Service Manual

FRIEDRICH

Chill Premier Inverter ® Series Room Air Conditioners R-32 Refrigerant

Fixed Chassis, Cool Only

CCV08A10A, CCV10A10A, CCV12A10A

THE EXPERTS IN ROOM AIR CONDITIONING

93012001_00

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.

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.
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 aquired on the Friedrich website. Click the Link or scan the QR code to be directed to the Profeesional page where you can locate our technical literature.

IMPORTANT: It will be necessary for you to accurately identify the unit you are servicing, so you can be certain of a proper diagnosis and repair.

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

⚠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 resposibility 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

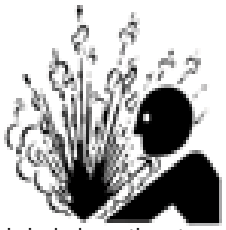
Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.

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. R32 systems operate at higher pressures than R22 equipment. Appropriate safe service and handling practices must be used.

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

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

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

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

INTRODUCTION

Personal Injury or Death Hazards

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

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

ELECTRICAL HAZARDS:

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

INTRODUCTION

Personal Injury Or Death Hazards

- **REFRIGERATION SYSTEM REPAIR HAZARDS:**

- Use approved standard refrigerant recovering procedures and equipment to relieve high pressure before opening system for repair.
- 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.
- Connect to a properly grounded outlet only.
- 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.
- Insure that the unit has a 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.

SPECIFICATIONS

Refrigeration Systems Performance Data

Model	Cooling Btu	Volts Rated	Cooling Amps	Cooling Watts	EER	CEER	Moisture Removal-Pints/HR	Refrigerant	Refrigerant Charge g/ oz	Indoor Airflow CFM Low/ Med/ Hi	Outdoor Airfllow CFM Low/ Med/ Hi	Weight Net./ Ship lbs.
FIXED CHASSIS, COOL ONLY (WINDOW INSTALLATION ONLY)												
CCV08A10A	8000	115	8	740		15	2.11	R-32	280/9.88	194/165/147	430/359/294	56.2/ 59.5
CCV10A10A	10000	115	8	950		15	3.17	R-32	300/ 10.58	253/195/135	430/359/294	57.8/ 61.1
CCV12A10A	12000	115	11	1180		15	3.69	R-32	330/ 11.64	265/195/147	430/359/294	58.2/ 61.5

Figure 201

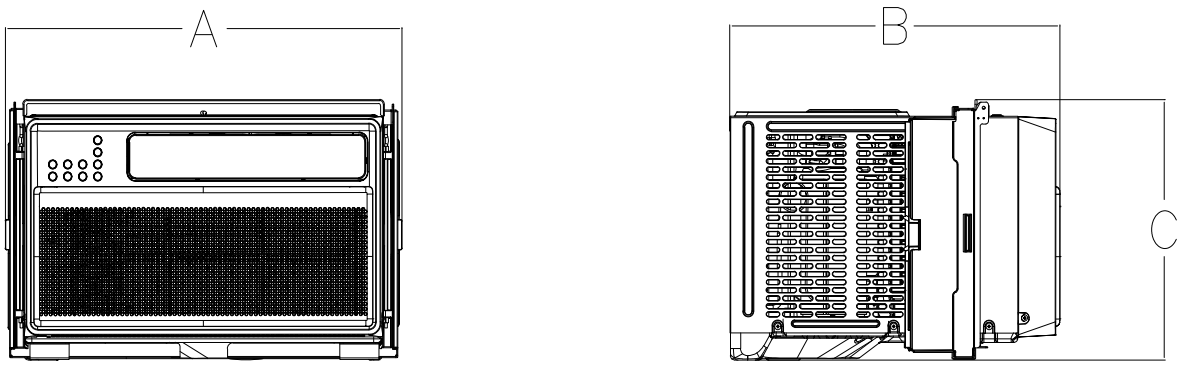
Compressor Performance Data

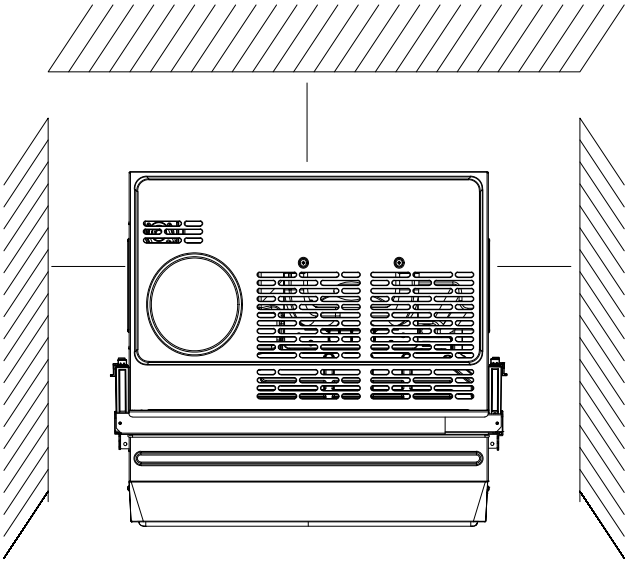
Model	Type	Brand	Capacity BTU/h	Refigerant Oil (ml)
FIXED CHASSIS, COOL ONLY (WINDOW INSTALLATION ONLY)				
CCV08A10A	Rotary	GMCC	9468	240
CCV10A10A	Rotary	GMCC	9468	240
CCV12A10A	Rotary	GMCC	9468	240

Figure 202

SPECIFICATIONS

Dimensions





Model	A"	B "	C "	Minimum Window Width "	Maximum Window Width "	Minumun Window Height "
CCV08A10A	20 5/8	19 1/4	13 3/8	24	36	14 1/2
CCV10A10A	20 5/8	19 1/4	13 3/8	24	26	14 1/2
CCV12A10A	20 5/8	19 1/4	13 3/8	24	36	14 1/2

Figure 203

SPECIFICATIONS

Electrical Data

⚠ WARNING

ELECTRIC SHOCK HAZARD

Turn off electric power before service or installation.

All electrical connections and wiring MUST be installed by a qualified electrician and conform to codes which have jurisdiction.

Failure to do so can result in personal injury or death.

NOTICE

FIRE HAZARD

Not following the above WARNING could result in fire or electically unsafe conditions which could cause moderate or serious property damage.
Read, understand and follow the above warning.

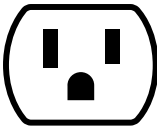
Model	Circuit Rating Breaker or T-D Fuse	Plug Face (NEMA#)	Power Cord Length (ft.)	Wall Outlet Appearance
CCV08A10A CCV10A10A CCV12A10A	125V-15A	5-15P	5	

Figure 204 (Circuit Breaker / Plug / Receptacle / Cord Rating)

Wire Size - Use ONLY wiring size recommended for single outlet branch circuit.

Fuse/ Circuit Breaker - Use ONLY the correct HACR type and size fuse/circuit breaker. Read electrical ratings on unit's rating plate. Proper circuit protection is the responsibiity of the homeowner.

Grounding - Unit MUST be grounded from branch circuit through service cord to unit, or through separate ground wire provided on permanently connected units. Be sure that branch circuit or general purpose outlet is grounded.

Receptacle - The field supplied outlet must match plug on service cord and be within reach of service cord. Do NOT alter the service cord plug. Do NOT use an extension cord. Refer to the table above for proper receptacle and fuse type.

