room	a. The indoor room temperature sensor loose. b. The indoor room temperature sensor failed. c. The indoor control board failed.
34	The failure for temperature sensor of indoor coil temperature	a. The indoor coil temperature sensor loose. b. The indoor coil temperature sensor failed. c. The indoor control board failed.

TROUBLESHOOTING

Diagnostic Codes
Indoor Unit

Error Code	Content	The root cause is may be one of the following
36	Communication failure between the indoor unit and outdoor unit	a. The communication cable connector loose. b. The connection between the filter board and the terminal is incorrect or loose. c. The communication cable failed. d. The connection between the filter board and the outdoor control board is incorrect or loose. e. The indoor control board failed. f. The PFC board failed. g. The power board failed. h. The outdoor control board failed.
38	Indoor EEPROM failure	a. The EEPROM chip loose; b. The indoor control board failed.
39	Indoor fan motor runs abnormally.	a. Something blocking the indoor fan motor. b. The fan motor cord is disconnected or loose. c. The fan motor failed. d. The indoor control board failed.
41	The failure for Indoor grounding protection.	The indoor control board failed.
77	Wi-Fi Connection Enabled	Cycle Power on/off

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

Compressor Fault Isolation

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.

Electric Filter Board Fault Isolation

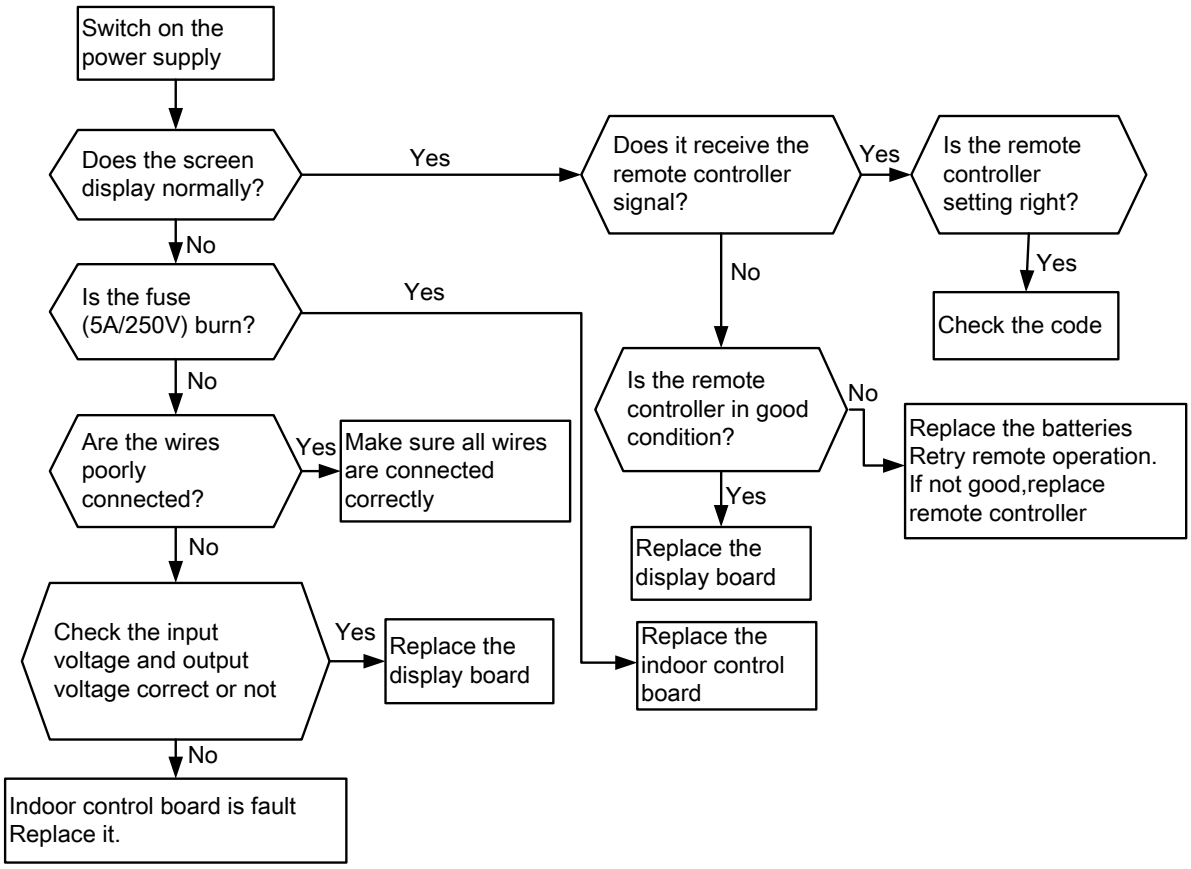
Visual examination: as the circuit is simple, the connection may be checked visually to see whether any loose or poor connection.
Voltage test: the voltage at the input end shall be the same as the voltage at the output end.

Electrical Communication Fault ISOLATION

1. Determine whether the connecting cables and tether cables of indoor/outdoor units are correctly wired. If not, change wiring order and test connection.
2. Determine whether there is loose connection.
Fasten the connection in the case of loose connection and then conduct verification.
3. Measure the voltage between SI and N with multi-meter and see whether the voltage fluctuates between 0 VDC and 24 VDC.
Replace indoor and outdoor control boards if there are no voltage fluctuations.

