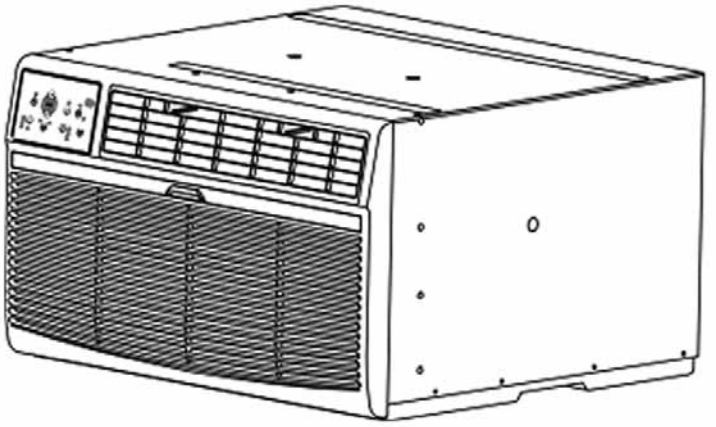
HEAT CONTROLLER, INC.

SERVICE MANUAL



Thru-the-Wall Series with R-410A

BG-81G
BG-101G
BG-103G
BG-123G
BGE-103G
BGE-123G
BG-143G

Heat Controller, Inc. • 1900 Wellworth Ave. • Jackson, MI 49203 • (517)787-2100 • www.heatcontroller.com

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1. PRECAUTION

1.1 Safety precaution

- To prevent injury to the user and property damage, the following instructions must be followed.
- Incorrect operation may cause harm or damage.
- Before servicing unit, be sure to read this service manual.

1.2 Warning

- Do not use damaged power cords, plugs, or a loose socket.
- Always use the power plug and socket with the ground terminal.
- Do not modify or extend the power cord.
- Do not turn the air-conditioner ON or OFF by plugging or unplugging the power plug.
- Use a dedicated power outlet for this appliance.
- Grasp the plug to remove the cord from the outlet. Do not touch it with wet hands.
- Do not place a heater or other appliance near the power cable.
- Do not allow water to run into electrical parts.
- Do not store or use flammable gas or combustibles near the air conditioner.
- Unplug the unit if strange sounds, odors, or smoke comes from it.

1.3 Caution

- Use a soft cloth to clean the unit. Do not use harsh detergents, solvents, etc.
- Do not touch the metal parts of the product when removing the air filter. They are very sharp.
- Do not step on or put anything on the air conditioner
- Do not insert hands or other objects through the air inlet or outlet while the air conditioner is plugged in.

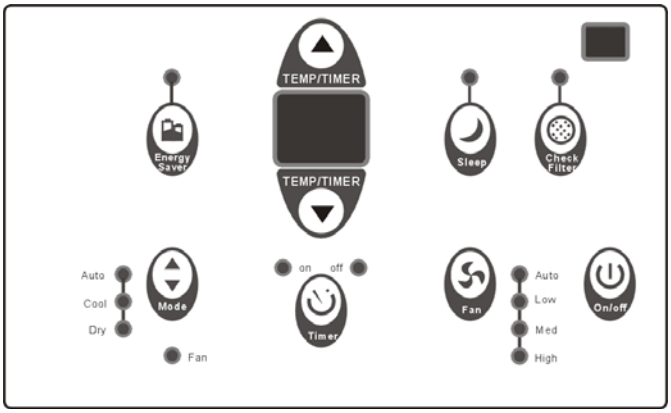
2. FEATURES AND PANEL

2.1 Features

- Slide-in and Top-out chassis for simple installation and service (on some models).
- Washable one-touch filter and easy access panel.
- Super compact design.
- Reliable and efficient rotary compressor.
- Fresh air switch (on some models).
- Anti-freezing control in cooling mode. Prevents water from freezing on evaporator by sensing the evaporator pipe temperature in cooling mode.
- Auto-restart function.
- Time delay safety for compressor. Restart approx. 3 minutes after the power failure.
- Auto mode in heating mode. Operation mode can be automatically set by the room temperature.
- Sleep mode.
- Self-diagnosis function.
- Filter check sensor after 250 hours.
- Auto cool function.
- Follow me function (optional).
- Ionizer function (optional).
- Silver ion filter (optional).
- Alternate between Celsius or Fahrenheit temperature display units
- 24 hours timer function.
- Energy saver.

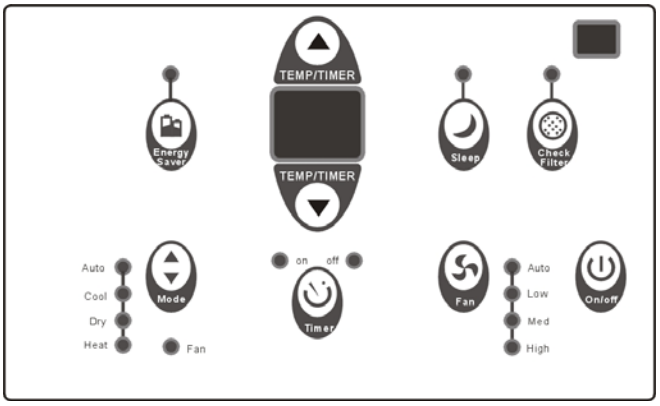
2.2 Control panel illustration

■ **Control panel for cooling only models:**



B Panel

■ Control panel for cooling and heating models:



B Panel

Note: The control panels above are representative of many available models. Your model may be slightly different.

On/Off (On and Off):

Press this button once to start the unit, press again to stop.

FAN:

Press this button to select appropriate fan speed.

Fan Speed mode has four options - Auto, Low, Med or High. Each time the button is pressed, the fan speed mode is shifted.

TEMPRATURE UP AND DOWN:

Press the Up(▲)or Down(▼) buttons to change temperature setting.

Press the Up(▲) button to increase the set (operating) temperature of the unit.

Press the Down(▼) button to decrease the set (operating) temperature of the unit.

Press or hold either button until the desired temperature is displayed. This temperature will be automatically maintained anywhere between 62°F (17°C) and 86°F (30°C).

MODE:

Press this button to select operation mode.

Each time you press the button, the operation mode is selected in a sequence that goes from Auto, Cool, Dry and Fan for cooling only models. and Auto, Cool, Dry, Heat and Fan for electric heating models.

ENERGY SAVER:

Press this button to activate energy saving. This feature can only function in cooling mode.

SLEEP:

Press this button to save energy and create a more comfortable environment when sleeping. In this function, the setting temperature will increase by 2° F degrees 30 minutes after the mode is selected. The temperature will then continue to increase by another 2° F degrees after every 30 minutes. After 7 hours, the unit return to the originally programmed settings. The Sleep mode program can be cancelled at any time during operation by again pressing the Sleep button.

TIMER:

Press this button to set the time for unit starting or stopping.
Press or hold the Up (▲) / Down (▼) to set the timer time.
Turning the unit ON or OFF at any time will cancel the Auto Start/Stop function.

CHECK FILTER:

This feature is a reminder to clean the Air Filter for more efficient operation. The “CHECK FILTER” light will illuminate after 250 hours of operation.
After the filter is cleaned, press this button to confirm that the filter has been cleaned and the light will go off.