⚠ WARNING

Electrical Shock Hazard

Make sure your electrical receptacle has the same configuration as your air conditioner's plug. If different, consult a Licensed Electrician.
Do not use plug adapters.
Do not use an extension cord.
Do not remove ground prong.Always plug into a grounded 3 prong outlet.
Failure to follow these instructions can result in death, fire, or electrical shock.

Make sure the wiring is adequate for your unit.
All Wiring should meet all national and local codes and ordinances.

If you have fuses, they should be of the time delay type. Before you install or relocate this unit, be sure that the amperage rating of the circuit breaker or time delay fuse does not exceed the amp rating listed in Table 206.

DO NOT use an extension cord.

The cord provided will carry the proper amount of electrical power to the unit; an extension cord may not.

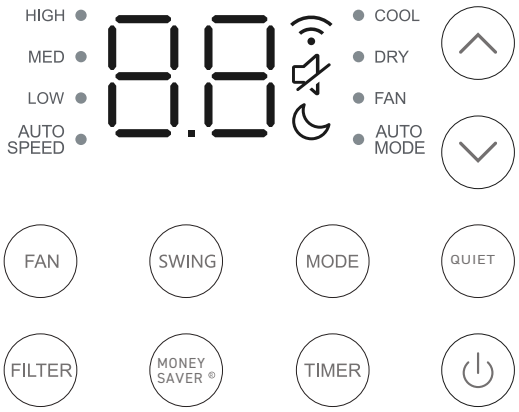
Make sure that the receptacle is compatible with the air conditioner cord plug provided.

Proper grounding must be maintained at all times. Two prong receptacles must be replaced with a grounded receptacle by a certified electrician.

The grounded receptacle should meet all national and local codes and ordinances. You must use the three prong plug furnished with the air conditioner. Under no circumstances should you remove the ground prong from the plug.

OPERATION

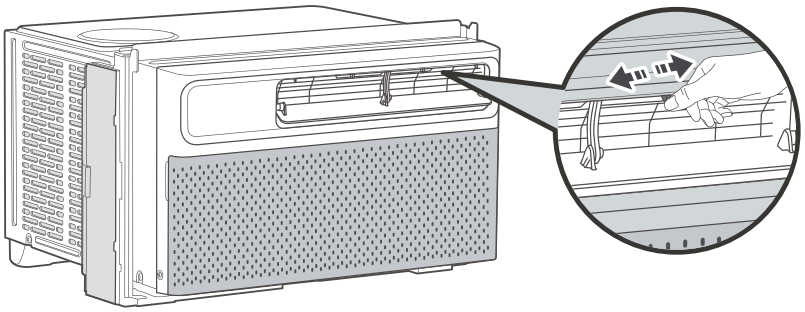
Control Panel



Power	Turn on the air conditioner or switch to standby.
FAN Fan Speed	Adjust fan speed (Low, Med, High, Auto) NOTE: Fan speed setting is available in Auto, Cool, and Fan modes only.
SWING Swing/ Oscillation	Select to adjust the airflow direction by swinging the louver vertically.
Decrease	Decrease the air conditioning temperature.
Increase	Increase the air conditioning temperature.
MODE	Switch between Cool/Dry/Fan/Auto mode.
FILTER	Remind to clean the dust filter.
MONEY SAVER ®	Turn on/off the ECO mode, under Cool/Dry mode.
TIMER	Timer on or Timer off the unit.
QUIET	Turn on/off the MUTE mode.
COOL DRY FAN AUTO MODE	Indicates Cool, Dry, Fan, and Auto mode, respectively.
	Indicates the unit is in Sleep mode.
	Indicates the unit is in MUTE mode.
	Indicates that there is a WiFi connection
HIGH MED LOW AUTO SPEED	Indicates Low, Medium, High, and Automatic fan speeds, respectively.

OPERATION

Control Panel

Power Button	Press to turn on the air conditioner or switch it to standby mode.
Increase Button	Press to increase the air conditioning temperature by 1°F/°C.
Decrease Button	Press to decrease the air conditioning temperature by 1°F/°C.
Swing/ Oscillation Button	1.Press to make the louver move up and down. 2.Press again to stop the louver at the desired angle. **NOTE:** To adjust the airflow direction horizontally, manually move the levers located on top of the air outlet from side to side. **NOTE:** Do not adjust the big horizontal louver by hand, otherwise will cause damage. 
Fan Speed Button	**Adjust Fan Speed** Press repeatedly to adjust fan speed: Low, Med, High, and Auto. **Reset Filter Reminder** To clean the filter, see Routine Maintenance.

NOTE:

- In Auto speed, fan speed will adapt to the room temperature.
- In Dry Mode, fan speed cannot be adjusted.

OPERATION

Control Panel

Mode Button	Press repeatedly to cycle through Cool, Dry, Fan and Auto modes. **Cool Mode** - In Cool mode, the air conditioner cools the room to the desired temperature. - Temperature and fan speed are adjustable. **Dry Mode** - In Dry mode, the air conditioner works as a dehumidifier to remove humidity in the room. The fan is constantly running at a low speed. - Temperature and fan speed cannot be adjusted, **Fan Mode** - In Fan mode, the air conditioner circulates air like a normal fan. Remember to open the vent during this function, but keep it closed during cooling for maximum cooling efficiency - Fan speed can be set to Low, med, or High. - Temperature cannot be adjusted. Auto Mode Will adjust Cooling, Fan speed, & Vertical Louver (if activated) automatically based on the room temperature conditions. The set temperature can be adjusted from 61-88˚F in auto mode, the operation of fan speed and vane position change according to the temperature setting.

Other Features

Filter Reminder

When the running time of the fan reaches 500 hours, the filter reminder will light up to remind you to clean the filter.

Display Auto Off

- Display will dim after 30 seconds (off after 15 seconds in sleep mode).
- Wake up the display with any button.

Memory

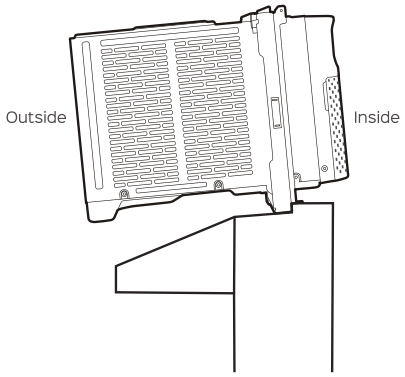
If the air conditioner is turned OFF and stays connected to the power, it will operate under the previous settings (except the timer setting) when it is turned ON again.

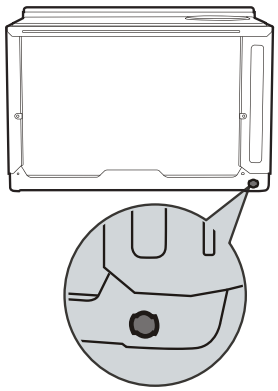
Drain Water

After proper installation, condensate will not overflow during normal use.

If the sound of the condensate water hitting the fan blade is unpleasant and you dislike, it or is too loud; you can remove the drain cap located at the back of the air conditioner bottom right corner to drain away the water more quietly.

NOTE: Removing the cap may affect the heat transfer efficiency.