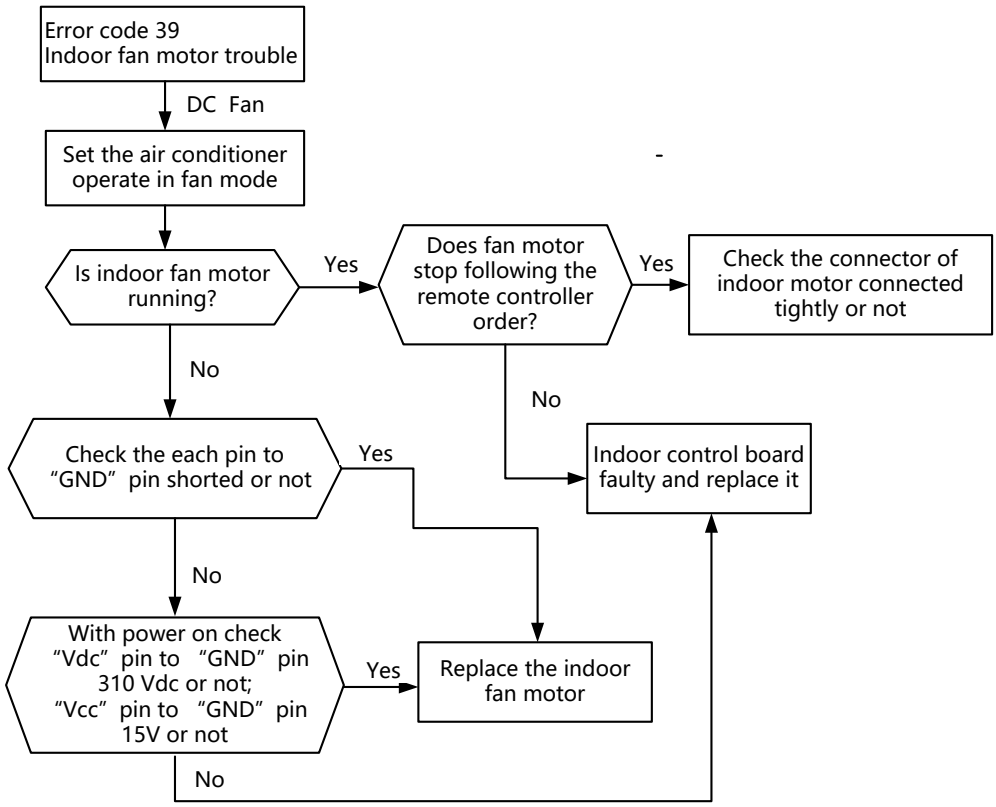
TROUBLESHOOTING

Unit Does Not Run



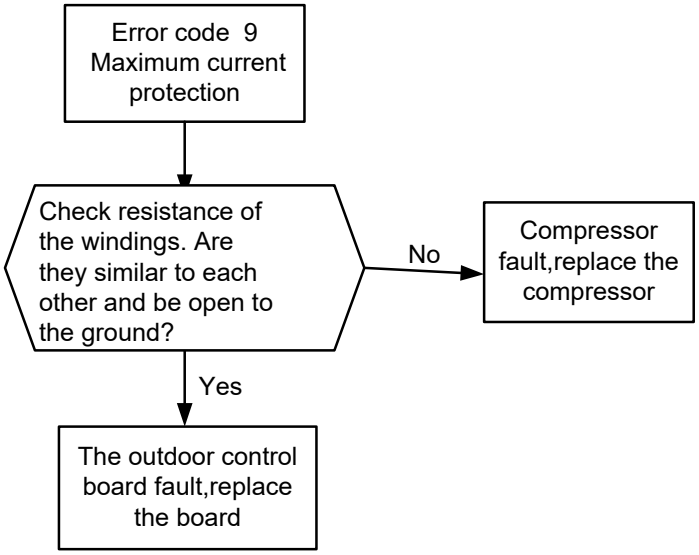
TROUBLESHOOTING

Error Code 39-DC Fan



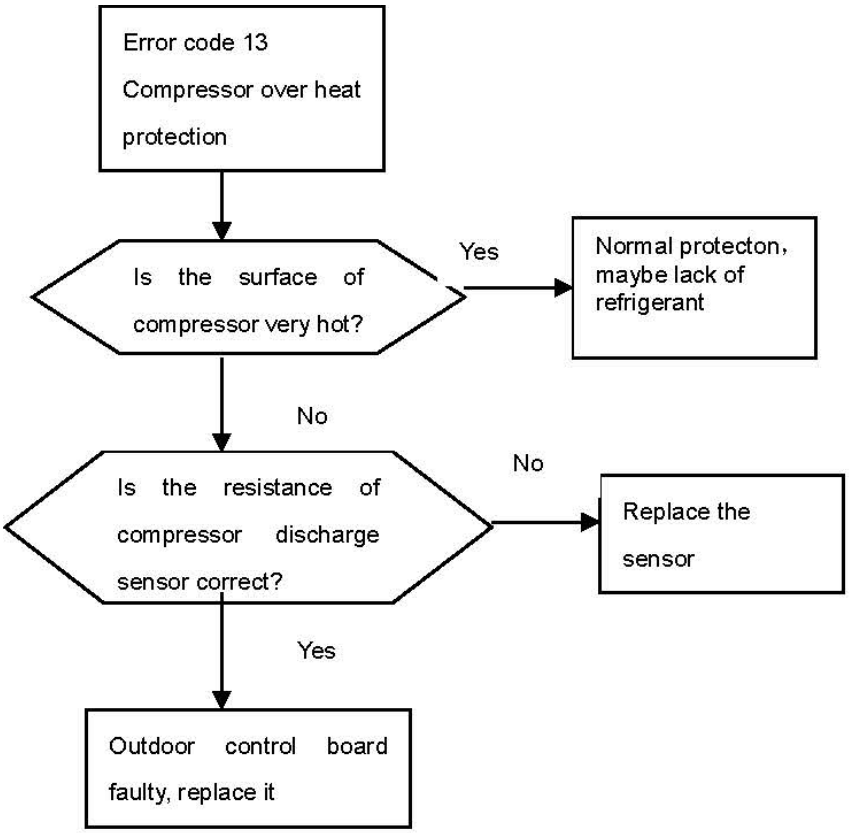
TROUBLESHOOTING

Error Code 9

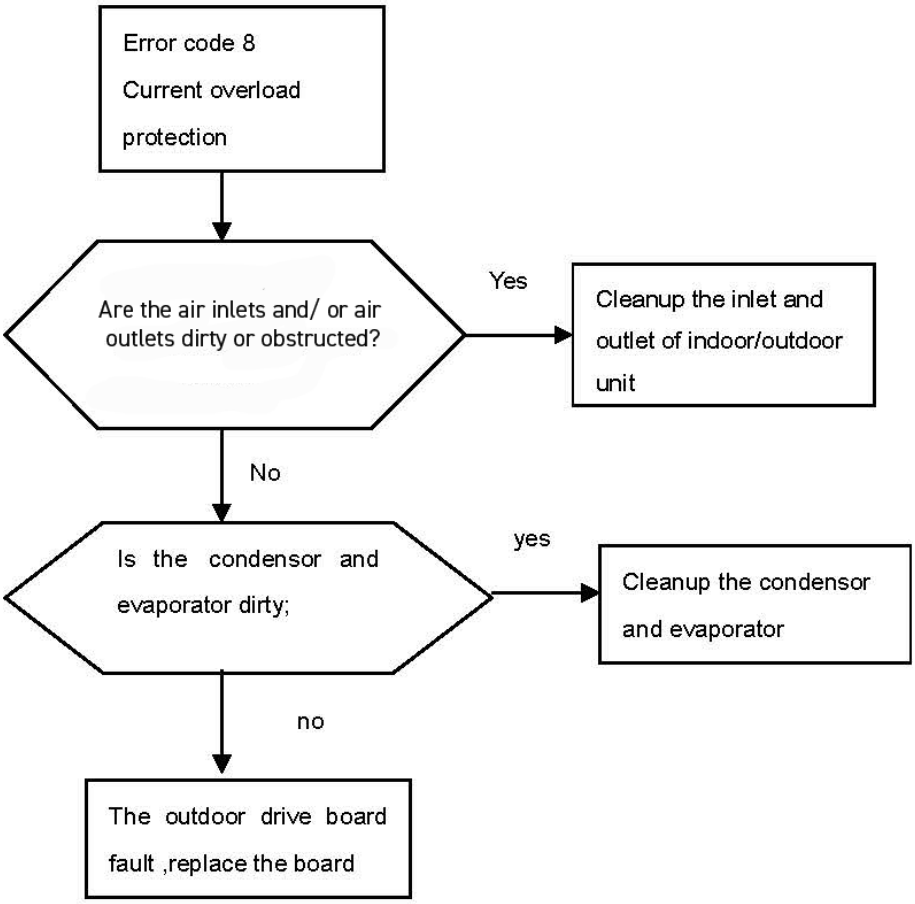


TROUBLESHOOTING

Error Code 13

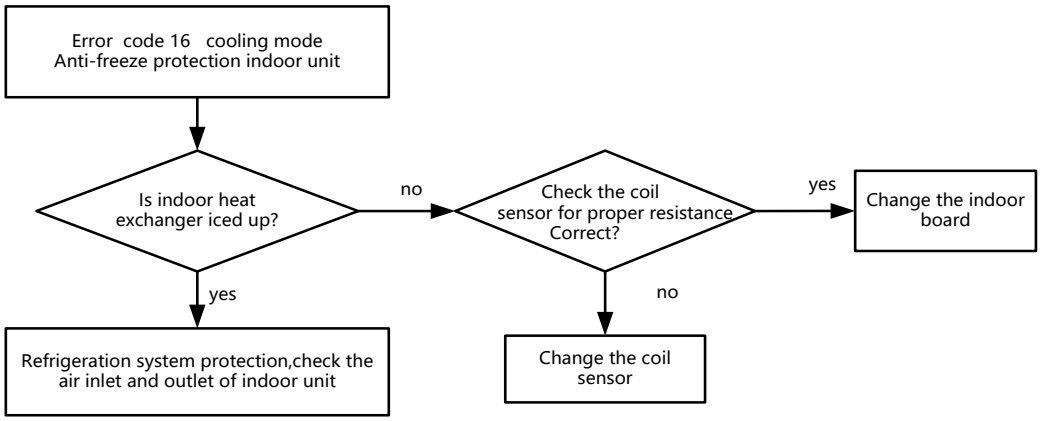


Error Code 8

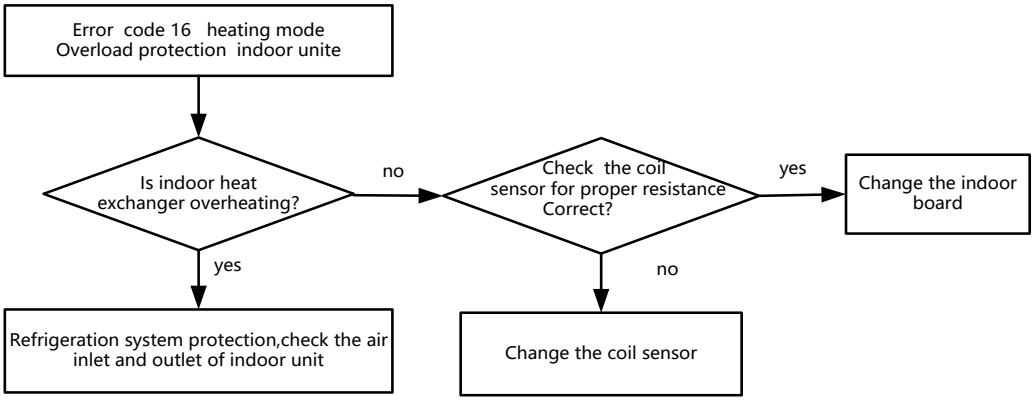


TROUBLESHOOTING

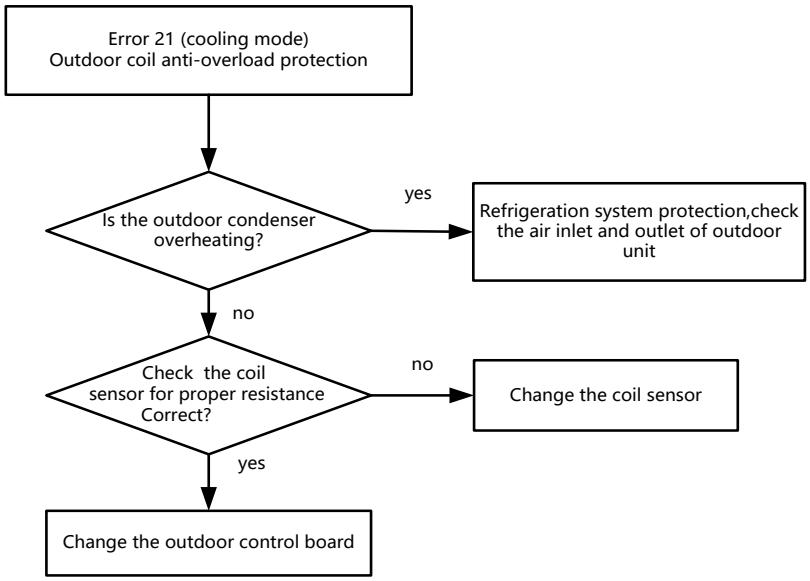
Error Code 16



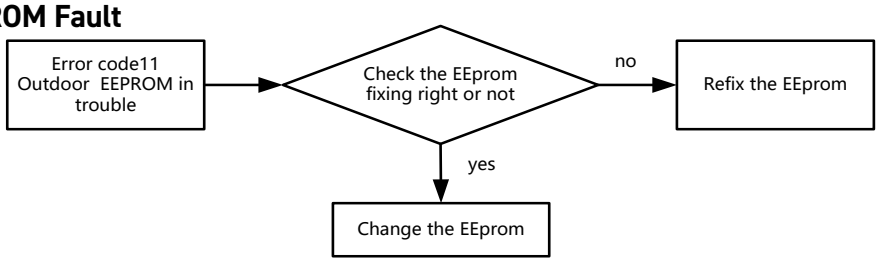
Error Code 16 Heating Mode



Error Code 21 Cooling Mode

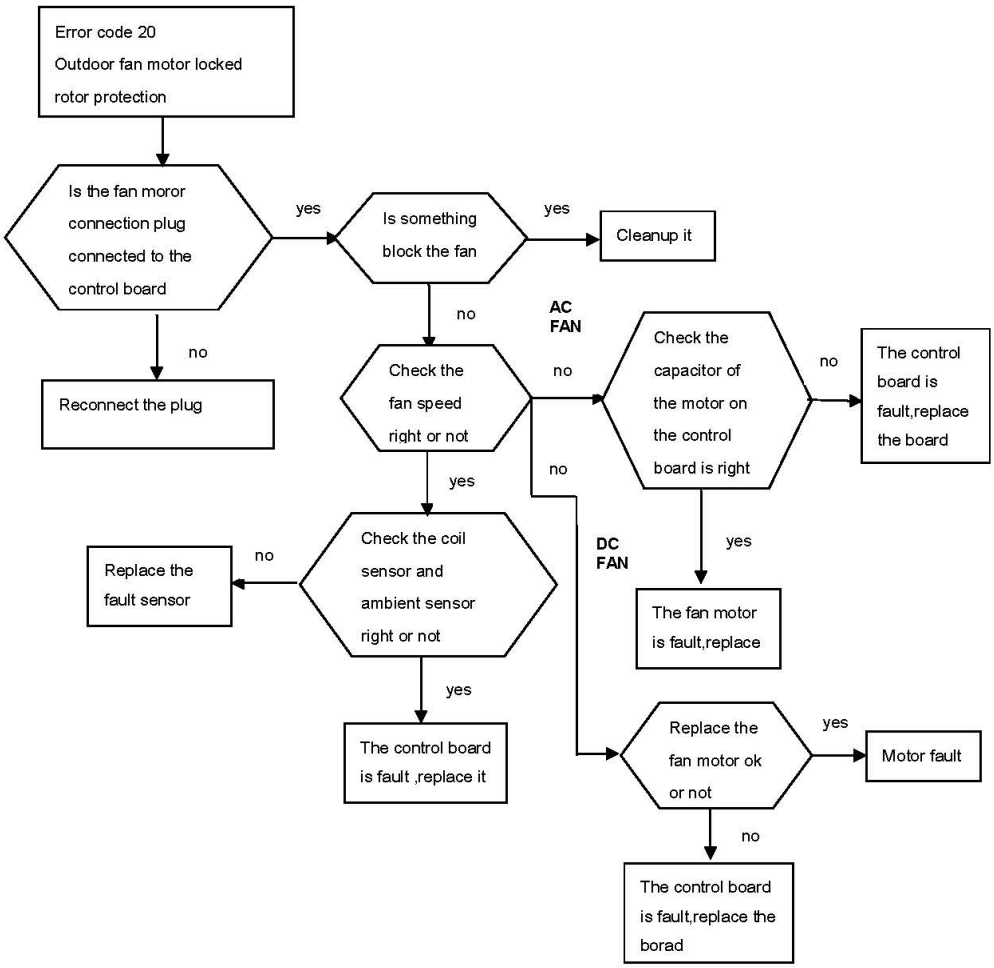


Error Code 11 EEPROM Fault

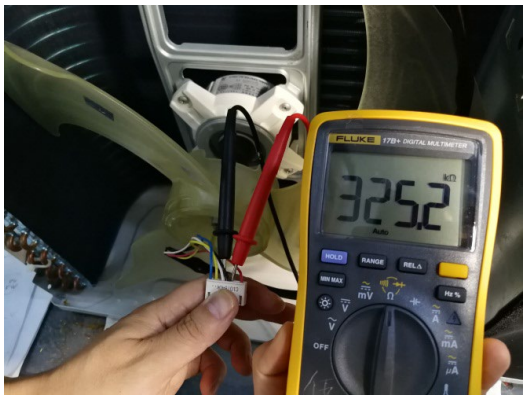


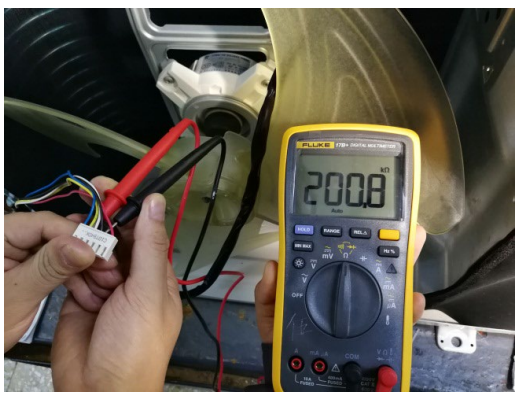
TROUBLESHOOTING

Error Code 20



DC fan motor test point:

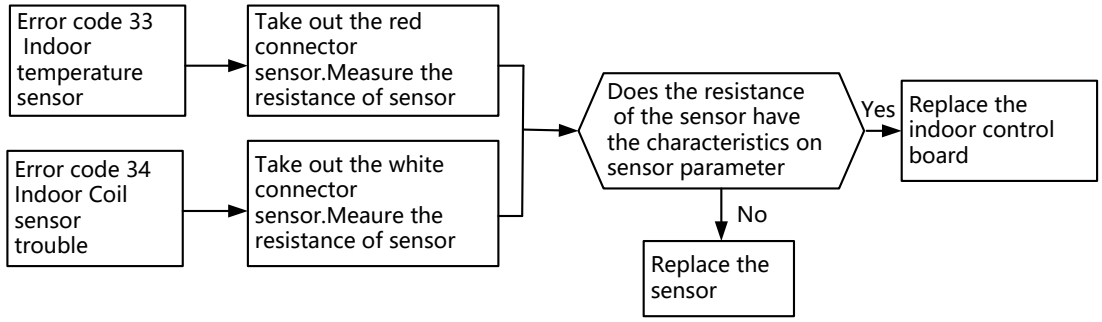




TROUBLESHOOTING

Error Code 33

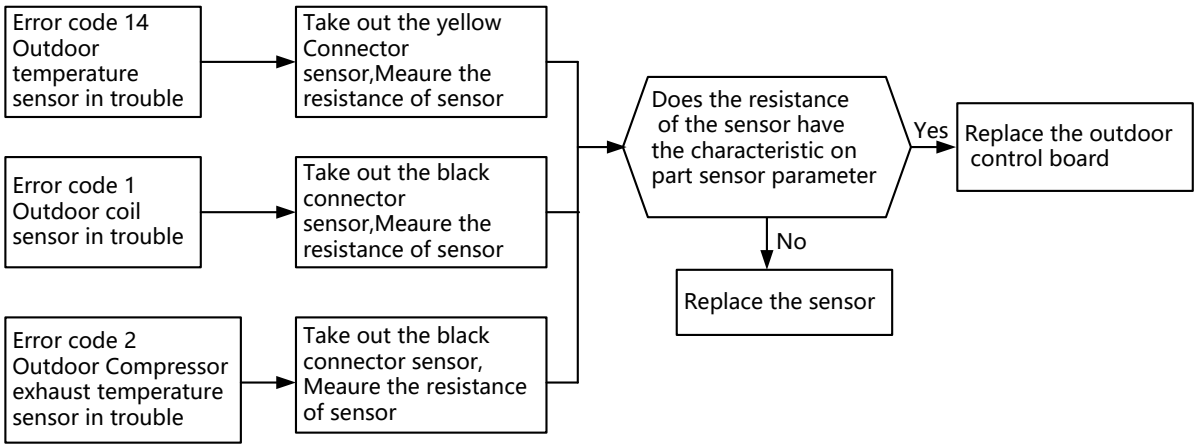
Error Code 34



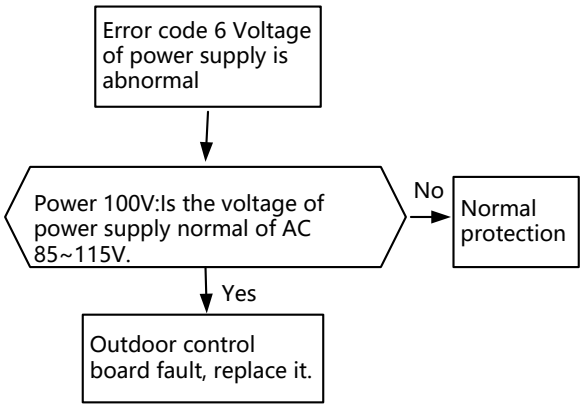
Error Code 14

Error Code 1

Error Code 2

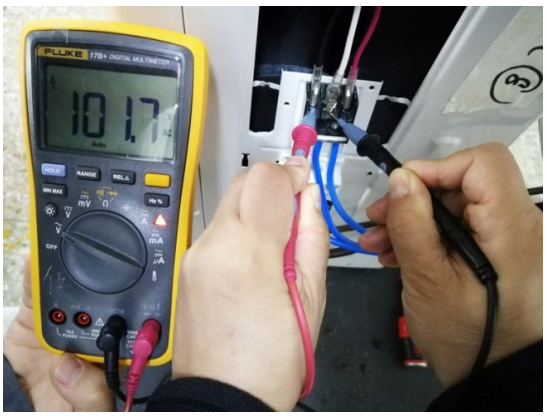


Error Code 6



The Voltage protection values is different according to the model

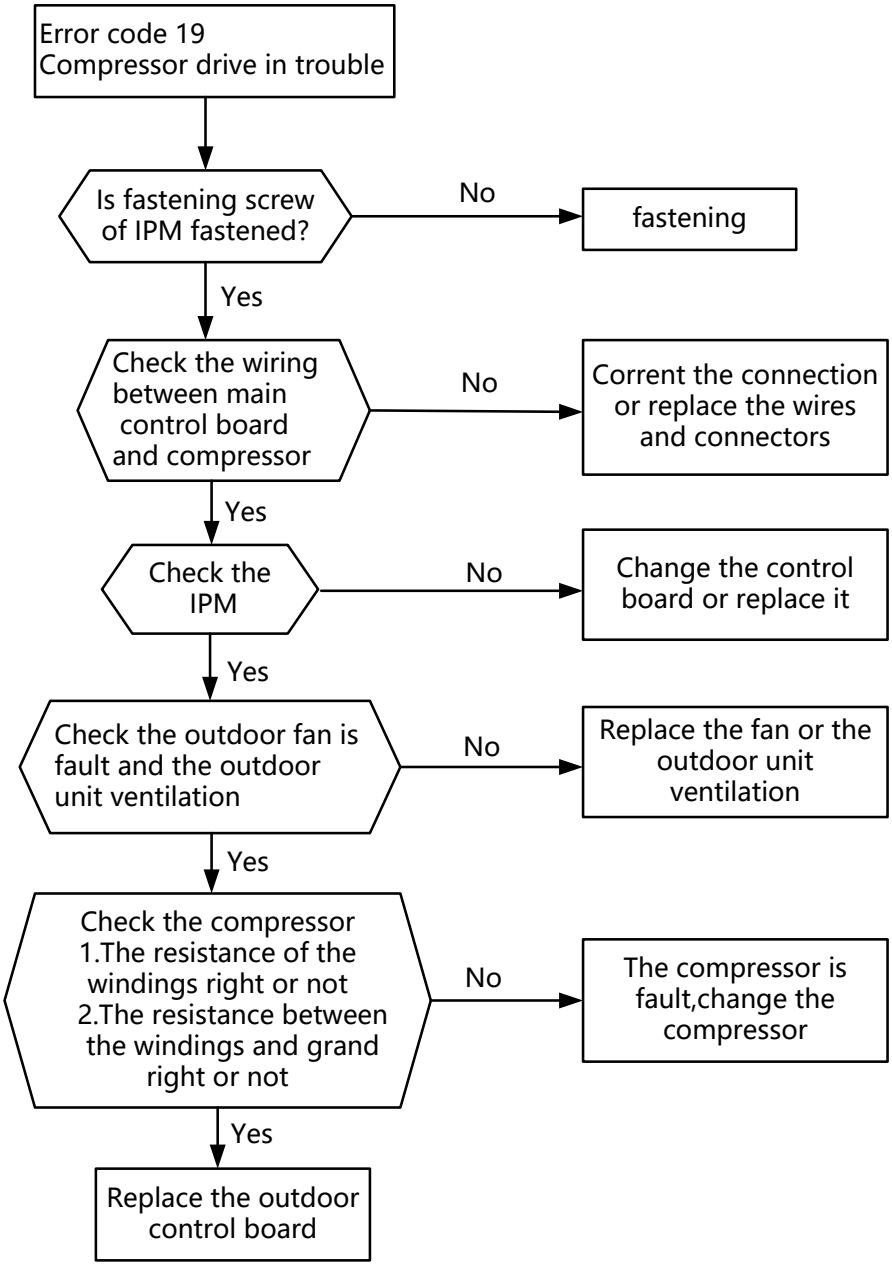
AC voltage test point:



Sensor test point:

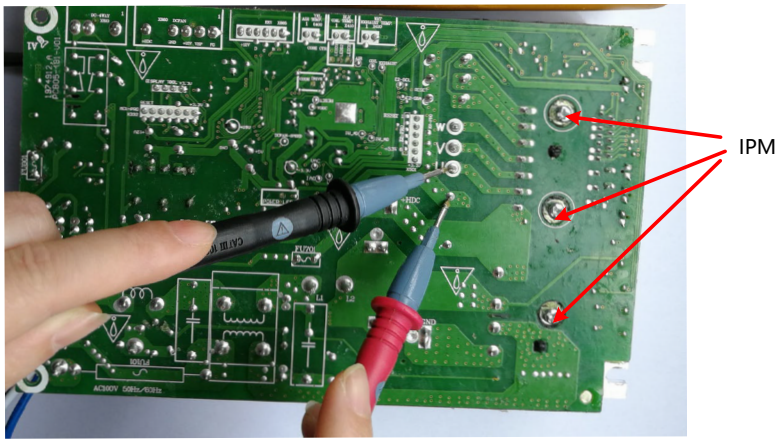
TROUBLESHOOTING

Error Code 19



test point:

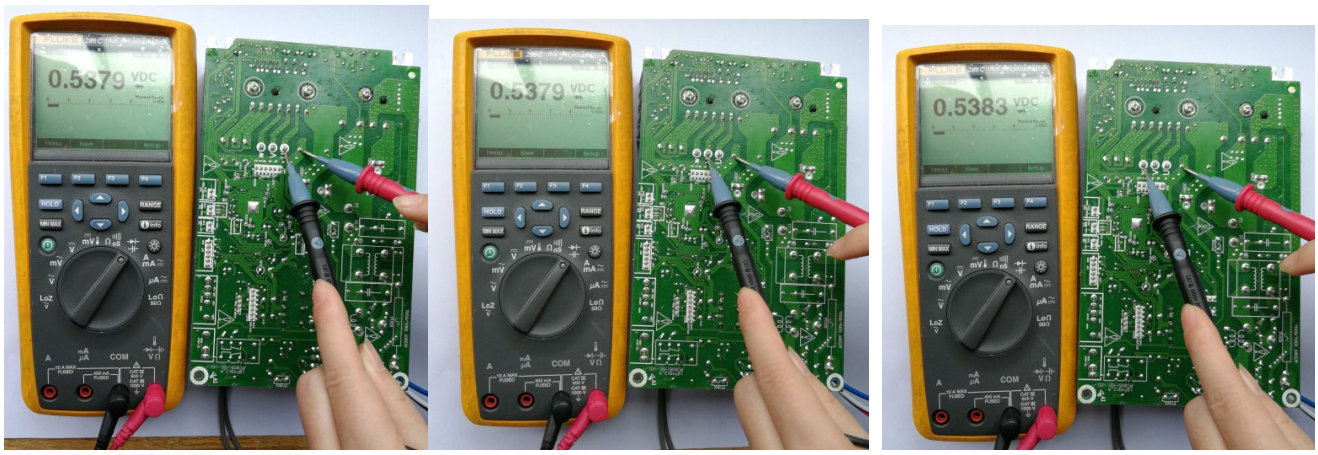
Check the screw of IPM fastening：



TROUBLESHOOTING

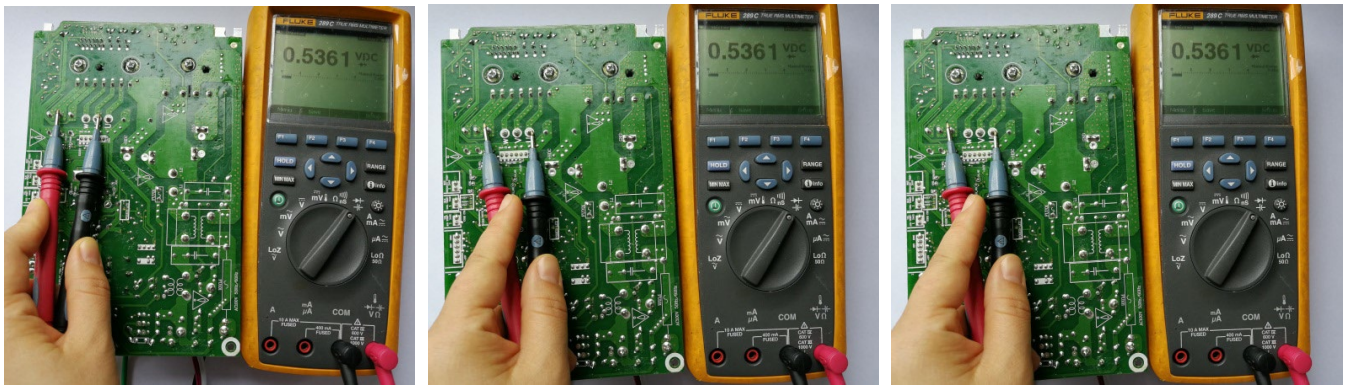
Error Code 19

Forward of IPM P-U/P-V/P-W test :



Reverse of IPM P-U/P-V/P-W test:

Forward of IPM N-U/N-V/N-W test :

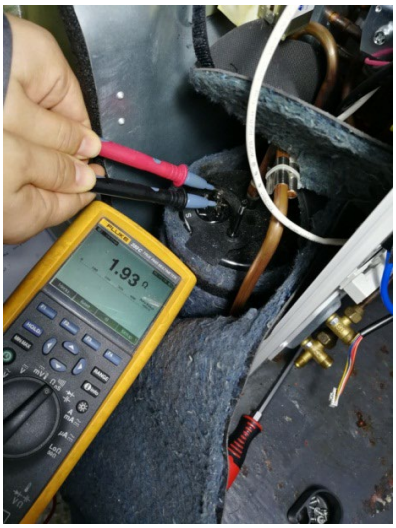


Reverse of IPM N-U/N-V/N-W test :

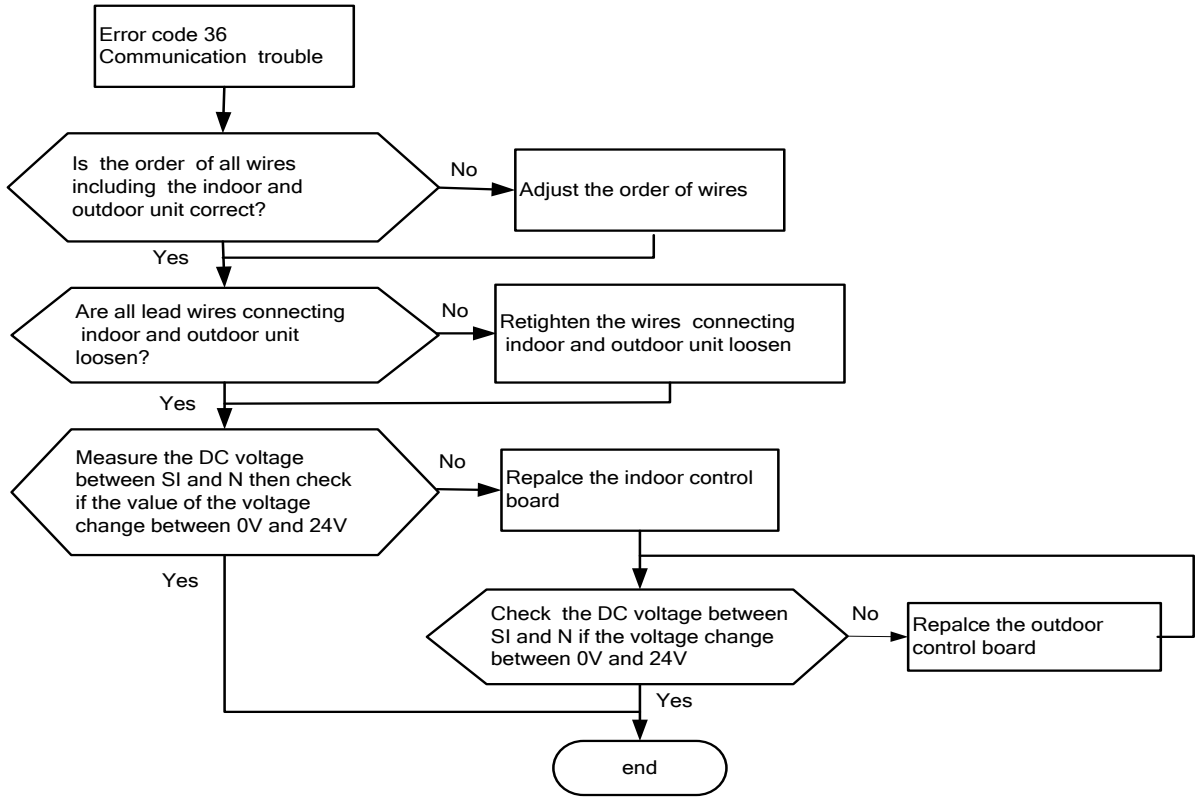
TROUBLESHOOTING

Error Code 19

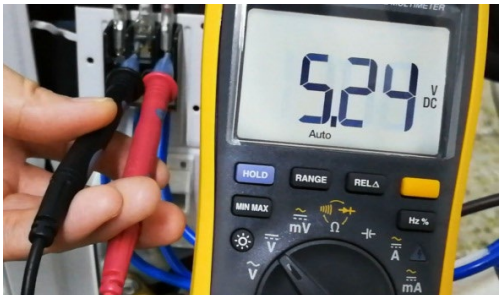
The resistance of the compressor U-W\V-W