FOLLOW ME (OPTIONAL):

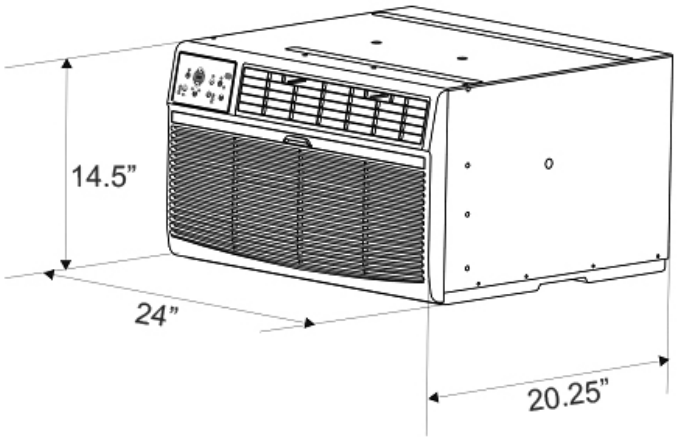
Press the button on the remote controller to activate this feature, which serves as a remote thermostat allowing for the precise temperature control at its location, rather than using the thermostat sensor in the unit’s display.

Clean Air (OPTIONAL):

Press this button to start the Clean Air feature, press again to stop.
When this feature is started, the Ionizer is energized to generate abundant anions to fill the room with refreshing and natural air.

3. UNIT DIMENSION

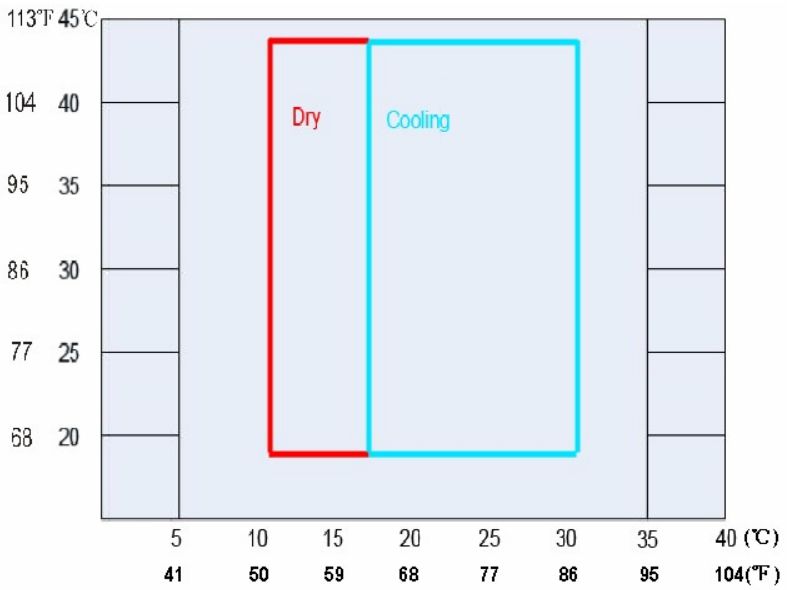
3.1 Unit dimension:



4. OPERATION LIMITS

4.1 Cooling operation

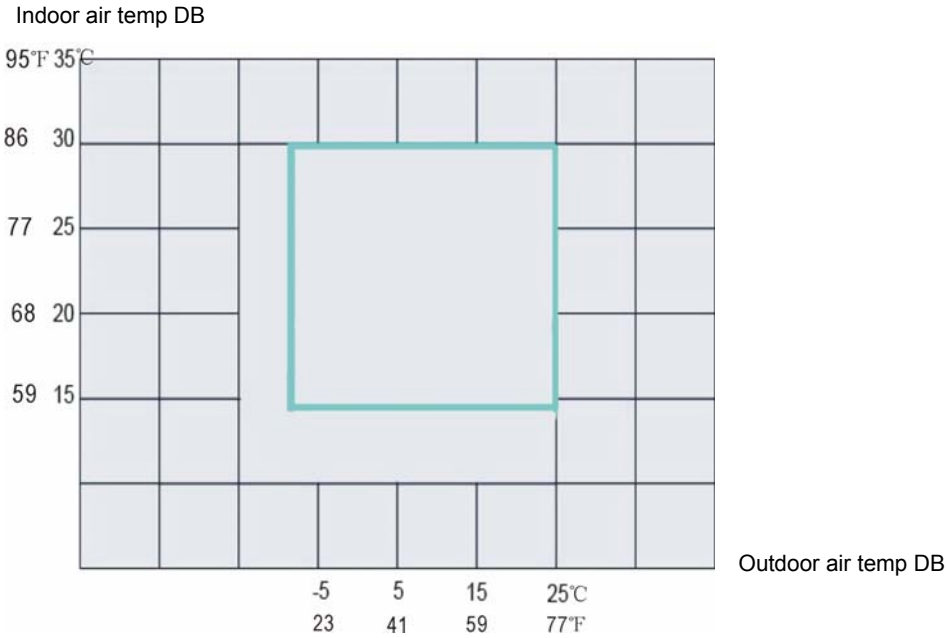
Outdoor unit air temp DB



Indoor air temp DB

Note: *The chart is the result from the continuous operation under constant air temperature conditions. However, the initial pull-down stage is not included.*

4.2 Electric heating operation



Note: *The chart is the result from the continuous operation under constant air temperature conditions. However, the initial pull-down stage is not included.*

5. PROTECTION FUNCTION

5.1 Symbol & Meaning

TA: Indoor ambient temperature;
TE: Indoor evaporator temperature;
TS: Setting temperature through the remote controller.

5.2 Protection Function

■ **3 minute compressor time delay**

The compressor will wait for 3 minutes before restarting, so as to prevent the pressure imbalance in refrigerant system from resulting in compressor rotor locking.

■ **Anti-freezing protection in cooling or dry mode**

Anti-freezing function is activated according to TE.

If TE is lower than 33.8°F (1℃) for 14 minutes, the evaporator anti-freezing protection will be activated. The compressor will turn off for 5 minutes. 5 minutes later, if the evaporator pipe temperature is still lower than 33.8°F (1℃), the compressor remain off; when it gets higher than 33.8°F (1℃), the compressor will restart and the antifreeze function will be cancelled.

Note: If the compressor stops operation, the time will be cleared.
If the fan motor turns to High speed or the indoor ambient temperature gets over 78.8°F (26℃), the time will keep inactive, not be cleared.

■ **Anti-frosting protection and defect at cooling or dry mode**

After compressor runs for 3 minutes, if TE is less than 5°F (-15℃) for the subsequent 3 minutes, the anti-frosting protection will be activated and the compressor will stop for the following 6 minutes. After that time, if the condition for de-frosting function is met again in the following 10 minutes while the compressor is operating, the unit will display '**Ed**' to indicate that the unit is in the defrost mode defect. The compressor and fan motor will turn OFF

- Note: The Defect display can be cancelled only by pressing the ON/OFF button on the unit or the remote controller.