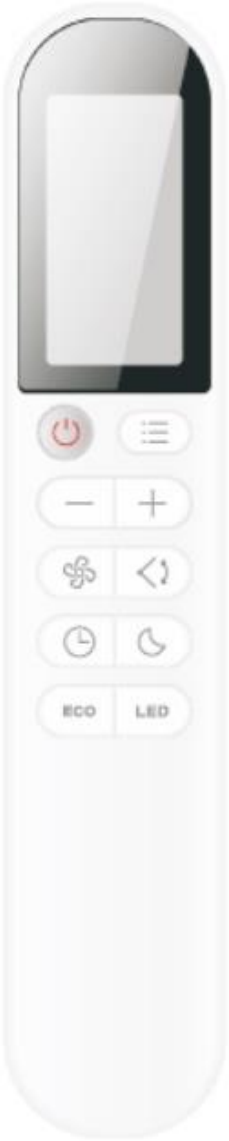




Remove the cap located at the back

OPERATION

Remote Control



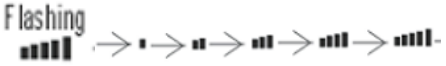
1. ON/OFF button
To switch the conditioner on and off.

2. MODE button
To select the mode of operation.

3. TEMP DOWN button
Decrease the temperature or time by 1 unit.

4. TEMP UP button
Increase the temperature or time by 1 unit.

5. FAN button
To select the fan speed of auto/low/mid/high , cycle as be low.



6. Up/Down SWING button
To activate the swing of horizontal flap(up/down) or deactivate it.

7. TIMER button
Press this button to activate/deactivate the TIMER function.

8. SLEEP button
Press this button to activate/deactivate the SLEEP function.

9. ECO button
Press this button to activate/deactivate the ECO function.

10. LED button
Press this button to activate/deactivate the DISPLAY function.

11. WIFI RESET (wifi restoration)
KEEP pressing “MODE” AND “+” together over 3 seconds.

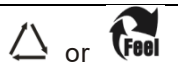
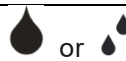
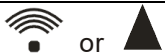
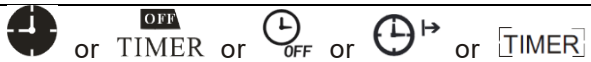
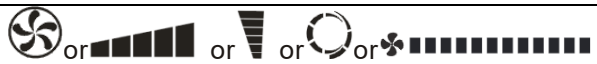
12. Fahrenheit and Celsius one click toggle
Under boot state, long press the FAN button to switch between Fahrenheit and Celsius display

⚠ The look and function of remote control may be different.
⚠ The shape and position of switches and indicators may be different according to the model, but their function is the same.

OPERATION

Remote Control

Meaning of symbols on the liquid crystal display.

1		FEEL mode indicator
2		COOLING indicator
3		DEHUMIDIFYING indicator
4		FAN ONLY OPERATION indicator
5		SIGNAL RECEPTION indicator
6		TIMER OFF indicator
7		TIMER ON indicator
8		AUTO FAN indicator
9		LOW FAN SPEED indicator
10		MIDDLE FAN SPEED indicator
11		HIGH FAN SPEED indicator
12		SLEEP indicator
13		FLAP SWING indicator
14		ECO indicator
15		BATTERY indicator
16		Mute indicator

OPERATION

Remote Control

Sleep Mode Button (On Remote Control)	In Sleep mode, the air conditioning temperature will adjust gradually every 30 minutes to keep you comfortable while preventing overcooling. After 10 hours, Sleep mode will exit automatically and the temperature will return to the initial temperature. **NOTE:** In Sleep mode, all the button sounds will be muted, and all the indicators on the display will turn off after 15 seconds, except for the Sleep mode indicator.
LED Display Button (On Remote Control)	- Turn on or off the display on the air conditioner. - Long press 5 seconds to switch between °F/°C.
Timer Button (On Remote Control)	- When the air conditioner is on standby/running, press the Timer button and its icon will flash on the remote display. During the flashing process, press + or - to select timer from 0.5 to 24 hours, then press the Timer button again to confirm the setting. After the timer ends, the air conditioner will start/stop running automatically. - Turning the air conditioner ON or OFF at any time or adjusting the timer setting to 0.0 hour will cancel the timer program.
Eco Mode Button (On Remote Control)	In Eco mode, when the desired temperature is reached, the compressor will turn off and the fan will continue to run for 3 minutes. Then the fan cycles on from 1 to 5 minute intervals until the room temperature is above the set temperature, at which time the compressor turns back on and cooling restarts.

OPERATION

General Knowledge Sequence Of Refrigeration

A good understanding of the basic operation of the refrigeration system is essential for the service technician. Without this understanding, accurate troubleshooting of refrigeration system problems will be more difficult and time consuming, if not (in some cases) entirely impossible. The refrigeration system uses four basic principles (laws) in its operation they are as follows:

1. "Heat always flows from a warmer body to a cooler body."

2. "Heat must be added to or removed from a substance before a change in state can occur"

3. "Flow is always from a higher pressure area to a lower pressure area."

4. "The temperature at which a liquid or gas changes state is dependent upon the pressure."

The refrigeration cycle begins at the compressor. Starting the compressor creates a low pressure in the suction line which draws refrigerant gas (vapor) into the compressor. The compressor then "compresses" this refrigerant vapor, raising its pressure and its (heat intensity) temperature.

The refrigerant leaves the compressor through the discharge Line as a hot High pressure gas (vapor). The refrigerant enters the condenser coil where it gives up some of its heat. The condenser fan moving air across the coil's finned surface facilitates the transfer of heat from the refrigerant to the relatively cooler outdoor air.
When a sufficient quantity of heat has been removed from the refrigerant gas (vapor), the refrigerant will "condense" (i.e. change to a liquid). Once the refrigerant has been condensed (changed) to a liquid it is cooled even further by the air that continues to flow across the condenser coil.

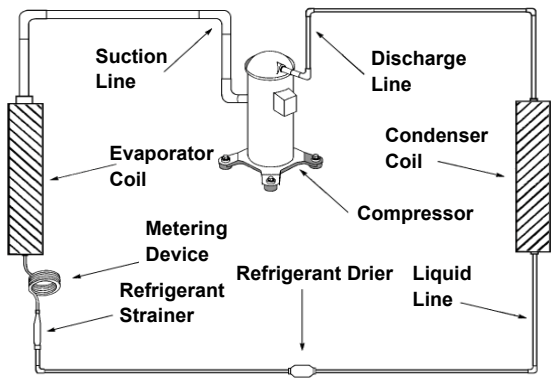
The design determines at exactly what point (in the condenser) the change of state (i.e. gas to a liquid) takes place. In all cases, however, the refrigerant must be totally condensed (changed) to a Liquid before leaving the condenser coil.

The refrigerant leaves the condenser Coil through the liquid line as a warm high pressure liquid. It next will pass through the refrigerant drier (if equipped). It is the function of the drier to trap any moisture present in the system, contaminants, and large particulate matter.

The liquid refrigerant next enters the metering device. The metering device is a capillary tube. The purpose of the metering device is to "meter" (i.e. control or measure) the quantity of refrigerant entering the evaporator coil.
In the case of the capillary tube this is accomplished (by design) through size (and length) of device, and the pressure difference present across the device.

Since the evaporator coil is under a lower pressure (due to the suction created by the compressor) than the liquid line, the liquid refrigerant leaves the metering device entering the evaporator coil. As it enters the evaporator coil, the larger area and lower pressure allows the refrigerant to expand and lower its temperature (heat intensity). This expansion is often referred to as "boiling" or atomizing. Since the unit's blower is moving indoor air across the finned surface of the evaporator coil, the expanding refrigerant absorbs some of that heat. This results in a lowering of the indoor air temperature, or cooling.

The expansion and absorbing of heat cause the liquid refrigerant to evaporate (i.e. change to a gas). Once the refrigerant has been evaporated (changed to a gas), it is heated even further by the air that continues to flow across the evaporator coil.