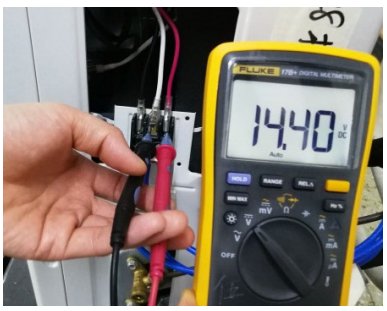


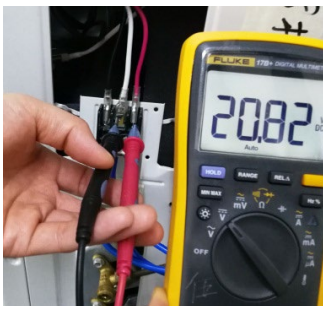
Error Code 36



SI and N test point:

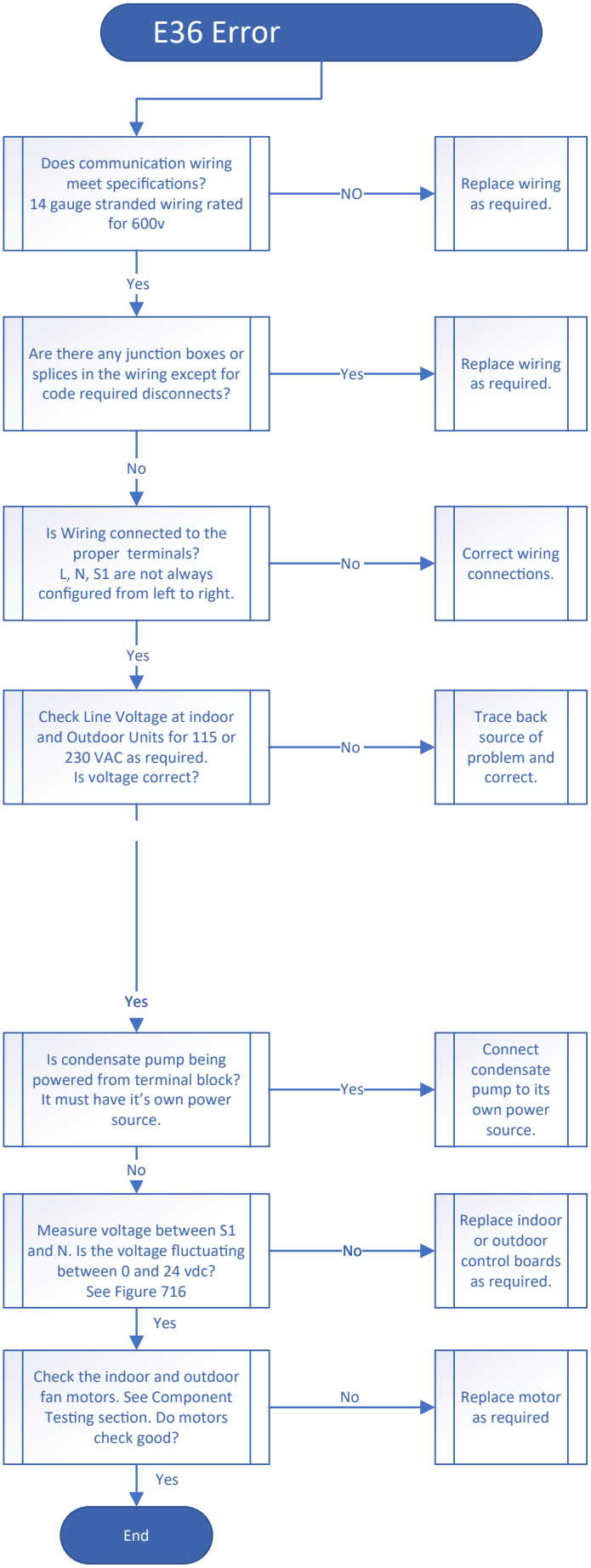






TROUBLESHOOTING

Error Code 36



See Figure 716

TROUBLESHOOTING

Error Code 36

Check from SI to Neutral on the outdoor unit or indoor unit

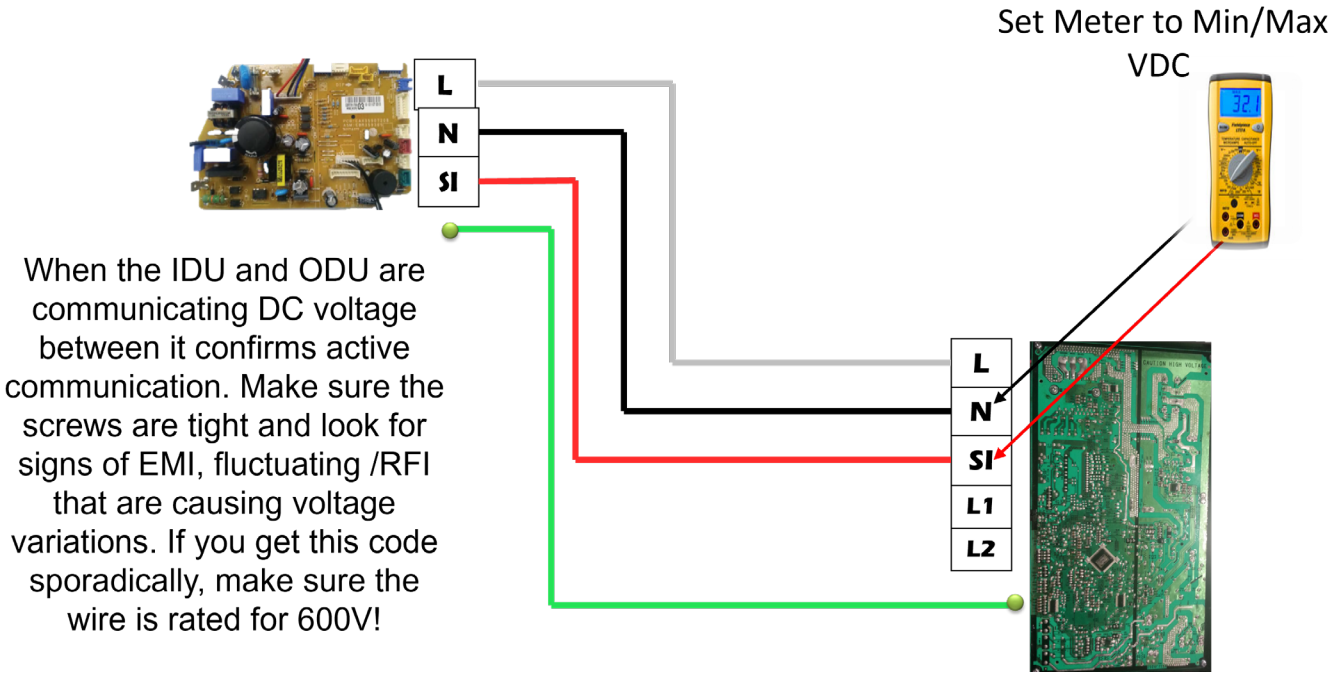


Fig. 716

TROUBLESHOOTING

Blank Display/ Indoor Micro Switch

If the Display is blank, check to see if the door is properly closed.

If the door is properly closed, confirm that you have proper line voltage to the indoor unit.

If the indoor unit door is not properly closed, or if the door micro switch has malfunctioned the display may be blank. See Figure 717
When the micro-switch is not engaged, and the power button is depressed, there will be no display and the system will not operate or respond in any way. See Figure 718.

When the Timer On/Clock button is pressed you will see a temperature on the display, but still no system operation. After a few seconds, the display will drop the temperature leaving just the Wi-Fi and Timer icons. Still no indoor unit operation. See Figure 719.

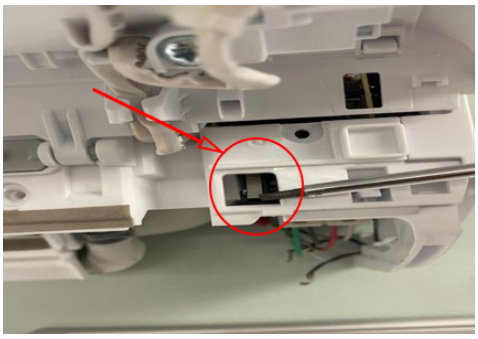


Fig. 717 (Door Micro Switch)

Fig. 718 (Blank Display)

TROUBLESHOOTING

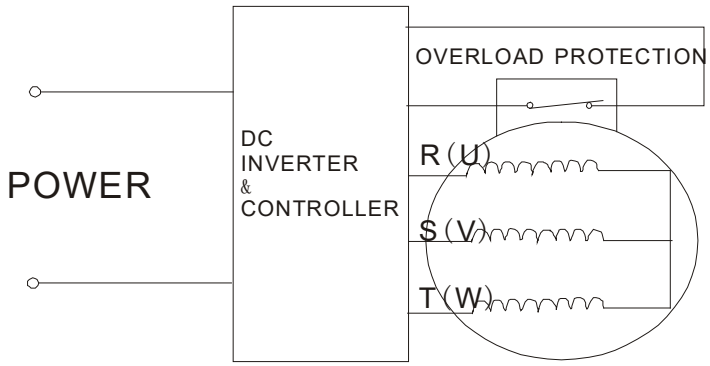
Blank Display/Indoor Unit Door Micro Switch

When the Timer On/Clock button is pressed you will see a temperature on the display, but still no system operation. After a few seconds, the display will drop the temperature leaving just the Wi-Fi and Timer icons. Still no indoor unit operation. See Figure 719.

Fig. 719 (Momentary Temp. Display)

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.

COMPONENT TESTING

Capillary Tube

⚠ WARNING

BURN HAZARD

Proper safety procedures must be followed, and proper protective clothing must be worn when working with a torch.

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

⚠ WARNING

CUT/SEVER HAZARD

Be careful with the sharp edges and corners. Wear protective clothing and gloves, etc.

Failure to do so could result in serious injury.

COOLING MODE

In the cooling mode of operation, high pressure liquid enters the check valve forcing the slide to close the opposite port (liquid line) to the indoor coil. This directs the refrigerant through the cooling capillary tube to the indoor coil.

HEATING MODE

In the heating mode of operation, high pressure refrigerant enters the check valve from the opposite direction, closing the port (liquid line) to the outdoor coil. The flow path of the refrigerant is then through the heating capillary to the outdoor coil.

Failure of the slide in the check valve to seat properly in either mode of operation will cause flooding of the cooling coil. This is due to the refrigerant bypassing the heating or cooling capillary tube and entering the liquid line.

Test the Capillary Tube and Check Valve Assy

Allow unit to run for ten minutes before checking temps in order for unit to stabilize. Units tested at low ambient temps may frost momentarily, but will return to normal once unit pressure stabilizes. If frost does not stop after 10 minutes then a possible restriction or low refrigerant charge may be present.

1. Check the capillary tube temperature by hand where the refrigerant enters the capillary tube. A partial restriction of the capillary tube will be indicated by frost or freezing in that area.
2. If check valve fails closed or the capillary tube is fully restricted, then pressure will increase and pressure switch will open if installed. If no pressure switch is installed, the unit will shut down due to the compressor overload opening. High discharge temperature will be present at the compressor.
3. If check valve fails open the unit will continue to run, but there will be little to no cooling or heating.

In normal operation, the tube will be cooler on the side where the coolant is entering the cap tube then where it exits. If the check valve is stuck open, there will be little difference in temperature.

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.

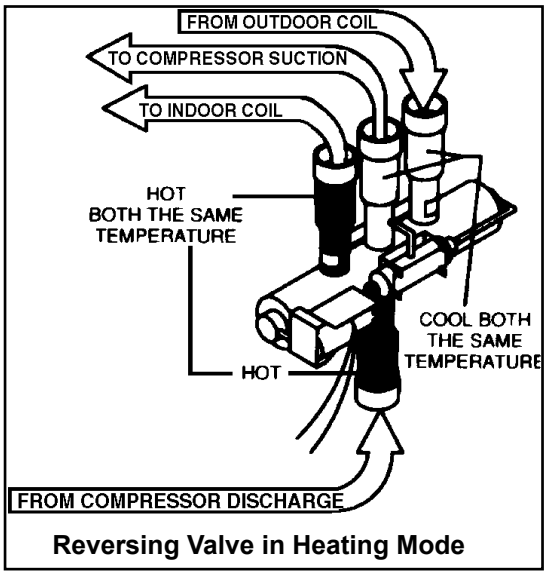
Proper safety procedures must be followed, and PPE must be utilized when working with refrigerants.

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.



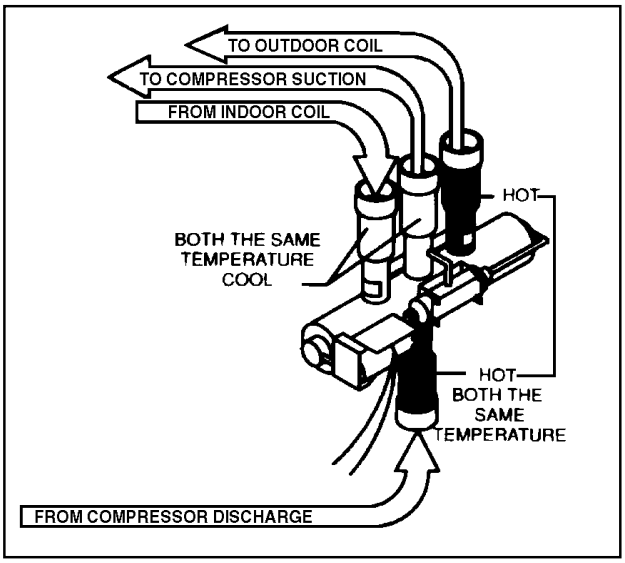
Reversing Valve in Heating Mode

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 Fan Motor Testing (230v models)

Power Check:

1. Turn unit on.
2. Check indoor fan connector on main PCB.

See Indoor Unit Main PCB Terminal ID

There are 5 wires:

Voltage for Power (Red) to Ground (Black) = 310 VDC

Motor Return Voltage (White) to Ground (Black) = 15 VDC

PWM (Yellow) to Ground (Black) = 0-6.5 VDC

3. 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.