■ **Fault Code**

Defect code	Defect explanation
Ed	Evaporator de-frosting defect.
AS	Indoor ambient temperature sensor failure in heating, cooling, dry and auto mode.
HS	DAHT sensor failure in heating mode.
LO	Sensor disconnection malfunction in fan only mode
HI	Sensor short circuit malfunction in fan only mode

6. COMPONENT OPERATION & TESTING

⚠ ***WARNING:***

DISCONNECT THE POWER CORD FROM THE POWER PLUG BEFORE SERVICING OR TESTING.

6.1 COMPRESSORS

Compressors are single phase, 115 or 230/208 volt, depending on the model number. All compressor motors are permanent split capacitor type using only a running capacitor across the start and run terminal.

All compressors are internally spring mounted and externally mounted on rubber isolators.

COMPRESSOR WINDING TEST (See Figure 1)

Remove compressor terminal box cover and disconnect wires from terminals. Using an ohmmeter, check continuity across the following:

1. Terminal "C" and "S" - no continuity
- open winding - replace compressor.
2. Terminal "C" and "R" - no continuity
- open winding - replace compressor.
3. Terminal "R" and "S" - no continuity
- open winding - replace compressor.

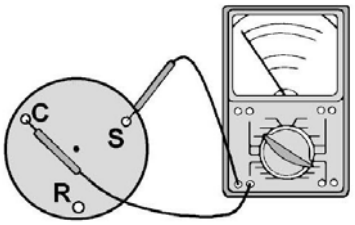


Figure 1: Compressor winding test

GROUND TEST

Use an ohmmeter set on its highest scale. Touch one lead to the compressor body (clean point of contact as a good connection is a must) and the other probe in turn to each compressor terminal (see Figure 2.) If a reading is obtained, the compressor is grounded and must be replaced.

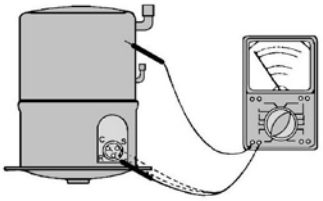


Figure 2: Typical ground test

CHECKING COMPRESSOR EFFICIENCY

The reason for compressor inefficiency is normally due to broken or damaged suction and/or discharge valves, reducing the ability of the compressor to pump refrigerant gas.

This condition can be checked as follows:

1. Install a piercing valve on the suction and discharge or liquid process tube.
2. Attach gauges to the high and low sides of the system.
3. Start the system and run a “cooling performance test.”

If test shows:

A. Below normal high side pressure.

B. Above normal low side pressure.

C. Low temperature difference across coil.

The compressor valves are faulty - replace the compressor.

THERMAL OVERLOAD (External)

Some compressors are equipped with an external overload which is located in the compressor terminal box adjacent to the compressor body (see Figure 3.) The overload is wired in series with the common motor terminal. The overload senses both major amperage and compressor temperature. High motor temperature or amperage heats the disc causing it to open and break the circuit to the common motor terminal.

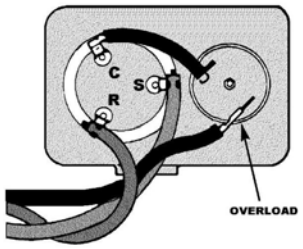


Figure 3: External overload

Heat generated within the compressor shell is usually due to:

1. High amperage.
2. Low refrigerant charge.
3. Frequent recycling.
4. Dirty condenser.

TERMINAL OVERLOAD – TEST (Compressor - External Type)

1. Remove overload.
2. Allow time for overload to reset before attempting to test.
3. Apply ohmmeter probes to terminals on overload wires. There should be continuity through the overload.

TERMINAL OVERLOAD (Internal)

Some model compressors are equipped with an internal overload. The overload is embedded in the motor windings to sense the winding temperature and/or current draw. The overload is connected in series with the common motor terminal.

Should the internal temperature and/or current draw become excessive, the contacts in the overload will open, turning off the compressor. The overload will automatically reset, but may require several hours before the heat is dissipated.

CHECKING THE INTERNAL OVERLOAD (see Figure 4.)

1. With no power to unit, remove the leads from the compressor terminals.
2. Using an ohmmeter, test continuity between terminals C-S and C-R. If not continuous, the compressor overload is open and the compressor must be replaced.

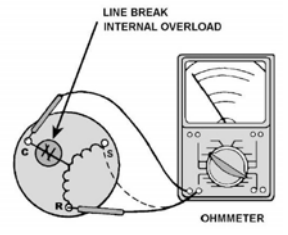


Figure 4: Internal overload

6.2 FAN MOTOR

A single phase permanent split capacitor motor is used to drive the evaporator blower and condenser fan. A self-resetting overload is located inside the motor to protect against high temperature and high amperage conditions.

FAN MOTOR - TEST

1. Determine that capacitor is serviceable.
2. Disconnect fan motor wires from fan speed switch or system switch.
3. Apply "live" test cord probes on Red wire and common terminal of capacitor. Motor should run at high speed.
4. Apply "live" test cord probes on Yellow wire and common terminal of capacitor. Motor should run at mid speed.
5. Apply "live" test cord probes on White wire and common terminal of capacitor. Motor should run at low speed.
6. Apply "live" test cord probes on each of the remaining wires from the speed switch or system switch to test intermediate speeds.

6.3 CAPACITOR, RUN

A run capacitor is wired across the auxiliary and main winding of a single phase permanent split capacitor motor such as the compressor and fan motor. A single capacitor can be used for each motor or a dual rated capacitor can be used for both.

The capacitor's primary function is to reduce the line current while greatly improving the torque characteristics of a motor. The capacitor also reduces the line current to the motor by improving the power factor of the load. The hook-up line side of the capacitor is marked with a red dot and is wired to the line side of the circuit (see Figure 5.)

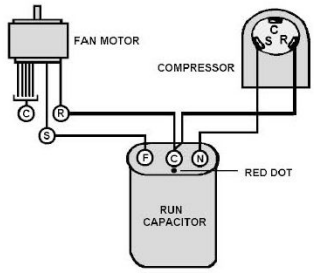


Figure 5: Run capacitor

CAPACITOR - TEST

1. Remove capacitor from unit.
2. Check for visual damage such as bulges, cracks, or leaks.
3. For dual rated, apply an ohmmeter lead to common (C) terminal and the other probe to the

compressor (HERM) terminal. A satisfactory capacitor will cause a deflection on the pointer, then gradually move back to infinity.

4. Reverse the leads of the probe and momentarily touch the capacitor terminals. The deflection of the pointer should be two times that of the first check if the capacitor is good.
5. Repeat steps 3 and 4 to check fan motor capacitor.

NOTE: A shorted capacitor will indicate a low resistance and the pointer will move to the "0" end of the scale and remain there as long as the probes are connected.

An open capacitor will show no movement of the pointer when placed across the terminals of the capacitor.

6.4 THERMOSTAT ADJUSTMENT

No attempt should be made to adjust thermostat. Due to the sensitivity of the internal mechanism and the sophisticated equipment required to check the calibration, it is suggested that the thermostat be replaced rather than calibrated. Thermostat bulb must be straight to insure proper performance.