The particular system design determines at exactly what point (in the evaporator) the change of state (i.e. liquid to a gas) takes place. In all cases, however, the refrigerant must be totally evaporated (changed) to a gas before leaving the evaporator coil.

The low pressure (suction) created by the compressor causes the refrigerant to leave the evaporator through the suction line as a cool low pressure vapor. The refrigerant then returns to the compressor, where the cycle is repeated.

Figure 345 (Refrigeration Sequence Of Operation)

OPERATION

Sequence of Operation

Electronic controller
RT - Room Temperature.
IPT - Indoor Pipe (Coil) Temperature.
ST - Indoor Setting Temperature.
OPT - Outdoor Pipe Temperature.
OAT - Outdoor Ambient Temperature.
ODT - Outdoor Discharge Temperature.

Cooling mode. CRT=RT

1. Auto mode

1.1. The set temperature can be adjusted from 61-88˚F in auto mode, the operation of fan speed and vane position change according to the temperature setting.

2. Cooling mode

2.1 Temperature control : The set temperature can be adjusted from 61-88˚F in auto mode, the operation of fan speed and vane position change according to the temperature setting.

2.2. Compressor and process control.

2.2.1. When RT-ST≥ 1˚F, the compressor starts, AC operates according to the temperature setting.

2.2.2). When

2.2.2.1. RT-ST≤ 5˚F, compressor keeps 2 min continuously;

2.2.2.2 RT-ST≤ 3.5˚F, compressor works in lowest frequency for 5 min continuously;

2.2.2.3 RT-ST≤ 2˚F, compressor works in lowest frequency for 10 min continuously,

The compressor stops operation.

2.2.3. The compressor frequency control: Based on relation of RT & ST, and the changing speed of RT.

2.2.4. The compressor will also stop working while unit is:

a. switched off.

b. under protection.

c. changed to fan mode.

2.2.5. Under normal operation, the compressor can be stopped by program only after 7 min once it starts up.

2.2.6. lOnce the compressor is stopped by program, restart will be delayed for 3 minutes.

3. Outdoor Fan motor control:

3.1. While unit is:

3.1.1 switched off.

3.1.2 under protection.

3.1.3 to the set temperature.

After compressor shutdown, the fan motor stops working according to the temperature of OPT and OAT, the max delay for the motor should be less than 160s.

3.2. When the unit is switched on in cooling mode, outdoor fan motor will delay 5s after compressor starts up.

4. When Main PCB fails or stops for protection, Display PCB works as preset.

OPERATION

Sequence of Operation

5. Anti-frosting protection

Control the unit operation frequency and the frequency changing rate to achieve anti-frosting protection.

5.1 Frequency Slowly Increasing(FSI):

5.1.1 If 43˚F≤IPT <45˚F, the frequency increasing rate is 1Hz/60s, slowly increasing operation speed.

5.1.2 When IPT≥7˚45˚F, unit protection shuts down the unit.

5.2 Frequency Limitation:

If 41˚F≤IPT<43˚F, the compressor frequency forbidden to increase.

5.3 Normal Frequency Decreasing (NFD):

If 37˚F≤IPT<39˚F, the frequency decreasing rate is 8Hz/90s, until reaching the lower frequency limit.

5.4 Fast Frequency Decreasing (FFD):

If 35˚F≤IPT<37˚F, the frequency decreasing rate is 16Hz/90s, until to the lower frequency limit.

5.5 Unit stop:

5.5.1 When IPT<34˚F for 3min continuously, unit stops working for anti-defrosting protection.

5.5.2 While IPT<42˚F, and the unit stopped for 3 min already, can the unit recover to operation.

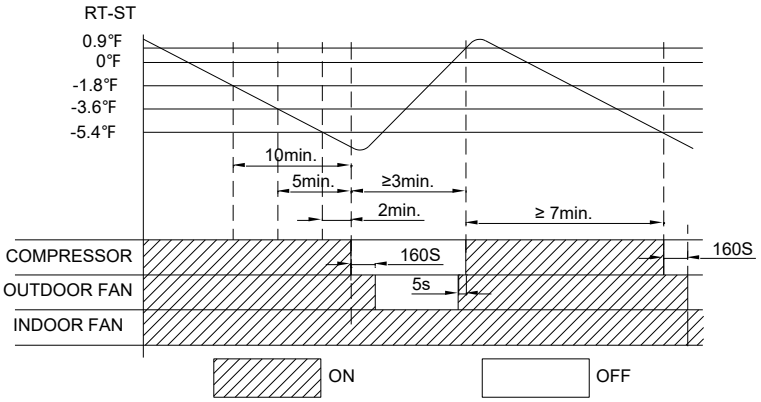


Figure 301

6. Dry mode

6.1 Temperature control: 61-88˚F.

Fan speed: low Vane blade position: as selected.

6.2 When Main PCB fails or stops for protection, Display PCB works as preset.

6.3 Failure protection: as cooling mode.

6.4 Energy saving and sleep mode: Invalid.

6.5 Fan motor stops working.

6.6 Energy saving and sleep mode: Invalid.

7. Fan mode

7.1The temperature setting: 61-88˚F,

Fan speed and vane position: as preset.

7.2 For above function, when unit preset to be auto fan mode, the fan motor will change its operation speed based on the temperature difference of ambient and preset temperature.

7.3 Outdoor fan and compressor always OFF.

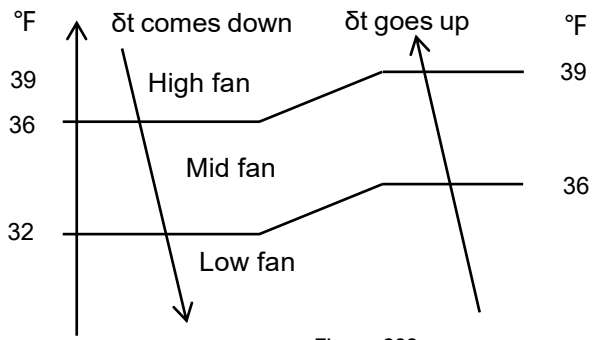


Figure 302

OPERATION

Sequence of Operation

8. Timer

The unit can be controlled by a timer. It will be switched on or off automatically.

8.1 TIMER ON

8.1.1 TIMER ON can be set only when the air conditioner is OFF.

8.1.2 Press TIMER on the remote control ONCE to enter time setting.

8.1.3 Press "+" or "- " to set the time for unit to start

8.1.4 Set other function as MODE, FAN SPEED, SWING etc.

8.1.5 Press TIMER ONCE AGAIN to confirm the TIME ON setting

8.2 TIMER OFF

8.2.1 TIMER OFF can be set only when the air conditioner is ON.

8.2.2 Press TIMER on the remote control ONCE to enter time setting.

8.2.3 Press "+" or "-" to set the time for unit to stop

8.2.4 Press TIMER ONCE AGAIN to confirm the TIME OFF setting

Note: In case of no selection for the time setting within 10s, the timer function will be OFF automatically.

9. Sleeping mode

While AC works in sleeping mode, the light of POWER SUPPLY and SLEEP always ON, and the temperature display will be OFF after 15s.

In this mode, the AC unit works according to the SLEEP CURVE as designed.

Sleeping mode the unit can work 10 hours continuously, after that it will quit from this mode and work as previous presetting.

10. Auto restart function

While unit is operating in one mode, all of its operation data, such as working mode, preset temperature etc., is memorized into IC by main PCB. If the unit lose power, the AUTO RESTART function will set synchronously and the air conditioner will work at the same mode as before once power is restored.