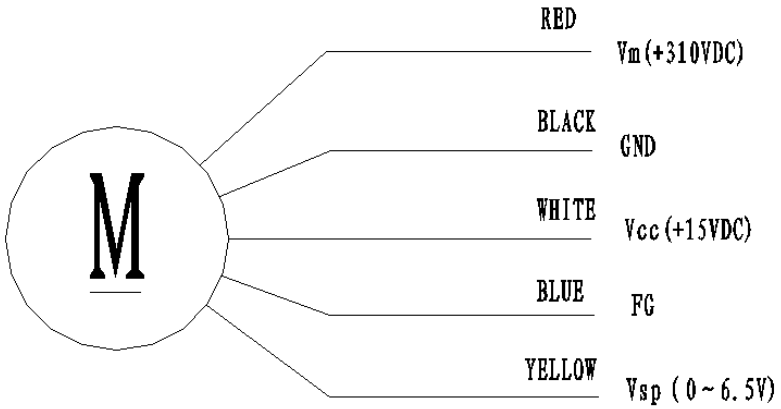
⚠ WARNING

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.

Indoor DC Fan Motor



1	RED	Vm(+310VDC)
2	--	--------
3	--	--------
4	BLACK	GND
5	WHITE	Vcc(+15VDC)
6	BLUE	FG
7	YELLOW	Vsp (0~6.5V)

COMPONENTS TESTING

Indoor Fan Motor Testing (115v models)

1. Apply power to unit.

2. Check voltage at Indoor motor control connector.
See Indoor Unit Main PCB Terminal ID
   a. White to ground VAC (Should read Supply line Voltage).
   b. If No voltage is present replace PCB.
   c. If only partial voltage is present ;
   Check voltage from black to ground should = 1/2 the supply voltage.
   d. If no voltage then fan motor internal overheat limit switch [100°C (212°F)] has opened. (If motor is cool to touch- replace motor), if hot proceed to next check.
   e. Check red to ground should = 1/2 supply voltage.
   If no voltage present replace PCB
3. Remove power from the unit.
4. Check fan motor windings resistance;

   a. Remove power from unit.
   b. Disconnect indoor motor control connector X842.
   c. Check resistance
      Red to Black = (red to white) +(black to white).
      Replace motor if windings check bad.

⚠ 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 Testing

Resistance Test.

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

See Outdoor Unit - Main PCB ID

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 0.1 ohms of each other.
A difference of more than 0.1 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..

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

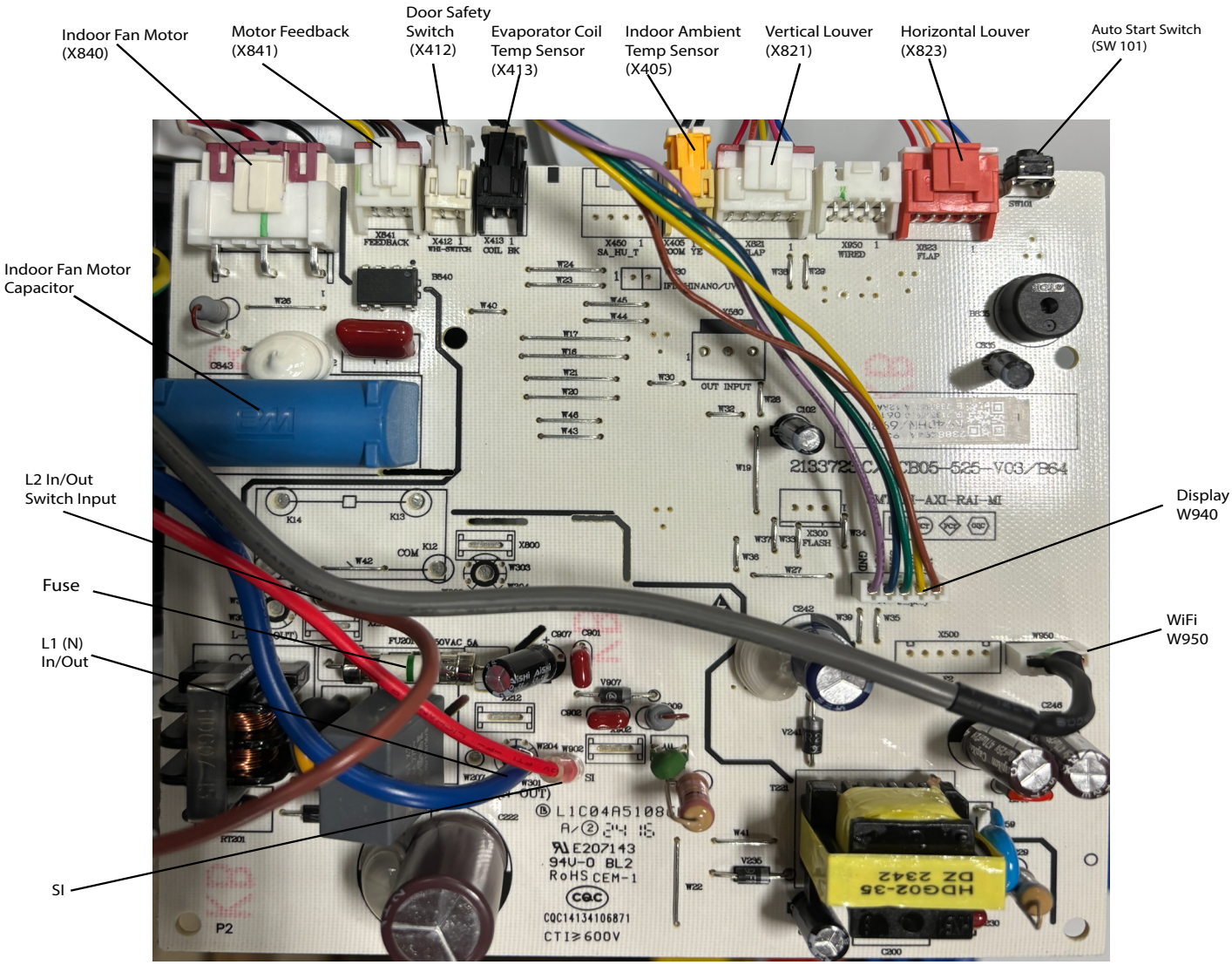
ELECTRIC SHOCK HAZARD
Turn off electric power before service or installation. Extreme care must be used, if it becomes necessary to work on equipment with power applied.