6.5 HEATING ELEMENT **- See Figure 6**

All electric heater models are equipped with a heating element. The heating element contains a fuse link and a heater limit switch. The fuse link is in series with the power supply and will open and interrupt the power when the temperature reaches 183.2°F (84°C) or 199.4°F (93°C) depending on series model, or a short circuit occurs in the heating element. Once the fuse link separates, a new fuse link must be installed. NOTE: Always replace with the exact replacement. The heater element has a high limit control. This control is a bimetal thermostat mounted in the top of the heating element. Should the fan motor fail or filter become clogged, the high limit control will open and interrupt power to the heater before reaching an unsafe temperature condition.

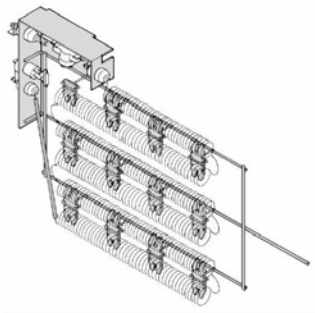


Figure 6: Heating element

The control is designed to open at 104°F (40°C). Test continuity below 104°F (40°C). and for open above 104°F (40°C)..

Press the “Mode” button, select “Heat” mode, to bring on the heating element and turn off the compressor. The room temperature sensor will then control the cycling of the element when the selected indoor temperature is reached.

Testing of the elements can be done using an ohmmeter across the terminals after the connecting wires have been removed. A cold resistance reading of approximately 10.2 ohms for the 4.7 KW heater should be registered.

6.6 VALVE, DRAIN PAN (see Figure 7)

During the cooling mode of operation, condensate which collects in the drain pan is picked up by the condenser fan blade and sprayed onto the condenser coil. This assists in cooling the refrigerant plus evaporating the water.

During the heating mode of operation, it is necessary that water be removed to prevent it from freezing due to cold outside temperatures. This could cause the condenser fan blade to freeze in the accumulated water and prevent it from turning.

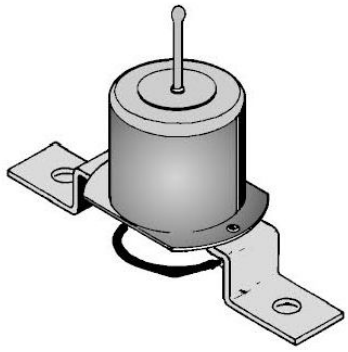


Figure 7: Drain pan valve

To provide a means of draining this water, a bellows type drain valve is installed over a drain opening in the Chassis.

This valve is temperature sensitive and will open when the outside temperature reaches 40°F (4.4°C). The valve will close gradually as the temperature rises above 40°F (4.4°C) to fully close at 68°F (20°C).

6.7 SEALED REFRIGERATION SYSTEM REPAIRS

EQUIPMENT REQUIRED:

1. Voltmeter
2. Ammeter
3. Ohmmeter
4. E.P.A. Approved Refrigerant Recovery System.
5. Vacuum Pump (capable of 200 microns or less vacuum.)
6. Acetylene Welder
7. Electronic Halogen Leak Detector (G.E. Type H-6 or equivalent.)
8. Accurate refrigerant charge measuring device such as:

a. Balance Scales - 1/2 oz. accuracy

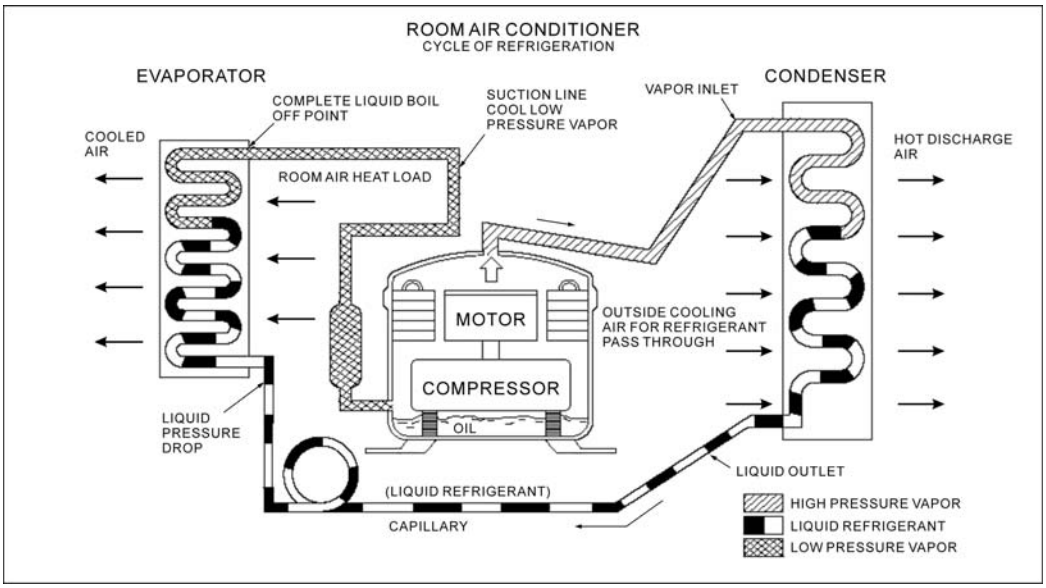
b. Charging Board - 1/2 oz. accuracy

9. High Pressure Gauge - (0 - 400 lbs.)
10. Low Pressure Gauge - (30 - 150 lbs.)
11. Vacuum Gauge - (0 - 1000 microns)

EQUIPMENT MUST BE CAPABLE OF:

1. Recovery CFC's as low as 5%.
2. Evacuation from both the high side and low side of the system simultaneously.
3. Introducing refrigerant charge into high side of the system.
4. Accurately weighing the refrigerant charge actually introduced into the system.
5. Facilities for flowing nitrogen through refrigeration tubing during all brazing processes.

HERMETIC COMPONENT REPLACEMENT



The following procedure applies when replacing components in the sealed refrigeration circuit or repairing refrigerant leaks. (Compressor, condenser, evaporator, capillary tube, refrigerant leaks, etc.)

1. Recover the refrigerant from the system at the process tube located on the high side of the system by installing a line tap on the process tube. Apply gauge from process tube to EPA approved gauges from process tube to EPA approved recovery system. Recover CFCs in system to at least 5%.
2. Cut the process tube below pinch off on the suction side of the compressor.
3. Connect the line from the nitrogen tank to the suction process tube.
4. Drift dry nitrogen through the system and unsolder the more distant connection first. (Filter drier, high side process tube, etc.)
5. Replace inoperative component, and always install a new filter drier. Drift dry nitrogen through the system when making these connections.
6. Pressurize system to 30 PSIG with proper refrigerant and boost refrigerant pressure to 150 PSIG with dry nitrogen.
7. Leak test complete system with electric halogen leak detector, correcting any leaks found.
8. Reduce the system to zero gauge pressure.
9. Connect vacuum pump to high side and low side of system with deep vacuum hoses, or copper tubing. (Do not use regular hoses.)
10. Evacuate system to maximum absolute holding pressure of 200 microns or less.