Note: The function setting: Within 3 min of turning the power ont, set the unit in cooling mode, set temperature to 86˚F, and mid fan speed, press the ECO button 10 times within 8s, the AUTO RESTART will be activated.

11. Over heat protection for Heating mode

11.1 Overload protection

11.1.1. Overload protection for Cooling or Dry mode

11.1.1.1 if:

a. OPT≥144˚F, unit stops working for overload

b. OPT<131˚F, after compressor has stopped for 3 min, the unit can be restarted.

11.1.2 When OPT≥131˚F, the compressor will be frequency limited/reduced for over load protection.

11.1.3 If the unit faults 6 times for overload stop working protection continuously, this protection can't be recovered unless ON/OFF button is pressed,. The unit will show failure code.

In the process of operation, once the compressor runs continuously more than 6 min, the counter of overload stop working protection will be reset to zero and start a new counting process.

The failure protection will be reset when the unit is switched off or placed in fan mode.

NOTE: If the defective failure can't be recovered, the failure can't eliminate even if operation mode changed.

11.2 Overload protection for Heating mode

11.2.1 If:

a. IPT≥144˚F, unit stops working for overload protection.

b. IPT<131˚F, after compressor stopps for 3 min, the unit can be restarted.

11.2.2 When IPT≥131˚F, the compressor will be frequency limited/reduced for over load protection.

11.2.3 If unit has 6 times of over load stop--working protection continuously, this protection can't be recovered unless ON/OFF button is pressed, and unit will show failure code.

In the process of operation, once the compressor runs continuously more than 6 min, the counter of over load stop working protection will be reset to zero and start a new counting process.

The failure and times for protection will eliminate immediately once the unit to be switched off, on fan mode or changed to be heating mode from others.

Note: If the defective failure can't be recovered, the failure can't eliminate even if operation mode changed.

OPERATION

Sequence of Operation

12. The compressor discharge temperature protection

12.1. If ODT≥239˚F, unit stops working for over temperature protection.
While ODT<212˚F, & after compressor stopped for 3 min, the unit can be restarted.
12.2 If ODT≥212˚F, the compressor will be frequency limited/reduced for over temperature protection.
12.3 If unit has a discharge over temperature stop working protection 6 times continuously, this protection can't be recovered unless ON/OFF button is pressed. The unit will show failure code.
In the process of operation, once the compressor runs continuously more than 6 min, the counter of discharge over temperature stop working protection will be reset to zero and start a new counting process.
The failure protection counter will be reset once the unit is switched off, or changed to fan mode.

13. The current protection

13.1 If the unit A/C working current is more than Limited current (ILC), the compressor will be frequency limited / reduced for over current protection.
13.2 When unit A/C working current is more than Stopped current (ISC), AC unit stops working. Only when the compressor stops for 3 min can the unit be restarted.
13.3 If unit faults 6 times for over current stop working protection continuously, the unit must be restarted to operate.
In the process of unit operation, once the compressor runs continuously more than 6 min, the counter of stop working protection will be reset to zero and re start a new counting process.

14. IPM overheating protection

14.1. When IPM temperature T IPM ≥189˚F, the compressor will be frequency limited / reduced for IPM over temperature protection.
14.2 When T IPM ≥203˚F, the AC unit stops working for AC system protection.
If T IPM 189˚F, and after compressor stopped for 3 min, the unit can be restarted.
14.3. If unit faults 6 times for IPM over temperature stop working protection continuously, the unit will need to be restarted.
In the process of operation, once the compressor runs continuously more than 6 min, the counter of over load stop working protection will be reset to zero and re start a new counting process.
The failure and times for protection will reset once the unit is switched off, or changed to fan mode.

15. Complementary

15.1 ECO function is effective under cooling and heating mode only, and is enabled by default when unit is started up (even if the ECO function is disabled manually). It will not enable ECO fucntion by default, if unit is started up by APP.
15.2 When the ECO function is set and the room temperature reaches the setting point , the indoor fan performs the following operation after the compressor stopping.

a. the indoor fan will be shut down after running for 3 minutes at the set speed.
b. If the compressor does not meet startup conditions, the indoor fan will stop within five minutes.
c. The indoor fan will resume operation at low speed for 1 minute after 5 minutes stop time.
d. The indoor fan will operate in cycle according to the order of b and c, before the compressor startup.
e. After the compressor meets the starting conditi ons, the indoor fan will exit the above cycle, and start running at the set speed immediately.
f. If the compressor does not meet the starting conditions after starting, the indoor fan runs at the set speed for 1 minute, and then cycles operation according to b and c. If the compressor start condition is reached after starting, the fan runs at the set speed.
h. The above logic will be not applied to the fault shutdown.

16. Communication control
If Main PCB can't get signal feedback from Display PCB for 2 min continuously, AC unit stops working and shows E0 error code as Main PCB/Display PCB communication failure. Once the Main PCB & Display PCB communication recovers, and the compressor has stopped for 3 minutes , can the unit be restarted.

17. Calibration Test Mode: Within 3 min while indoor unit switch on, and set the unit as:

17.1 Cooling mode.
17.2 set temperature to 30
17.3 Mid fan speed. Press ECO button 7 times within 8s, the unit will change to calibration test mode, and the buzzer sounds 3 times.

OPERATION

Refrigeration Sequence Of Operation

A good understanding of the basic operation of the refrigeration system is essential for the service technician. Without this understanding, accurate troubleshooting of refrigeration system problems will be more difficult and time consuming, if not (in some cases) entirely impossible. The refrigeration system uses four basic principles (laws) in its operation they are as follows:

1. "Heat always flows from a warmer body to a cooler body."

2. "Heat must be added to or removed from a substance before a change in state can occur"

3. "Flow is always from a higher pressure area to a lower pressure area."

4. "The temperature at which a liquid or gas changes state is dependent upon the pressure."

The refrigeration cycle begins at the compressor. Starting the compressor creates a low pressure in the suction line which draws refrigerant gas (vapor) into the compressor. The compressor then "compresses" this refrigerant vapor, raising its pressure and its (heat intensity) temperature.

The refrigerant leaves the compressor through the discharge Line as a hot High pressure gas (vapor). The refrigerant enters the condenser coil where it gives up some of its heat. The condenser fan moving air across the coil's finned surface facilitates the transfer of heat from the refrigerant to the relatively cooler outdoor air.
When a sufficient quantity of heat has been removed from the refrigerant gas (vapor), the refrigerant will "condense" (i.e. change to a liquid). Once the refrigerant has been condensed (changed) to a liquid it is cooled even further by the air that continues to flow across the condenser coil.

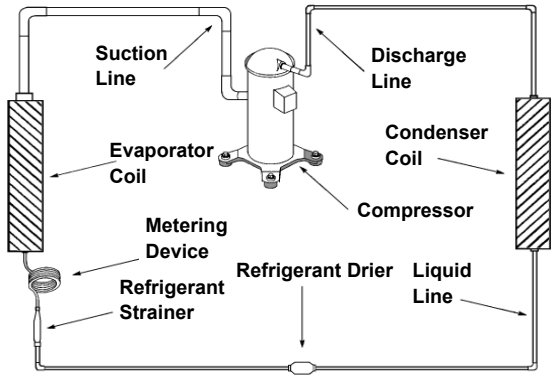
The design determines at exactly what point (in the condenser) the change of state (i.e. gas to a liquid) takes place. In all cases, however, the refrigerant must be totally condensed (changed) to a Liquid before leaving the condenser coil.

The refrigerant leaves the condenser Coil through the liquid line as a warm high pressure liquid. It next will pass through the refrigerant drier (if equipped). It is the function of the drier to trap any moisture present in the system, contaminants, and large particulate matter.