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

COMPONENTS TESTING

Indoor Unit Main PCB Terminal ID

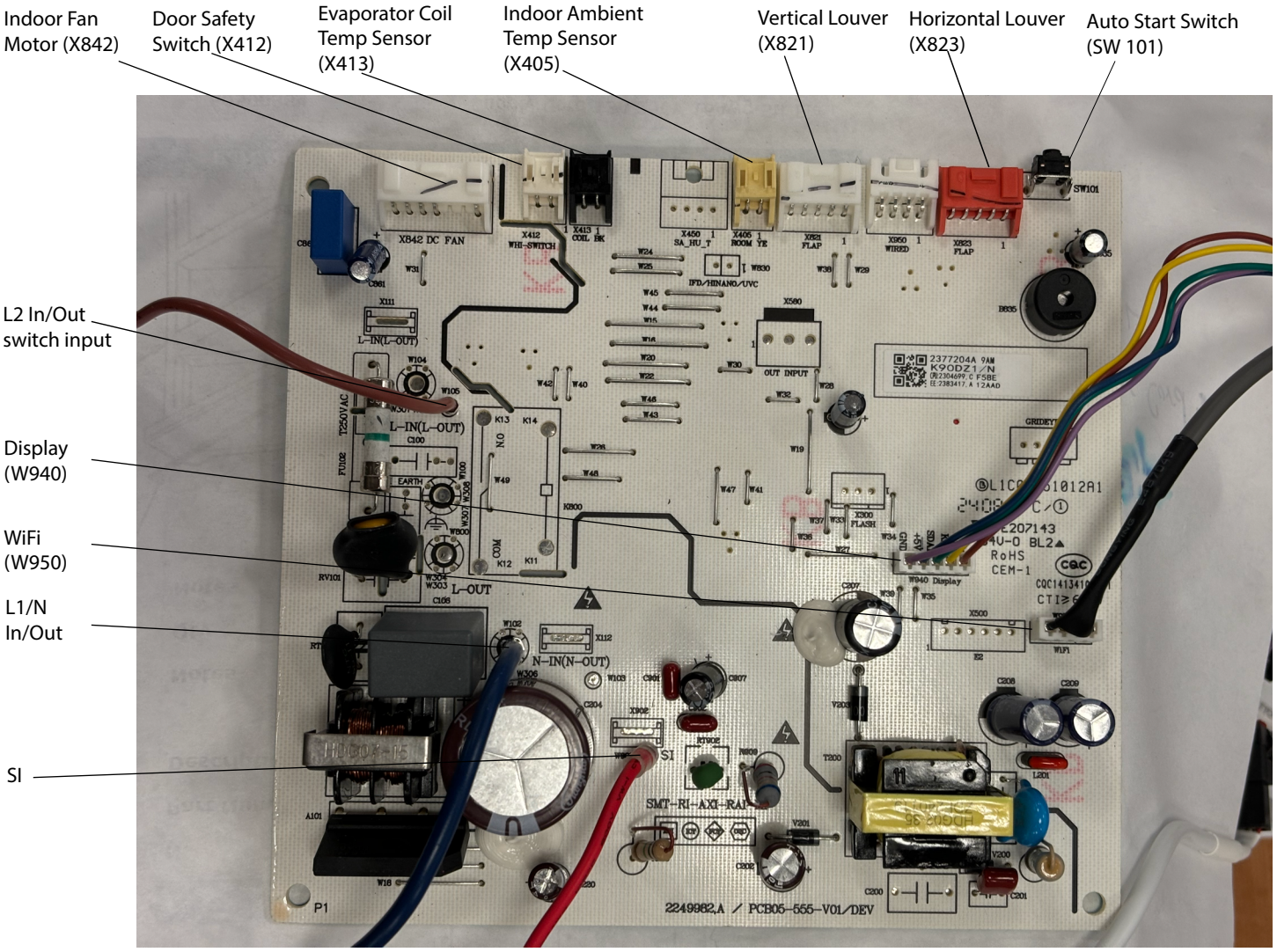
FAHFW09A1A, FAHFW12A1A



COMPONENTS TESTING

Indoor Unit Main PCB Terminal ID

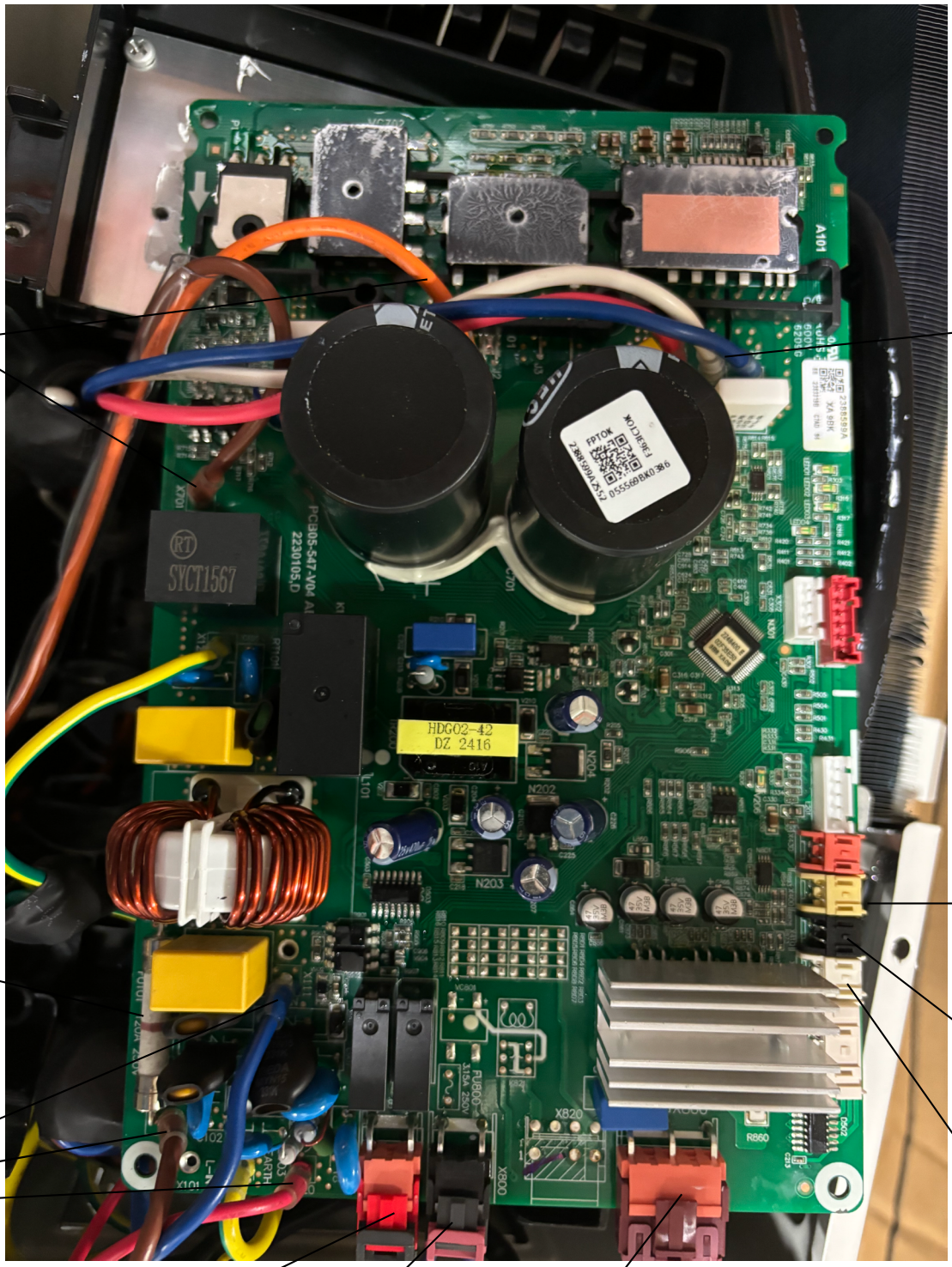
FAHFW18A3A, FAHFW24A3A



COMPONENTS TESTING

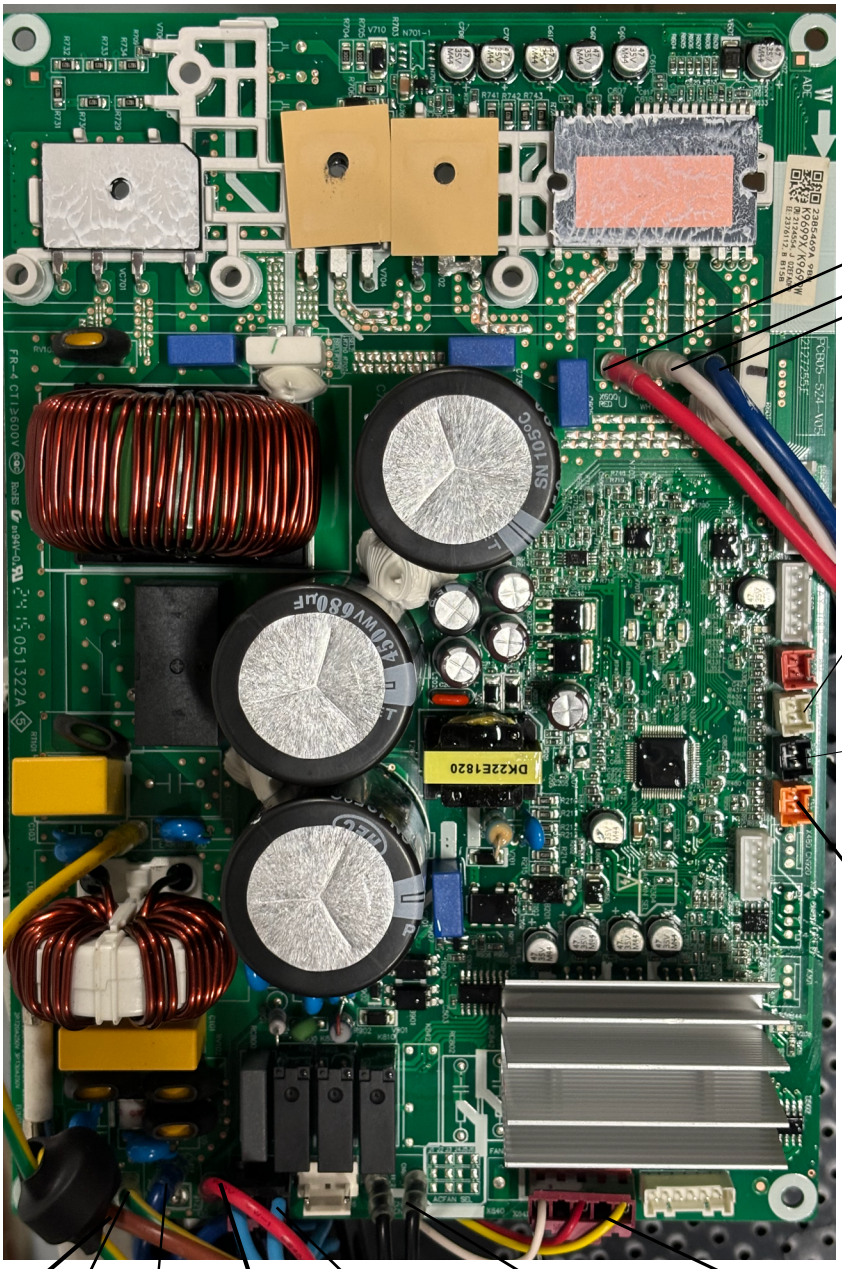
Outdoor Unit - Main PCB ID

FSHSR09B1B, FSHSR12B1B



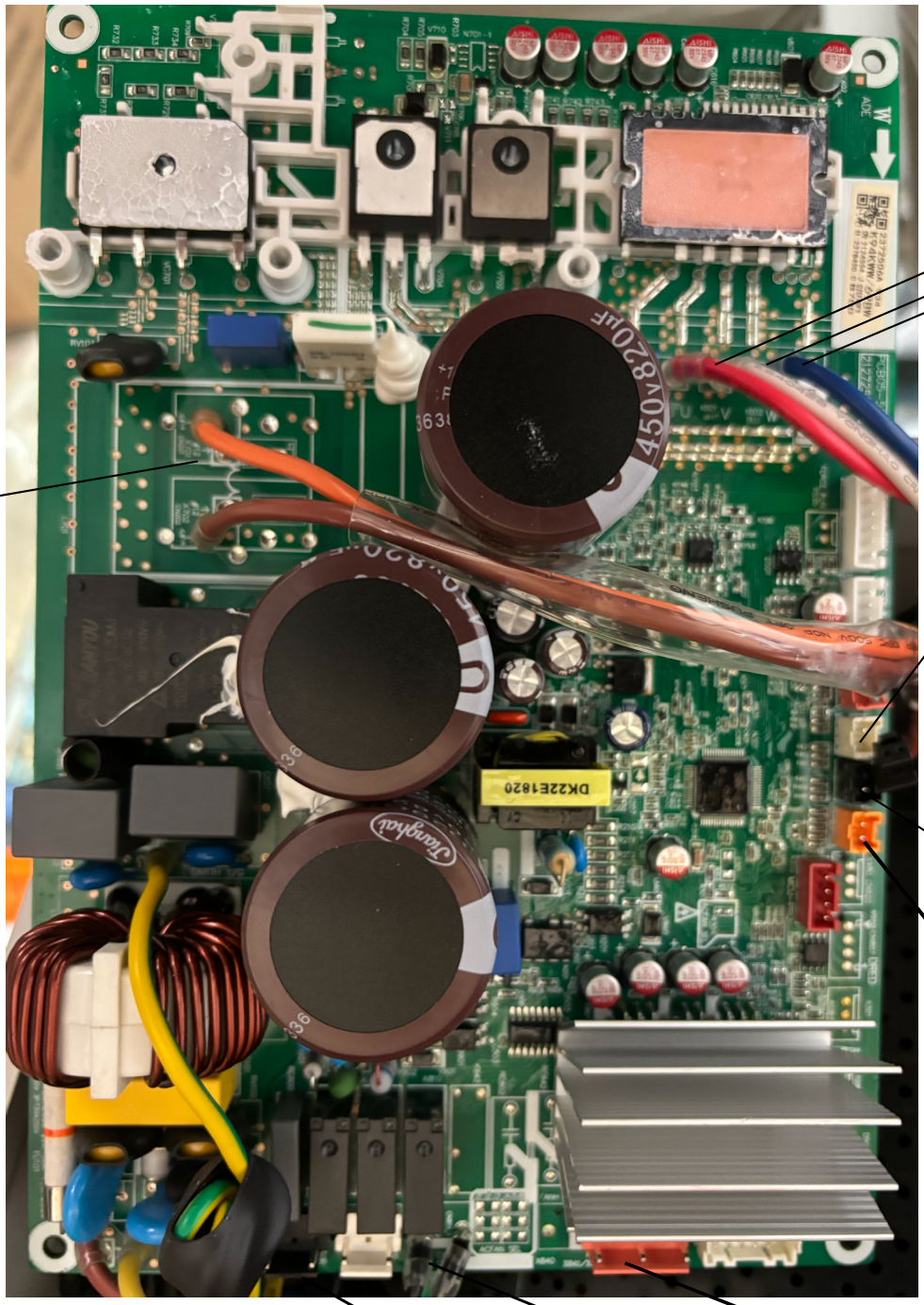
COMPONENTS TESTING

Outdoor Unit - Main PCB ID
FSHSR18B3B



COMPONENTS TESTING

Outdoor Unit - Main PCB ID
FSHSR24B3B



R-32 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-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.

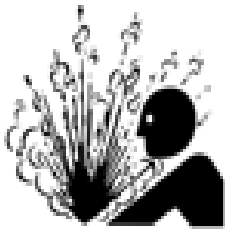
Do not pierce or burn.

Be aware that refrigerants may not contain an odor.

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-32 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 R-32 cannot be used as a retrofit for R-410A refrigerant. The mixing of refrigerant across classes is prohibited. R-32 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-32 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-32 equipment:

- R-32 pressure is similar to R-410A and approximately 60% higher than R-22 pressure.
- R-32 cylinders must not be allowed to exceed 125°F, they may leak or rupture.
- R-32 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-32 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-32 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-32 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-32 refrigerant.
- Gauge Manifold (Right handed threads).

R-32 SEALED SYSTEM REPAIR

Required Equipment

- A2L compatible Vacuum Gauge capable of 300 microns or less.
- Nitrogen regulator for purging and testing, rated to 800 psi. (Capable of low psi flow)
- Pipe tubing cutter.
- Refrigerant recovery cylinder. (Flammable A2L label)
- Ventilation fan.
- Class ABC fire extinguisher.
- Process Tube adapter kit
- Recovery access tool.
- Purge hose fittings
- Pinch off and opening tools

ABC Fire Extinguisher

Recovery Machine

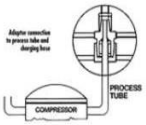
Vaccum Pump

Nitrogen

Guage Manifold

Nitrogen Regulator

Vaccum Guage



Recovery access tool

Process tube adapter kit

Purge hose fittings

Pinch off and opening tools

R-32 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-32 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-32 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-32 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. 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-32 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

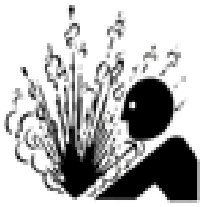
Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.

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. Weigh in the refrigerant charge with the proper quantity of R-32 refrigerant per model nameplate.

3. Perform triple evacuation.
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-32 SEALED SYSTEM REPAIRS

Refrigerant Charging

Triple Evacuation

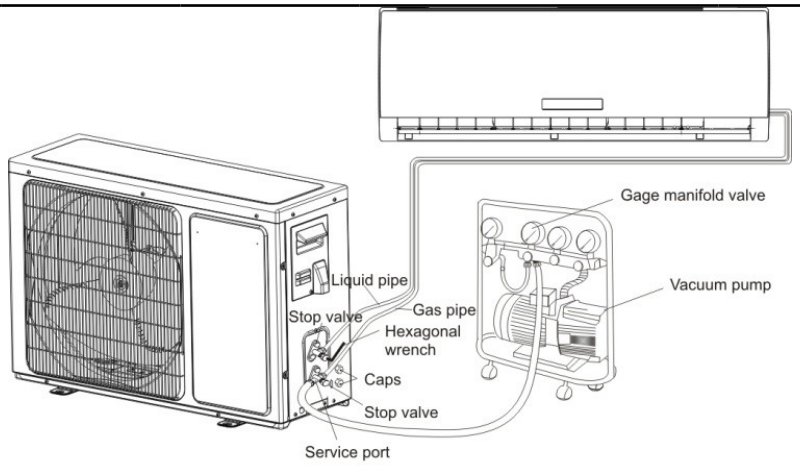
Friedrich requires all installations are Leak Checked and Evacuated in accordance to the "triple evacuation" process. This process promotes a dry tight refrigeration system before opening the service valves. It recommended that a single port refrigeration manifold and hoses rated over 31.5 psi be used.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

1. 1st Nitrogen Pressure Test:
Ensure all refrigeration connections are properly flared, secured, and torqued to their respective settings.
Pressurize the system with nitrogen to 550 psi. Soap all connections with an approved refrigerant leak detection solution.
The pressure in the system must hold for one hour respective to the environmental conditions and should not 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. Charging the system:
Unscrew Service Valve Caps to expose the inner hexagon head. Use an allen-head spanner or service wrench with appropriate adapter to release the refrigerant into the system. If the calculated line set length is over 2 ft, weight in the additional charge with an approved refrigerant scale as needed. Refer to Table G.1.

Capacity (Btu/h)	Refrigerant Pre-Charge	Pipe Size		Standard Length (ft)	Max. Elevation H (ft)	Max. Length L (ft)	Additional Refrigerant (oz/ft)
		LIQUID	GAS				
FPHSR09A1B	33.5 oz	1/4"	3/8"	25	50	66	.22
FPHSR09A3B	35.2 oz	1/4"	3/8"	25	50	66	.22
FSHSR09B1B	21.2 oz	1/4"	3/8"	25	50	66	.22
FPHSR12A1B	35.3 oz	1/4"	3/8"	25	50	66	.22
FPHSR12A3B	38.1 oz	1/4"	3/8"	25	50	66	.22
FSHSR12B1B	21.9 oz	1/4"	3/8"	25	50	66	.22
FPHSR18A3B	53 oz	1/4"	1/2"	25	50	100	.22
FSHSR18A3B	45.9 oz	1/4"	1/2"	25	50	100	.22
FPHSR24A3B	70.6	3/8"	5/8"	25	50	100	.32
FSHSR24A3B	47.6	3/8"	5/8"	25	50	100	.32

Table G.2

Figure G.3



R-32 SEALED SYSTEM REPAIRS

Compressor Replacement

⚠ WARNING

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

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

⚠ WARNING

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

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

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

⚠ WARNING

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

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

⚠ CAUTION

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

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

⚠ WARNING

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

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

2. Recover all refrigerant from the system though the 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. After all refrigerant has been recovered, cut and remove compressor. Be certain to have both suction and discharge process tubes open to atmosphere.

4. Install the replacement compressor.

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

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

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

R-32 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.