    NOTE: This process can be sped up by use of heat lamps, or by breaking the vacuum with refrigerant or dry nitrogen at 5,000 microns. Pressurize system to 5 PSIG and leave a minimum of 10 minutes. Recover refrigerant, and proceed with evacuation of a pressure of 200 microns or a minimum of 10%.
11. Break vacuum by charging system from the high side with the correct amount of refrigerant specified. This will prevent boiling the oil out of the crankcase.

    NOTE: If the entire charge will not enter the high side, allow the remainder to enter the low

side in small increments while operating the unit.

12. Restart unit several times after allowing pressures to stabilize. Pinch off process tubes, cut and solder the ends. Remove pinch off tool, and leak check the process tube ends.

SPECIAL PROCEDURE IN THE CASE OF COMPRESSOR MOTOR BURNOUT

1. Recover all refrigerant and oil from the system.
2. Remove compressor, capillary tube and filter drier from the system.
3. Flush evaporator condenser and all connecting tubing with dry nitrogen or equivalent, to remove all contamination from system. Inspect suction and discharge line for carbon deposits. Remove and clean if necessary.
4. Reassemble the system, including new drier strainer and capillary tube.
5. Proceed with process as outlined under hermetic component replacement.

ROTARY COMPRESSOR SPECIAL TROUBLESHOOTING AND SERVICE

Basically, troubleshooting and servicing rotary compressors is the same as on the reciprocating compressor with only a few exceptions.

1. Because of the spinning motion of the rotary, the mounts are critical. If vibration is present, check the mounts carefully..
2. The electrical terminals on the rotary are in a different order than the reciprocating compressors. The terminal markings are on the cover gasket. Use your wiring diagram to insure correct connections.

REFRIGERANT CHARGE

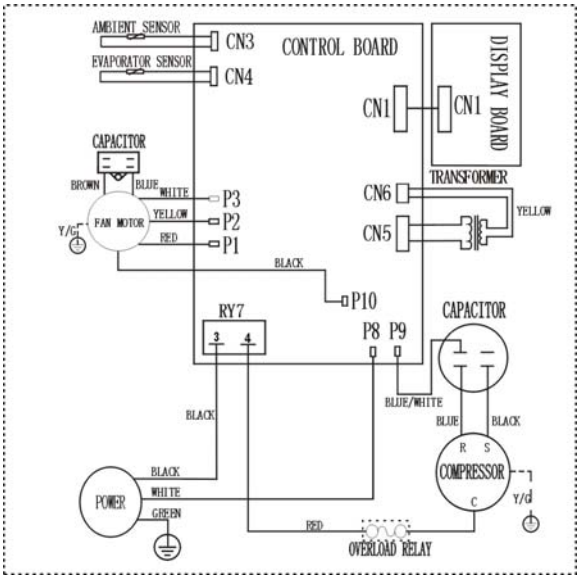
1. The refrigerant charge is extremely critical. Measure charge carefully - as exact as possible to the nameplate charge.
2. The correct method for charging the a rotary compressor is to introduce liquid refrigerant into the high side of the system with the unit off. Then start compressor and enter the balance of the charge, gas only, into the low side.

   The introduction of liquid into the low side, without the use of a capillary tube, will cause damage to the discharge valve of the rotary compressor.

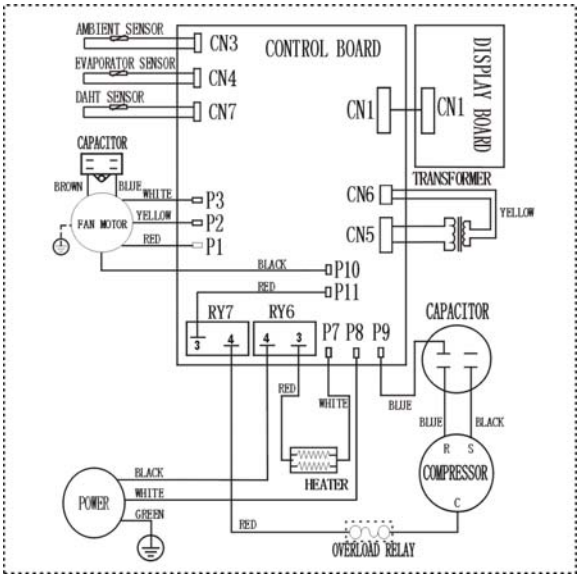
7. WIRING DIAGRAM

The wiring diagrams listed below are representative of models deployed with full features. Your model may not offer all these features, accordingly it will slightly differ from your wiring diagram in these optional features area. Refer to the actual wiring diagram included wit your unit.

- **Wiring Diagram For TTW Cooling only models:**



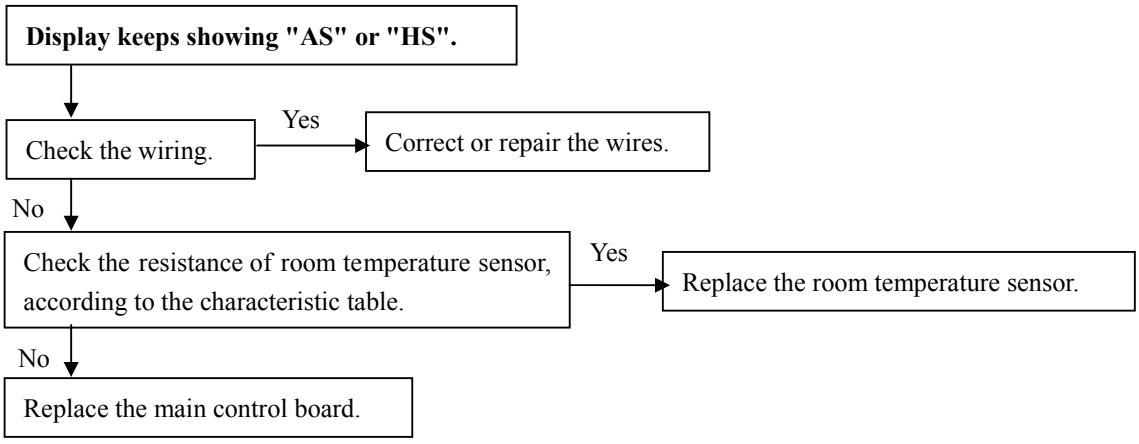
- **Wiring Diagram For TTW Cooling and Heating models:**