The liquid refrigerant next enters the metering device. The metering device is a capillary tube. The purpose of the metering device is to "meter" (i.e. control or measure) the quantity of refrigerant entering the evaporator coil.
In the case of the capillary tube this is accomplished (by design) through size (and length) of device, and the pressure difference present across the device.

Since the evaporator coil is under a lower pressure (due to the suction created by the compressor) than the liquid line, the liquid refrigerant leaves the metering device entering the evaporator coil. As it enters the evaporator coil, the larger area and lower pressure allows the refrigerant to expand and lower its temperature (heat intensity). This expansion is often referred to as "boiling" or atomizing. Since the unit's blower is moving indoor air across the finned surface of the evaporator coil, the expanding refrigerant absorbs some of that heat. This results in a lowering of the indoor air temperature, or cooling.

The expansion and absorbing of heat cause the liquid refrigerant to evaporate (i.e. change to a gas). Once the refrigerant has been evaporated (changed to a gas), it is heated even further by the air that continues to flow across the evaporator coil.



The particular system design determines at exactly what point (in the evaporator) the change of state (i.e. liquid to a gas) takes place. In all cases, however, the refrigerant must be totally evaporated (changed) to a gas before leaving the evaporator coil.

The low pressure (suction) created by the compressor causes the refrigerant to leave the evaporator through the suction line as a cool low pressure vapor. The refrigerant then returns to the compressor, where the cycle is repeated.

Figure 303 (Refrigeration Sequence Of Operation)

COMPONENT TESTING

Check 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.

Test the Capillary Tube and Check Valve Assy

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 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.

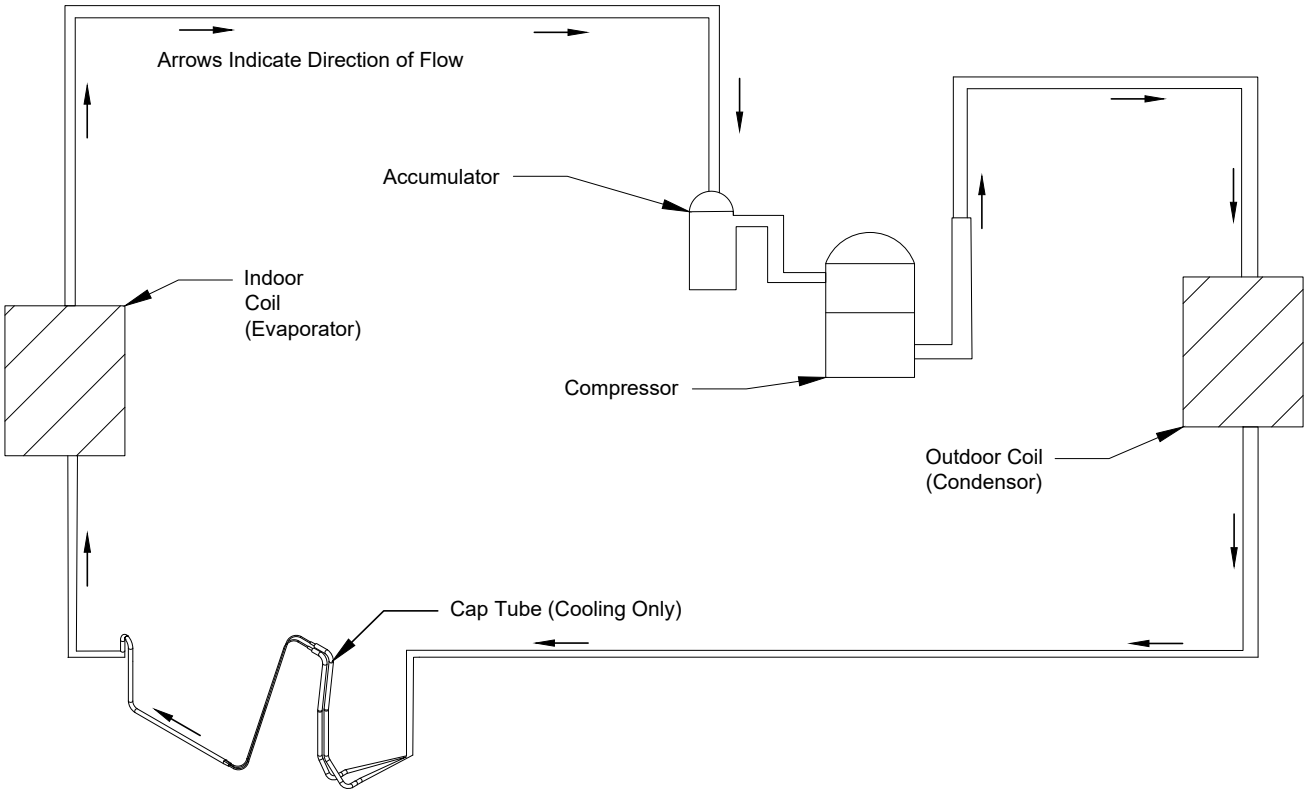


Figure 501 (Cooling Only Refigerant Flow)

COMPONENT TESTING

Compressor Checks

⚠ 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 proper protective clothing must be worn when working with refrigerants.

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

Gain access to the Compressor See Unit Disassembly

1. Remove Compressor Cap.

2. Disconnect terminals U, V, and W from the Compressor).

Resistance Test.

1. Set Ohm meter to the lowest scale and check continuity between pins U, V, and W.

At room temperature (70°- 95°F) the resistance should be approximately 3.5 ohms. The Ohm values will change significantly at different temperatures. This does not indicate that the compressor windings are faulty. A reading of open (infinity), or if resistance between the windings is not the same, **does** indicate that the compressor windings are faulty.

2. Check for continuity from between pins U to ground, V to ground, and U to ground.
The compressor windings are faulty if the there is continuity from the compressor windings to ground.

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.