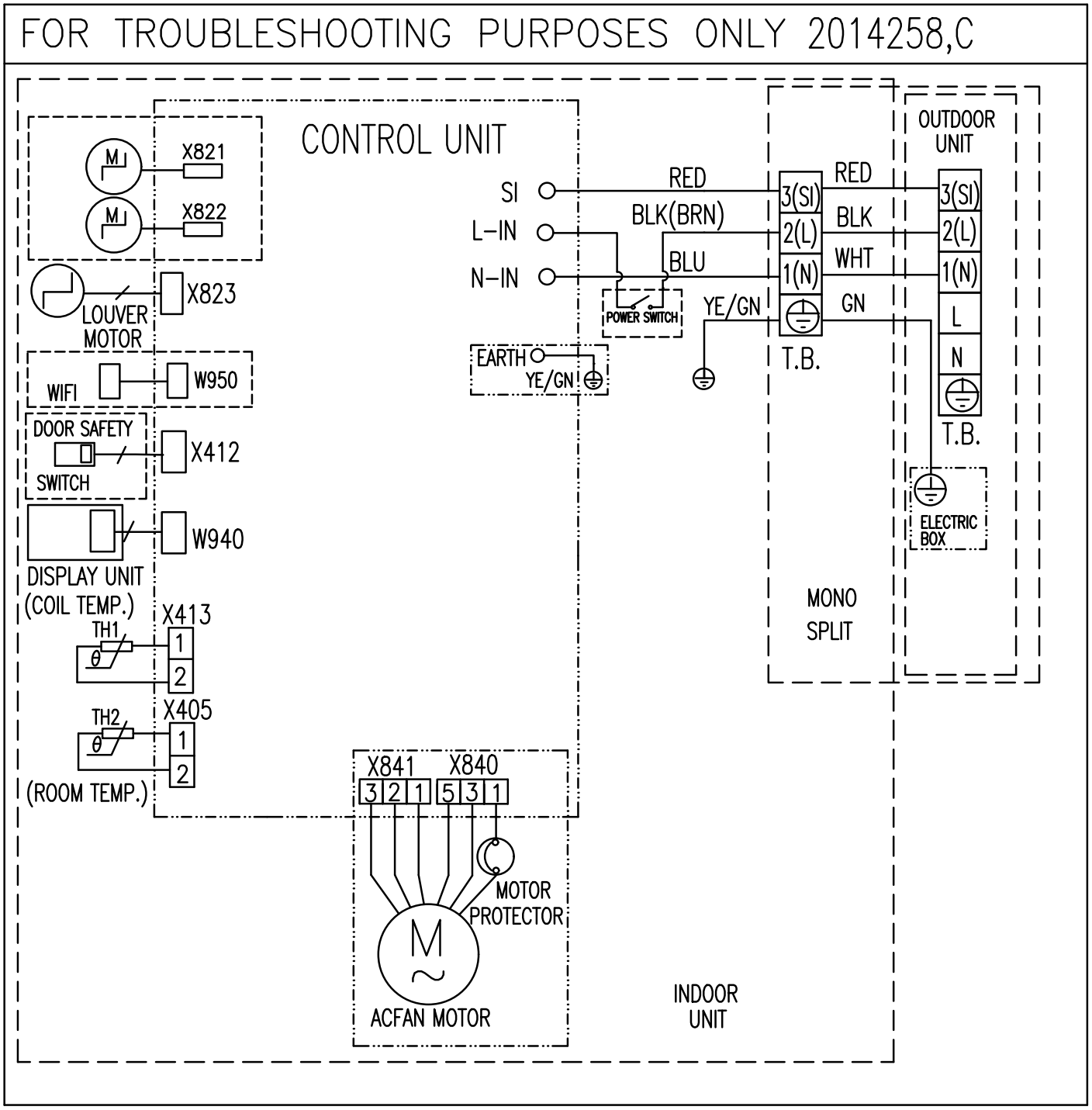
10. Once the sealed system is leak free, install solenoid coil on new valve.

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

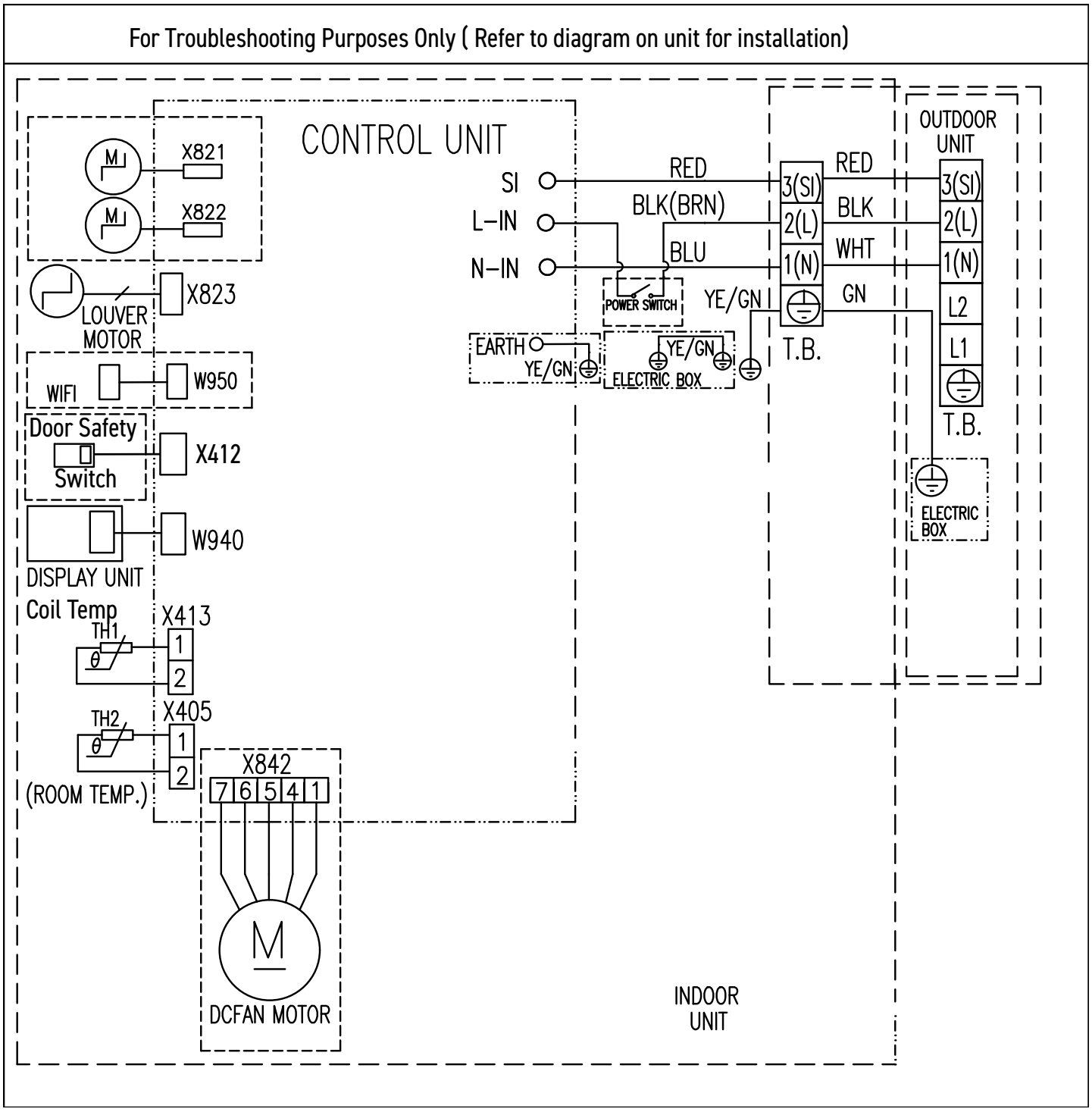
FAHSW09A1A, FSHWS12A1A



WIRING DIAGRAMS

Indoor Unit

FAHFW18A3A, FAHFW24A3A



WIRING DIAGRAMS

Outdoor Unit

FSHSR09B1B, FSHSR12B1B

For Troubleshooting Purposes Only (For unit Installation Refer to Diagram on Unit)