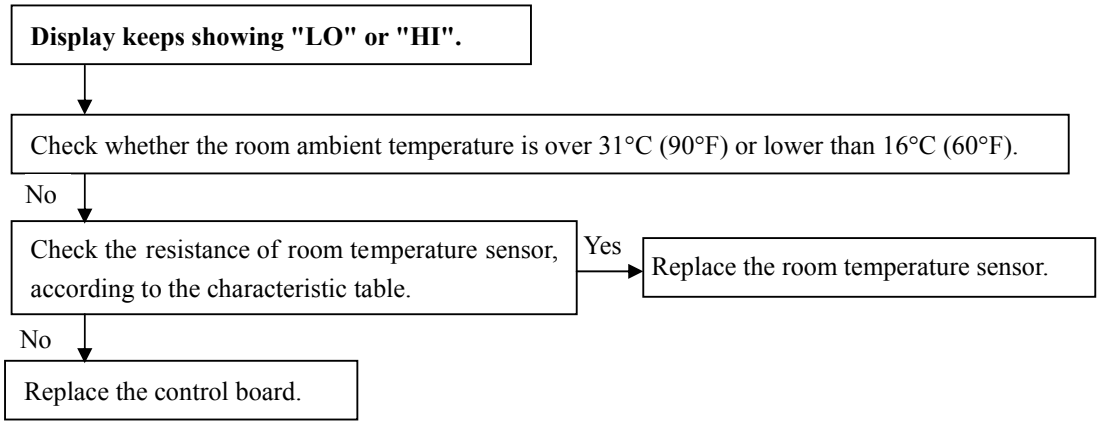


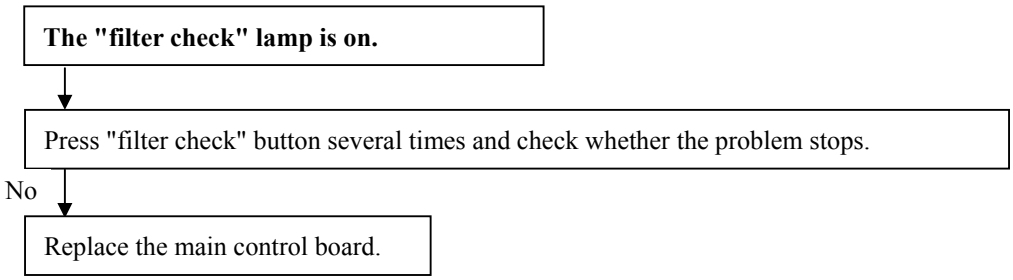
8. TROUBLESHOOTING

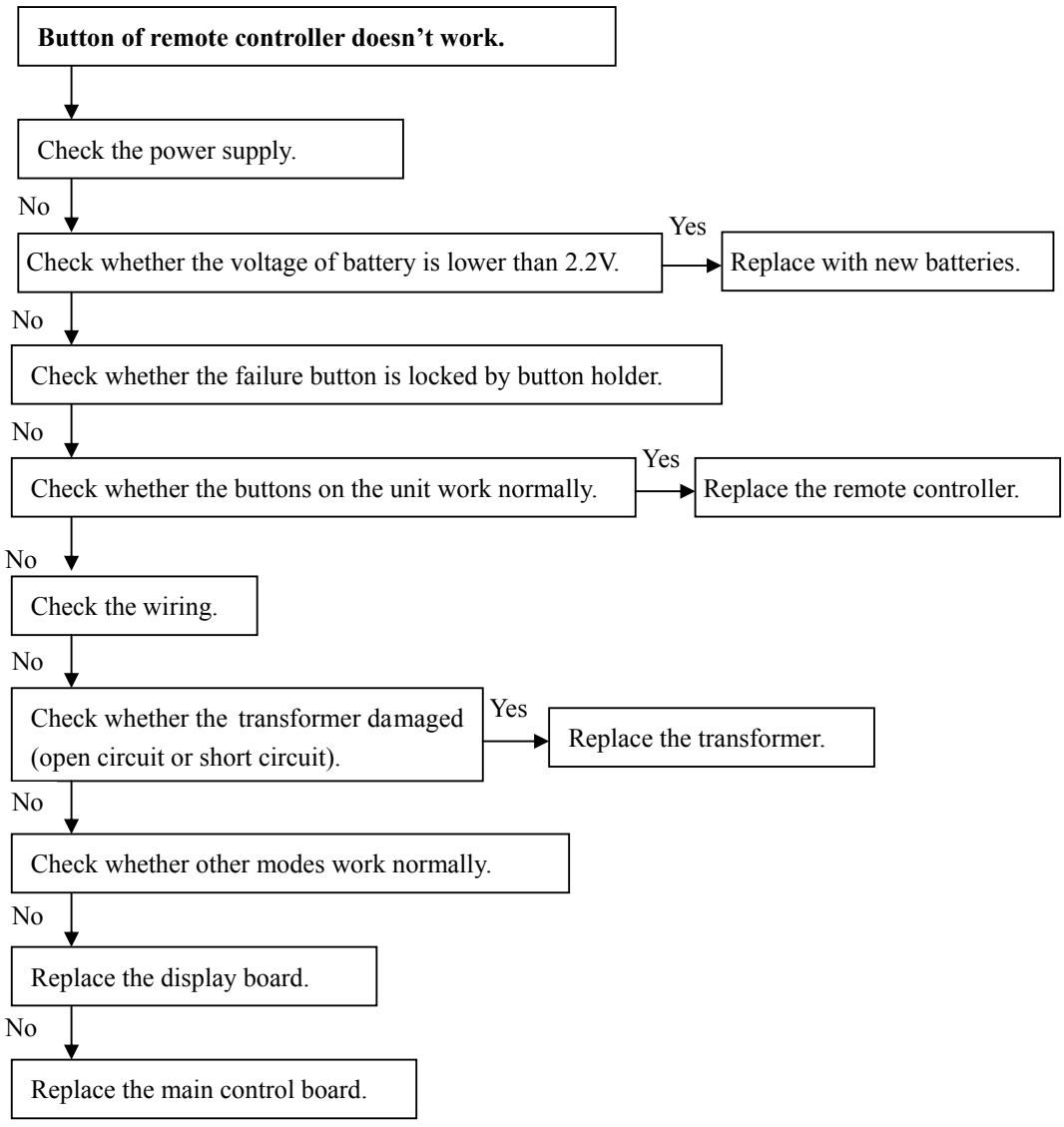
In general, problems are classified by three types. One is called Starting Failure which is caused from an electrical defect, another is ineffective Air Conditioning caused by a defect in the refrigeration circuit and improper application, and the other is called Structure Damage.