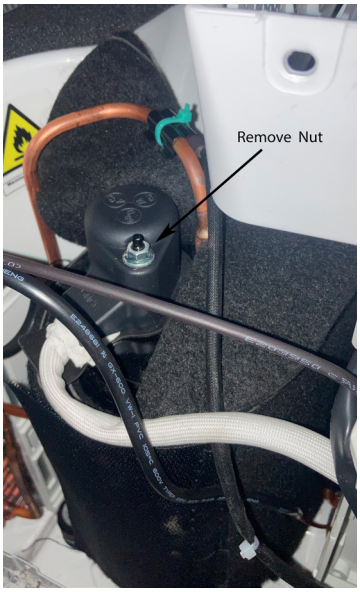


Figure 502

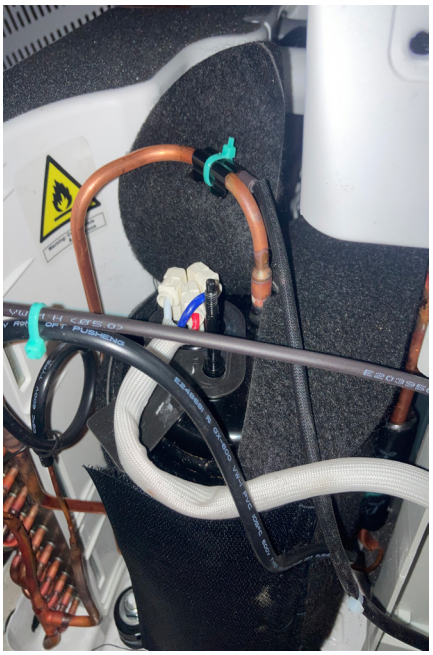


Figure 503

COMPONENT TESTING

Main PCB Identification

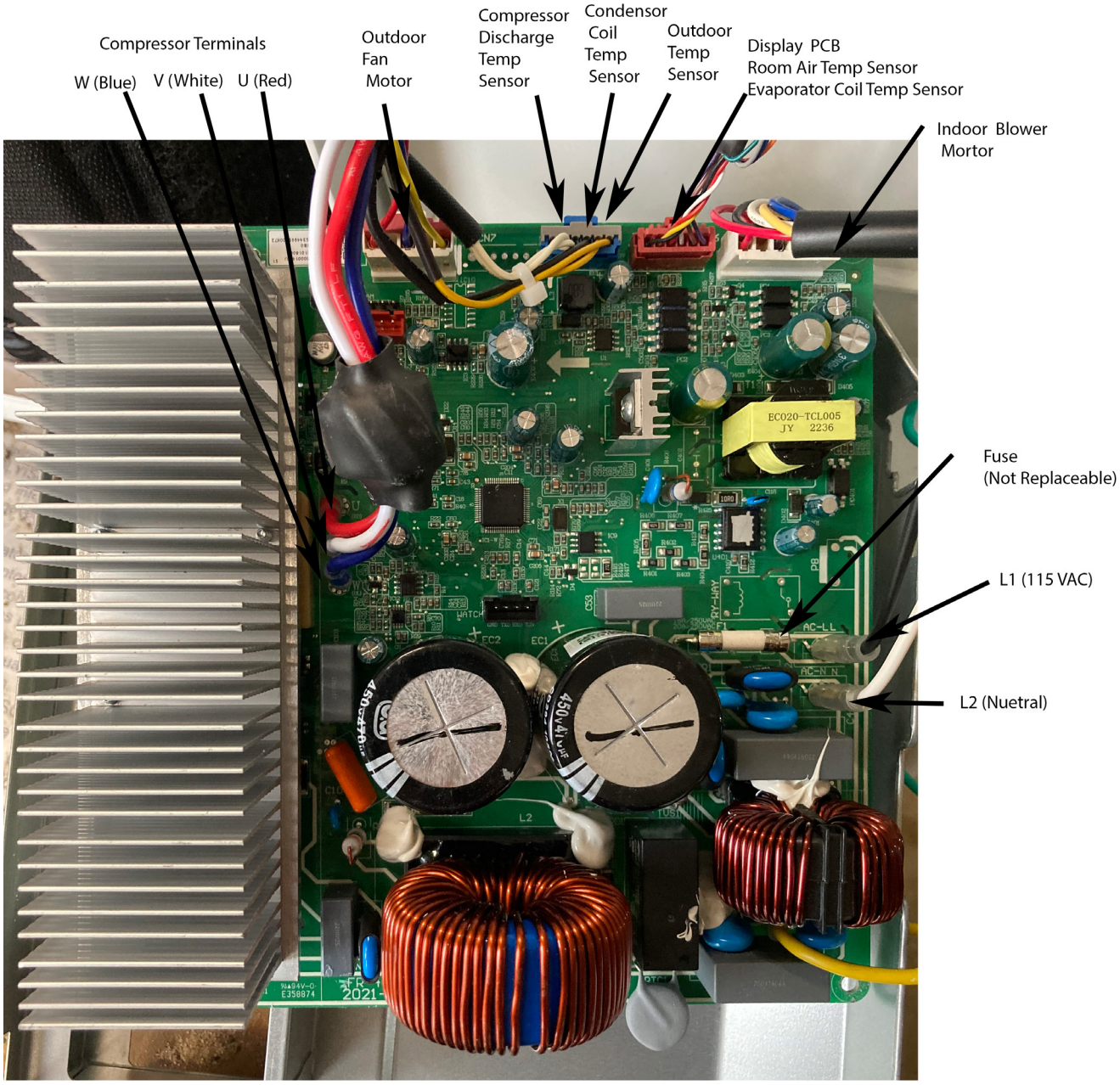


Figure 504

COMPONENT TESTING

Display PCB Identification

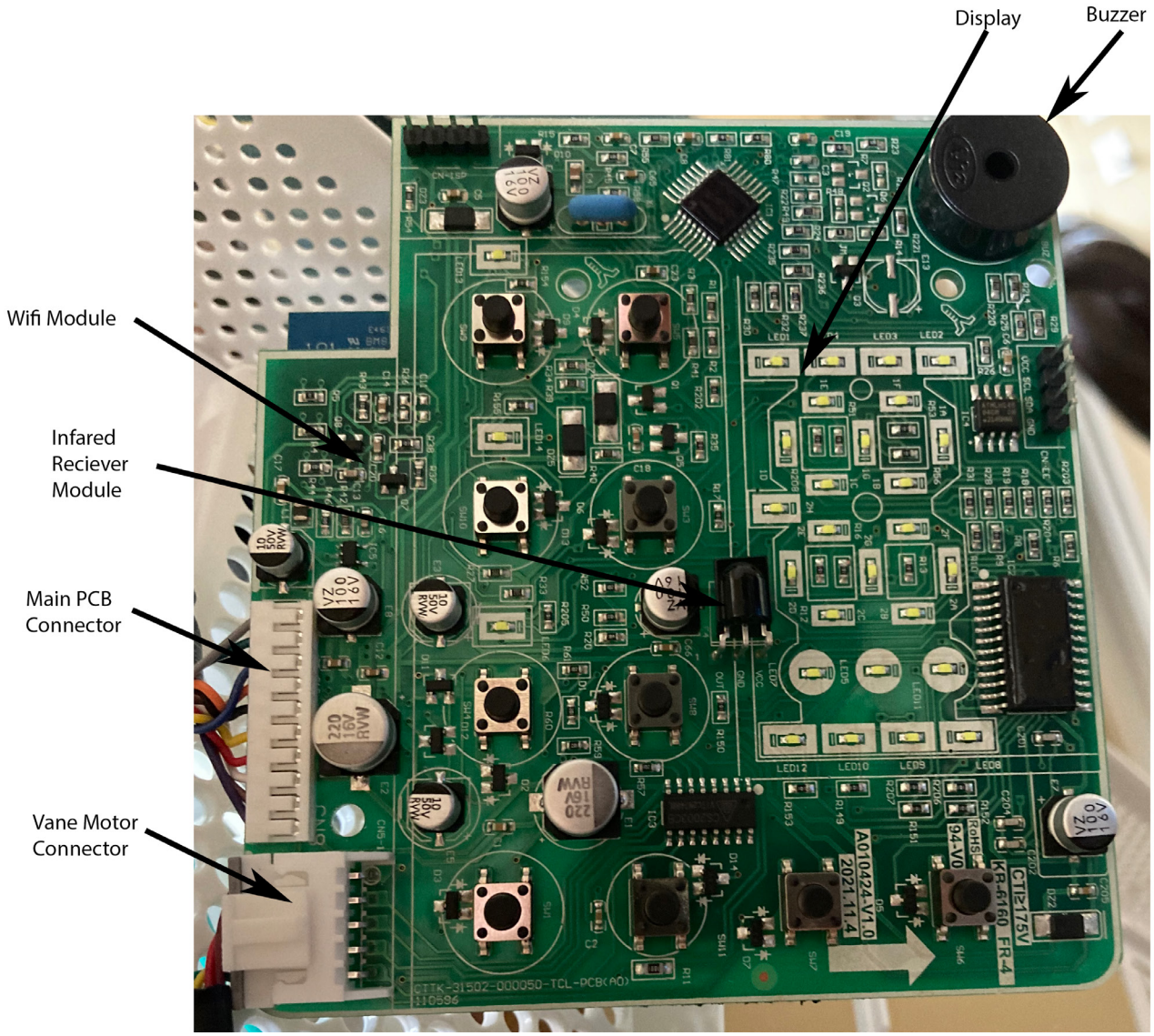


Figure 505

Routine Maintenance

Coils & Chassis

NOTE: Do not use a caustic (alakaline) or acidic cleaning agent on coils or base pan. Use a biodegradable cleaning agent and degreaser. The use of harsh cleaning materials may lead to deterioration of the aluminum fins or the coil end plates.