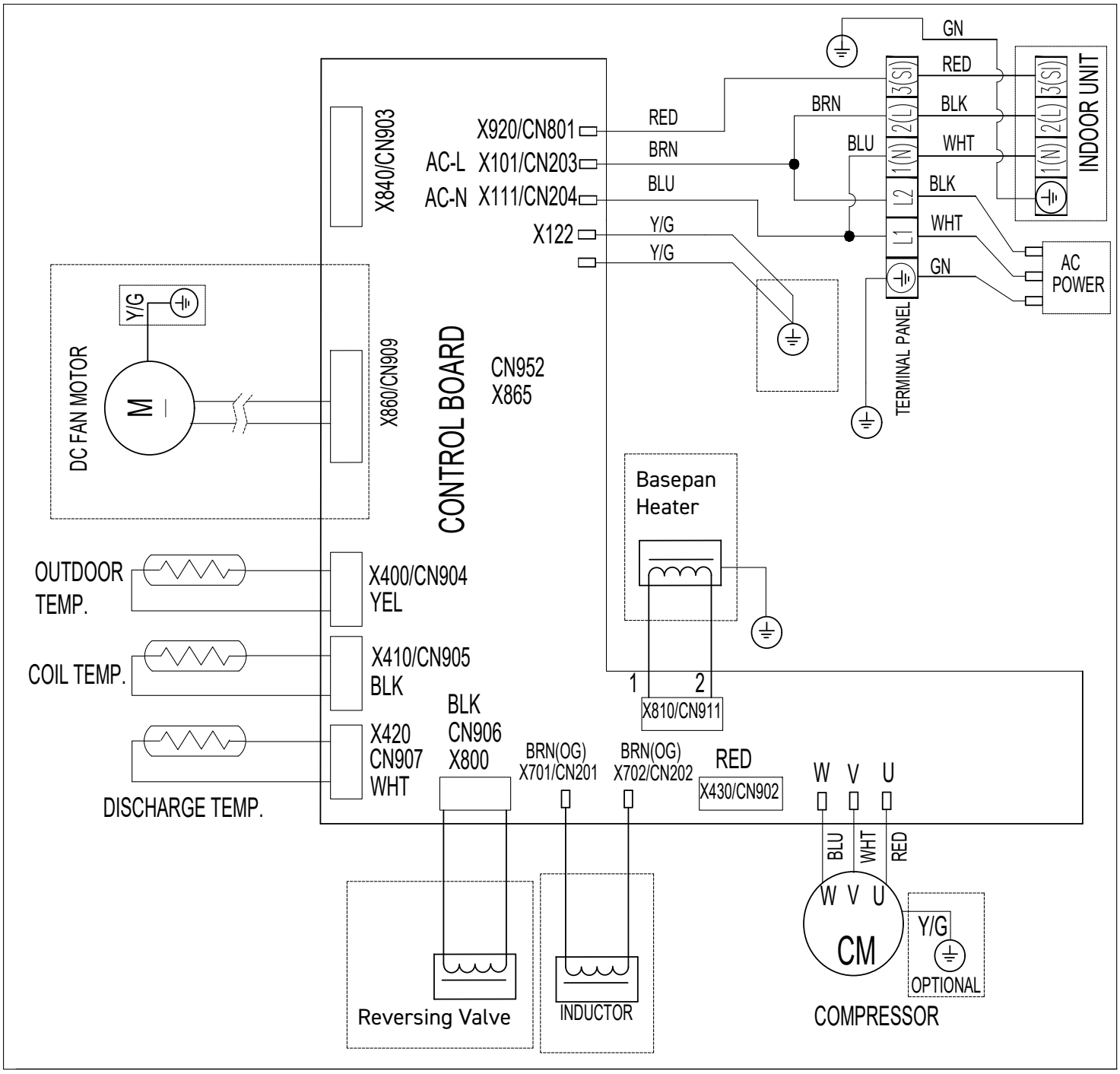


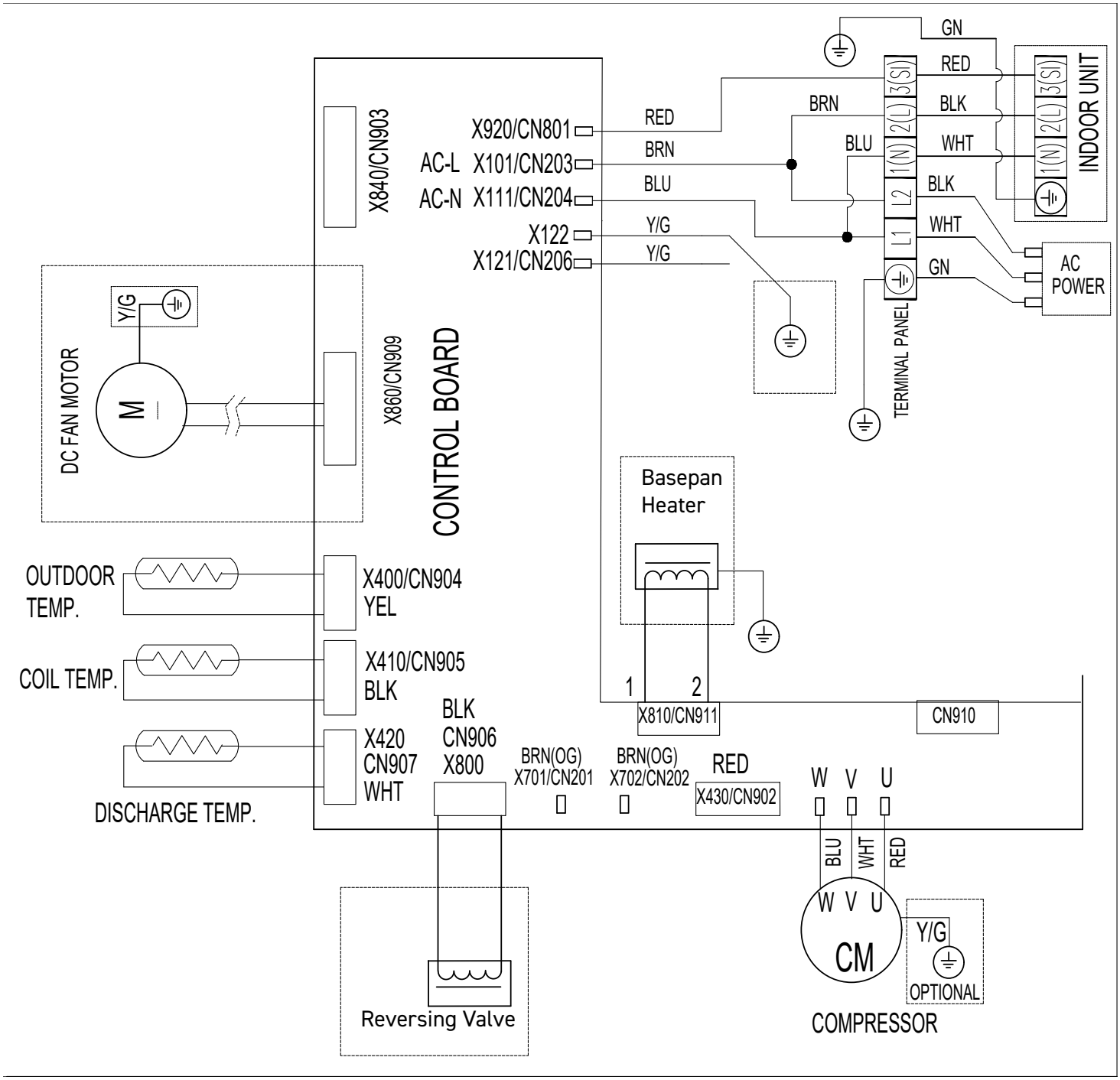
Figure 802

WIRING DIAGRAMS

Outdoor Unit

FSHSR18B3B

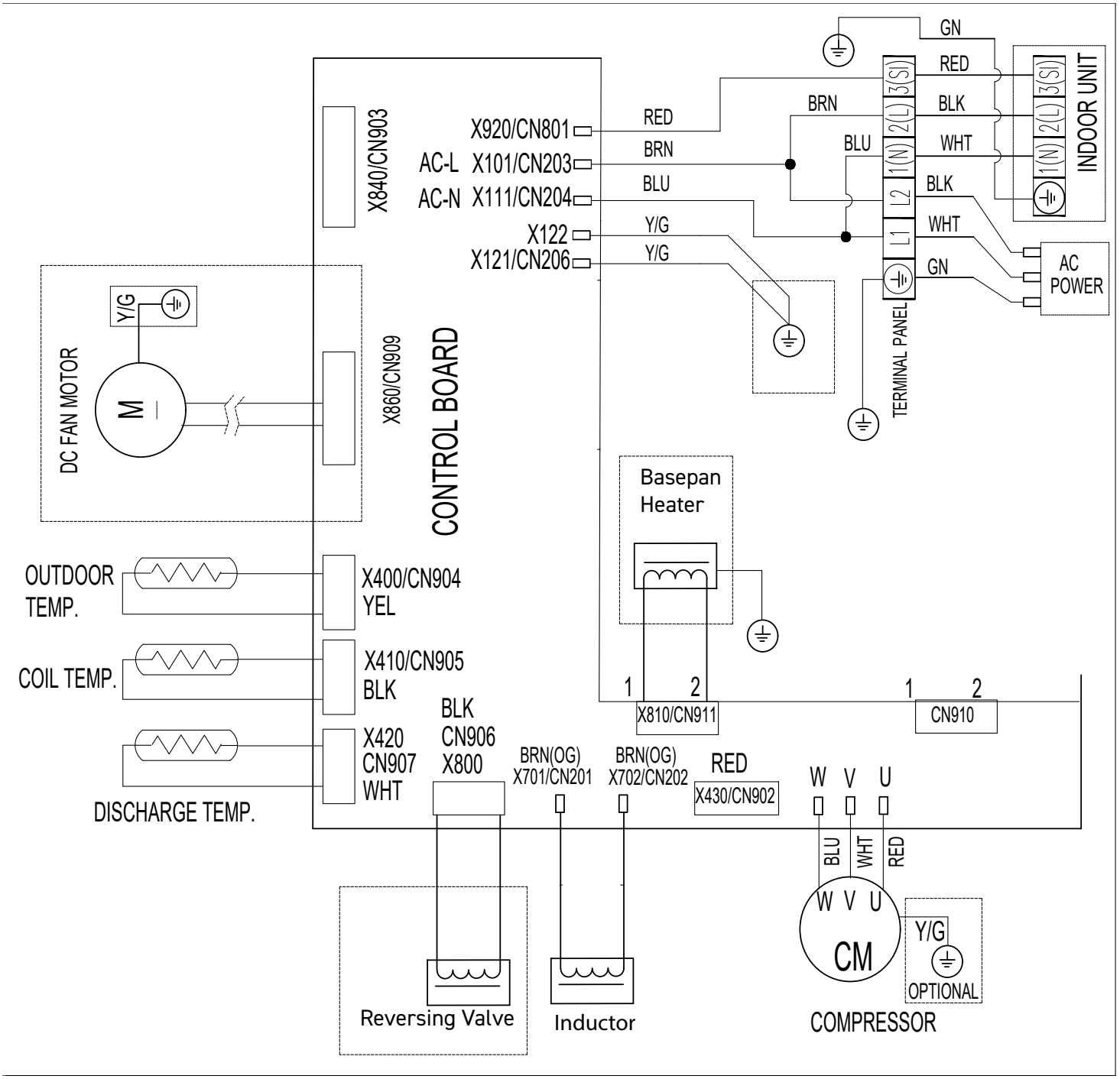
For Troubleshooting Purposes Only (For unit Installation Refer to Diagram on Unit)



WIRING DIAGRAMS

Outdoor Unit
FSHSR24B3B

For Troubleshooting Purposes Only (For unit Installation Refer to Diagram on Unit)



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 THE INDOOR COIL AND INDOOR ROOM SENSOR ,THE PARAMETER OF THE OUTDOOR COIL AND OUTDOOR AMBIENT TEMP SENSOR:

（R(0)=15k B(0/100)=3450）

Temperature(℃)	Resistance(k)	Voltage(V)		Temperature(℃)	Resistance(k)	Voltage(V)
-20	38.757	0.58143512		31	4.292	2.715076661
-19	36.844	0.60795346		32	4.137	2.76063657
-18	35.038	0.63530819		33	3.989	2.805589174
-17	33.331	0.66352684		34	3.847	2.850117358
-16	31.719	0.69257720		35	3.711	2.894109636
-15	30.196	0.72246147		36	3.58	2.937788018
-14	28.755	0.75321223		37	3.455	2.980713033
-13	27.392	0.78480857		38	3.335	3.023117961
-12	26.103	0.81722911		39	3.219	3.065272268
-11	24.882	0.85051031		40	3.108	3.106725146
-10	23.727	0.88458737		41	3.001	3.147759536
-9	22.632	0.91951536		42	2.899	3.187898487
-8	21.594	0.95527085		43	2.801	3.227439565
-7	20.611	0.99179340		44	2.706	3.266717909
-6	19.678	1.02913875		45	2.615	3.305249514
-5	18.794	1.06721353		46	2.528	3.342947037
-4	17.954	1.10609872		47	2.444	3.380169671
-3	17.158	1.14565549		48	2.363	3.416856492
-2	16.401	1.18599135		49	2.286	3.45247766
-1	15.683	1.22696435		50	2.211	3.487894953
0	15	1.26865672		51	2.139	3.522585993
1	14.351	1.31098658		52	2.07	3.556485356
2	13.734	1.35393437		53	2.003	3.590032381
3	13.148	1.39741342		54	1.939	3.622673675
4	12.589	1.44157386		55	1.877	3.654865988
5	12.058	1.48618720		56	1.818	3.686036427
6	11.553	1.53125563		57	1.76	3.717201166
7	11.071	1.57689691		58	1.705	3.747244673
8	10.613	1.62286005		59	1.652	3.776658768
9	10.176	1.66928515		60	1.6	3.805970149
10	9.76	1.71601615		61	1.551	3.834009923
11	9.363	1.76311968		62	1.503	3.861880963
12	8.985	1.81043663		63	1.457	3.888973616
13	8.624	1.85805887		64	1.413	3.91524643
14	8.279	1.90597205		65	1.37	3.941267388
15	7.951	1.95387327		66	1.328	3.967019291
16	7.637	2.00204130		67	1.289	3.991234935
17	7.337	2.05033368		68	1.25	4.015748031

APPENDIX

Thermistor Resistance Values

18	7.051	2.09859271		69	1.213	4.039284017
19	6.778	2.14682606		70	1.177	4.062450215
20	6.516	2.19524793		71	1.142	4.085229093
21	6.267	2.24333597		72	1.109	4.106941536
22	6.028	2.29151689		73	1.076	4.12888601
23	5.8	2.33944954		74	1.045	4.149715216
24	5.581	2.38741691		75	1.015	4.17007359
25	5.372	2.43506494		76	0.986	4.189944134
26	5.172	2.48247664		77	0.957	4.210004953
27	4.981	2.52951096		78	0.93	4.228855721
28	4.797	2.57653834		79	0.904	4.247168554
29	4.622	2.62291710		80	0.878	4.265640683
30	4.453	2.66931854				

Note: the AD value in the table is calculated on the basis of the pull-down resistor is 5.1K.

2. THE PARAMETER OF OUTDOOR COMPRESSOR TEMPERATURE SENSOR：

R(0)=187.25k B(0100)=3979)						
Temperature (℃)	Resistance(k)	Voltage(V)		Temperature (℃)	Resistance (k)	Voltage(V)
-20	542.867	0.06185563		51	19.907	1.273074475
-19	512.839	0.06543004		52	19.148	1.310312934
-18	484.672	0.06917993		53	18.422	1.348029498
-17	458.239	0.07311215		54	17.728	1.386170907
-16	433.423	0.07723358		55	17.065	1.424680494
-15	410.115	0.08155140		56	16.43	1.463624623
-14	388.213	0.08607312		57	15.822	1.502961719
-13	367.625	0.09080590		58	15.241	1.542579738
-12	348.264	0.09575738		59	14.684	1.582573078
-11	330.048	0.10093573		60	14.151	1.622834232
-10	312.904	0.10634837		61	13.64	1.663405088
-9	296.761	0.11200385		62	13.151	1.704175229
-8	281.556	0.11790981		63	12.682	1.745200698
-7	267.227	0.12407536		64	12.233	1.78637104
-6	253.72	0.13050821		65	11.802	1.827760456
-5	240.982	0.13721739		66	11.388	1.869364416
-4	228.965	0.14421140		67	10.992	1.910971223
-3	217.624	0.15149895		68	10.611	1.952788467
-2	206.917	0.15908889		69	10.246	1.994602839
-1	196.805	0.16699001		70	9.896	2.036415908
0	187.25	0.17521257		71	9.559	2.078366648
1	177.957	0.18402550		72	9.236	2.120229484
2	169.186	0.19319719		73	8.925	2.162162162
3	160.903	0.20273937		74	8.627	2.203928178
4	153.179	0.21252789		75	8.341	2.245558418
5	145.685	0.22297275		76	8.065	2.287251934

APPENDIX

Thermistor Resistance Values

6	138.696	0.23368340		77	7.8	2.328767123
7	132.086	0.24480509		78	7.546	2.369998606
8	125.833	0.25634646		79	7.301	2.411176512
9	119.916	0.26831655		80	7.065	2.452217815
10	114.315	0.28072493		81	6.843	2.492120501
11	109.01	0.29358432		82	6.624	2.532777116
12	103.984	0.30690352		83	6.414	2.573028606
13	99.222	0.32068816		84	6.212	2.612972641
14	94.708	0.33494897		85	6.017	2.652726847
15	90.427	0.34969710		86	5.829	2.692216328
16	86.366	0.36494000		87	5.648	2.731362468
17	82.512	0.38068793		88	5.474	2.770083102
18	78.854	0.39694585		89	5.306	2.808524698
19	75.381	0.41372093		90	5.144	2.846617549
20	72.082	0.43102355		91	4.988	2.884289108
21	68.948	0.44885674		92	4.837	2.921715219
22	65.968	0.46723835		93	4.692	2.958579882
23	63.136	0.48615877		94	4.552	2.995066949
24	60.443	0.50562884		95	4.417	3.031113488
25	57.88	0.52566481		96	4.286	3.066931265
26	55.367	0.54691396		97	4.161	3.10190676
27	52.978	0.56877112		98	4.039	3.13682074
28	50.707	0.59123237		99	3.922	3.171050177
29	48.547	0.61430611		100	3.776	3.214826021
30	46.492	0.63799445		101	3.703	3.237170332
31	44.537	0.66229036		102	3.602	3.268602192
32	42.676	0.68720188		103	3.501	3.300650422
33	40.904	0.71272849		104	3.409	3.33039475
34	39.217	0.73885738		105	3.317	3.360680043
35	37.609	0.76561057		106	3.228	3.390506582
36	36.077	0.79296593		107	3.141	3.420179056
37	34.616	0.82093877		108	3.058	3.448975451
38	33.224	0.84949031		109	2.977	3.477549351
39	31.895	0.87866649		110	2.899	3.505516033
40	30.628	0.90841082		111	2.823	3.533201704
41	29.419	0.93873381		112	2.749	3.56058226
42	28.264	0.96965549		113	2.678	3.587254695
43	27.162	1.00111890		114	2.609	3.613561484
44	26.109	1.03315203		115	2.542	3.639477628
45	25.103	1.06573050		116	2.477	3.664977902
46	24.142	1.09883007		117	2.414	3.6900369
47	23.223	1.13246511		118	2.353	3.714629083
48	22.345	1.16658089		119	2.294	3.738728832
49	21.505	1.20120120		120	2.237	3.762310501
50	20.701	1.23631868				

Note: the AD value in the table is calculated on the basis of the pull-down resistor is 6.8K.

APPENDIX

Accessories

WALL CONTROLLERS

FPWC1

FPWC1 Optional wired wall controller for Floating Air Select single zone and Floating Air ® Pro, single and multizone models.
Does not work with FPHSW36A3B at this time. Please check with your Friedrich representative for options.
Cable length = 24 ft (8m) ®

APPENDIX

Friedrich Authorized Parts Depots

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

FRIEDRICH

TECHNICAL SUPPORT CONTACT INFORMATION

Friedrich Air Conditioning Co.
10001 Reunion Place, Suite 500 • San Antonio, Texas 78216
1-800-541-6645
www.friedrich.com