The indoor coil and outdoor coils and base pan should be inspected periodically (annually or semi-annually) and cleaned of all debris (lint, dirt, leaves, paper, etc.) as necessary. Under extreme conditions, more frequent cleaning may be required. Clean the coils with and base pan with a coil comb or soft brush and compressed air or vacuum. A low pressure washer device may also be used; however, you must be careful not to bend the aluminum fin pack. Use a sweeping up and down motion in the direction of the vertical aluminum fin pack when pressure cleaning coils.

NOTE: It is extremely important to insure that none of the electrical and/or electronic parts of the unit get wet when cleaning. Be sure to cover all electrical components to protect them from water or spray.

Decorative Front

Use a damp (not wet) cloth when cleaning the control area to prevent water from entering the unit, and possibly damaging the electronic control.

The decorative front and the cabinet can be cleaned with warm water and a mild liquid detergent. Do NOT use solvents or hydrocarbon based cleaners such as acetone, naphtha, gasoline, benzene, etc.

The indoor coil can be vacuumed with a dusting attachment if it appears to be dirty. DO NOT BEND FINS. The outdoor coil can be gently sprayed with a garden hose.

The air filter should be inspected periodically and cleaned if needed by vacuuming with a dust attachment or by cleaning in the sink using warm water and a mild dishwashing detergent. Dry the filter thoroughly before reinstalling. Use caution, the coil surface can be sharp.

Fan Motor & Compressor

The fan motor & compressor are permanently lubricated and require no additional lubrication.

Sleeve

Inspect the inside of the sleeve and drain system periodically (annually or semi-annually) and clean as required. Under extreme conditions, more frequent cleaning may be necessary. Clean both of these areas with an antibacterial and antifungal cleaner. Rinse both items thoroughly with water and ensure that the drain outlets are operating correctly. Check the sealant around the sleeve and reseal areas as needed.

Blower Wheel / Housing / Condensor Fan / Shroud

Inspect the indoor blower and its housing, evaporator blade, condenser fan blade and condensor shroud periodically (yearly or bi-yearly) and clean of all debris (lint, dirt, mold, fungus, etc.). Clean the blower housing area and blower wheel with an antibacterial / antifungal cleaner. Use a biodegradable cleaning agent and degreaser on condenser fan and condenser shroud. Use warm or cold water when rinsing these items. Allow all items to dry thoroughly before reinstalling them.

Electrical / Electronic

Periodically (at least yearly or bi-yearly) inspect all control components: electronic, electrical and mechanical, as well as the power supply. Use proper testing instruments (voltmeter, ohmmeter, ammeter, wattmeter, etc.) to perform electrical tests. Use an air conditioning or refrigeration thermometer to check room, outdoor and coil operating temperatures.

Air Filter

To ensure proper unit operation, the air filter should be cleaned at least monthly, and more frequently if conditions warrant. The unit must be turned off before the filter is cleaned.

Friedrich Air Conditioning Company
10001 Reunion Place, Suite 500
San Antonio, TX 78216
800-541-6645
www.friedrich.com

ROOM AIR CONDITIONERS
LIMITED WARRANTY

FIRST YEAR

ANY PART: If any part supplied by FRIEDRICH fails because of a defect in workmanship or material within twelve months from date of original purchase, FRIEDRICH will repair the product at no charge, provided room air conditioner is reasonably accessible for service. Any additional labor cost for removing inaccessible units and/or charges for mileage related to travel by a Service Agency that exceeds 25 miles one way will be the responsibility of the owner. This remedy is expressly agreed to be the exclusive remedy within twelve months from the date of the original purchase.

SECOND THROUGH FIFTH YEAR

SEALED REFRIGERANT SYSTEM: If the Sealed Refrigeration System (defined for this purpose as the compressor, condenser coil, evaporator coil, reversing valve, check valve, capillary, filter drier, and all interconnecting tubing) supplied by FRIEDRICH in your Room Air Conditioner fails because of a defect in workmanship or material within sixty months from date of purchase, FRIEDRICH will pay a labor allowance of $100 and parts necessary to repair the Sealed Refrigeration System; PROVIDED FRIEDRICH will not pay any additional labor charges over the prescribed labor allowance including the cost of diagnosis of the problem, removal, freight charges, and transportation of the air conditioner to and from the Service Agency, and the reinstallation charges associated with repair of the Sealed Refrigeration System. All such cost will be the sole responsibility of the owner. This remedy is expressly agreed to be the exclusive remedy within sixty months from the date of the original purchase.

APPLICABILITY AND LIMITATIONS: This warranty is applicable only to units retained within the Fifty States of the U.S.A., District of Columbia, and Canada. This warranty is not applicable to:

1. Air filters, fuses, batteries and the front grille removal tool.
2. Products on which the model and serial numbers have been removed.
3. Products which have defects or damage which results from improper installation, wiring, electrical current characteristics, or maintenance; or caused by accident, misuse or abuse, fire, flood, alterations and/or misapplication of the product and/or units installed in a corrosive atmosphere, default or delay in performance caused by war, government restrictions or restraints, strikes, material shortages beyond the control of FRIEDRICH, or acts of God.

OBTAINING WARRANTY PERFORMANCE: Service will be provided by the FRIEDRICH Authorized Dealer or Service Organization in your area. They are listed in the Yellow Pages. If assistance is required in obtaining warranty performance, write to: Room Air Conditioner Service Manager (the Friedrich address is at the top of this w arranty) or email tac@friedrich.com.

LIMITATIONS: THIS WARRANTY IS GIVEN IN LIEU OF ALL OTHER WARRANTIES. Anything in the warranty notwithstanding, ANY IMPLIED WARRANTIES OF FITNESS FOR PARTICULAR PURPOSE AND/OR MERCHANTABILITY SHALL BE LIMITED TO THE DURATION OF THIS EXPRESS WARRANTY. MANUFACTURER EXPRESSLY DISCLAIMS AND EXCLUDES ANY LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGE FOR BREACH OF ANY EXPRESSED OR IMPLIED WARRANTY.
Performance of Friedrich's Warranty obligation is limited to one of the following methods:

1. Repair of the unit
2. A refund to the customer for the prorated value of the unit based upon the remaining w arranty period of the unit.
3. Providing a replacement unit of equal value

The method of fulfillment of the warranty obligation is at the sole discretion of Friedrich Air Conditioning.

NOTE: Some states do not allow limitations on how long an implied w arranty lasts, or do not allow the limitation or exclusion of consequential or incidental damages, so the foregoing exclusions and limitations may not apply to you.

OTHER: This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

PROOF OF PURCHASE: Owner must provide proof of purchase in order to receive any w arranty related services.

All service calls for explaining the operation of this product w ill be the sole responsibility of the consumer.

All warranty service must be provided by an **Authorized FRIEDRICH Service Agency,** unless authorized by FRIEDRICH prior to repairs being made.