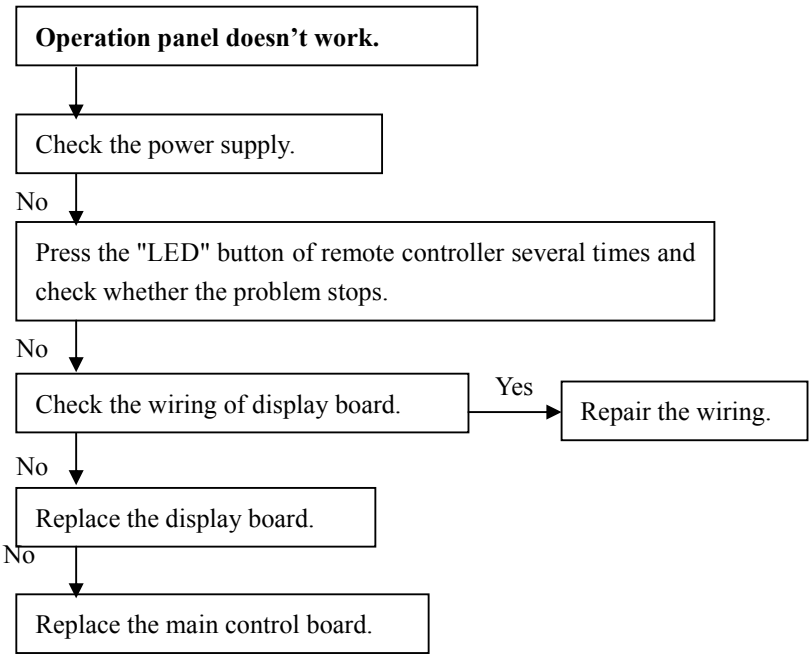
8.1 Flow Chart

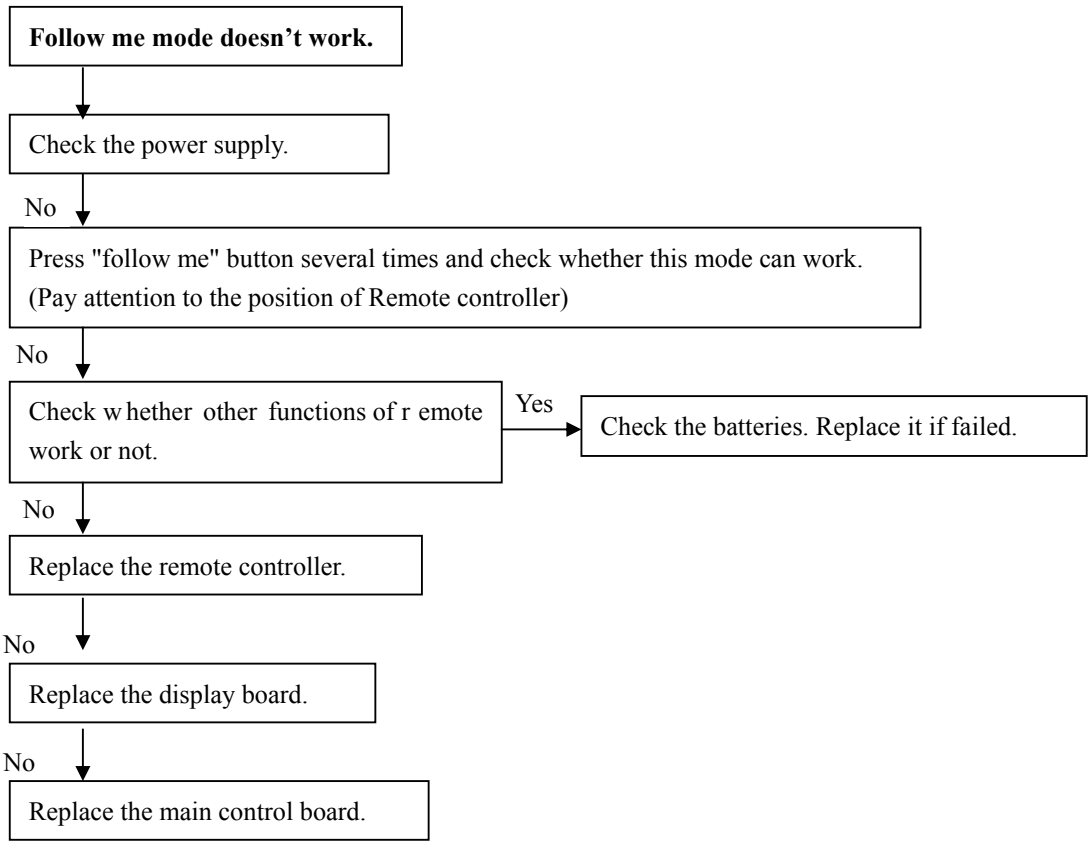


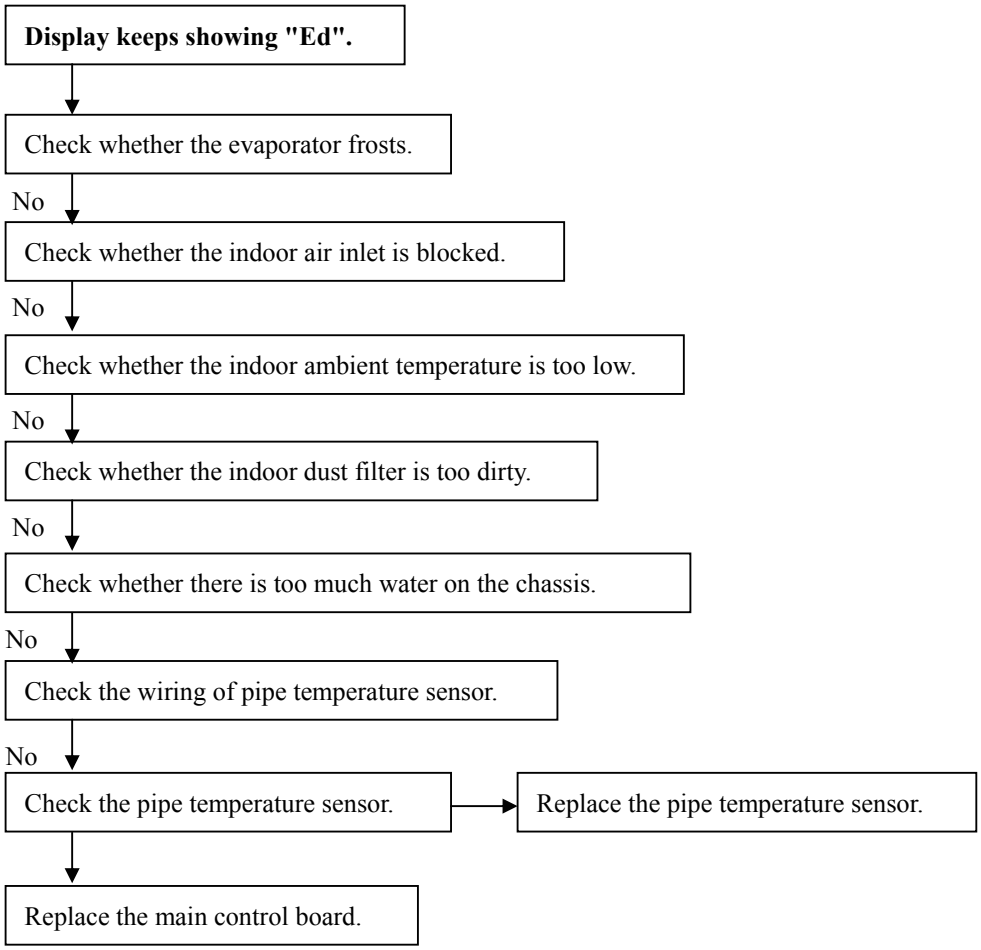


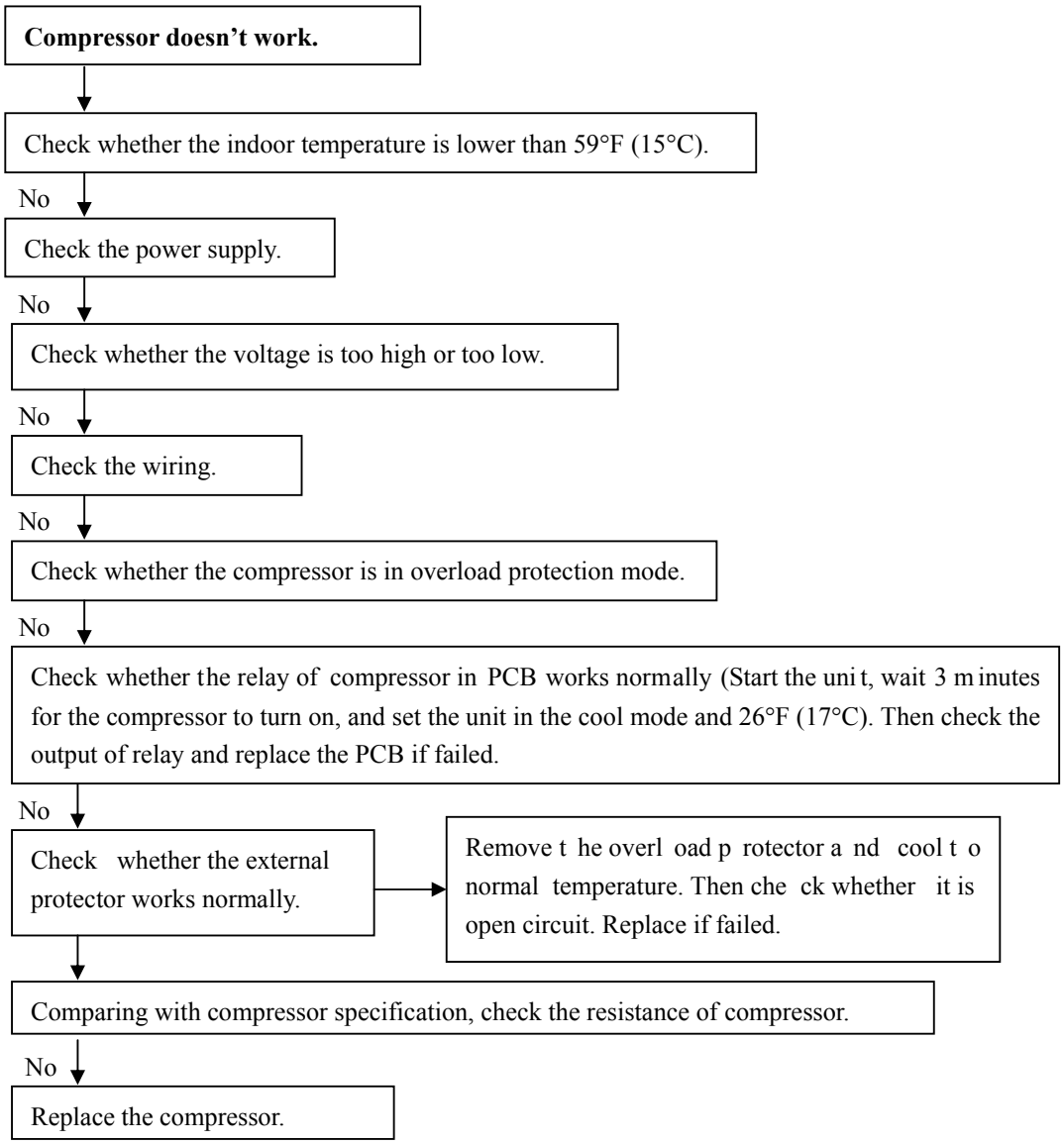


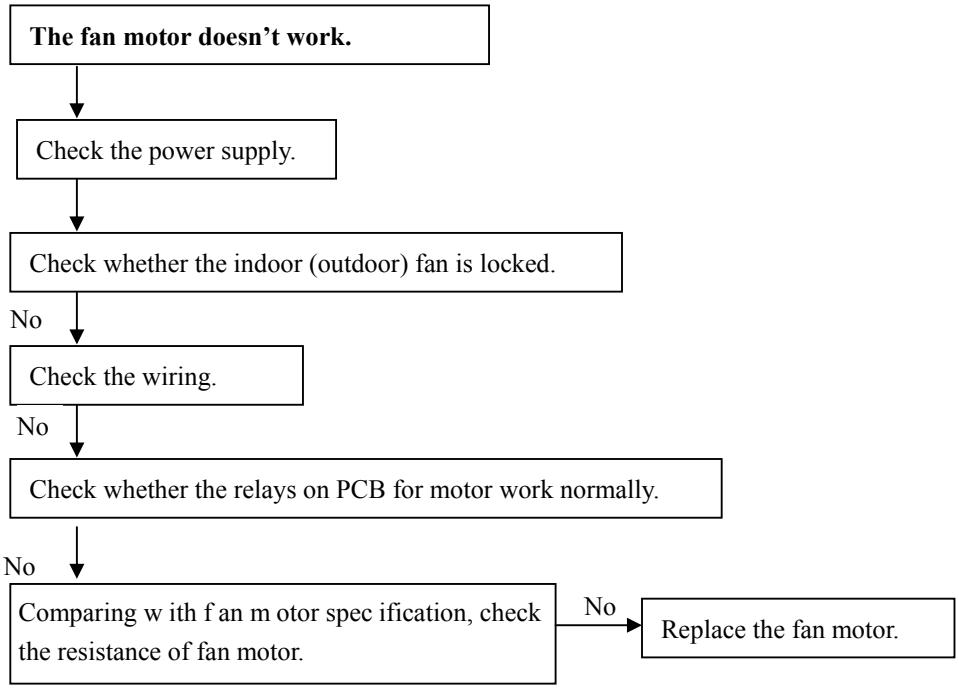


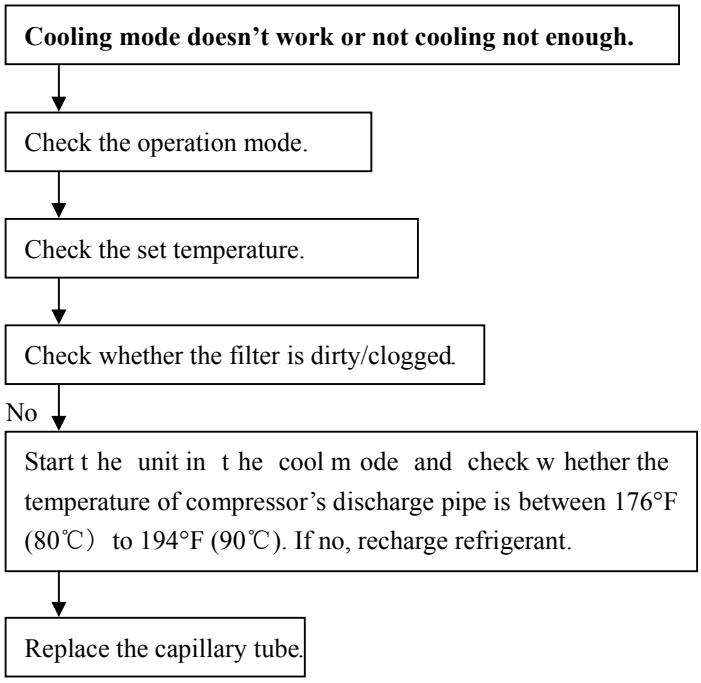












The air conditioner doesn't work.

↓

Check the power supply.

No ↓

Check the wiring.

No ↓

Check whether the transformer has failed. Measure the output voltage of transformer and check whether it is the range from +5V to 12V. If not, replace the transformer.

No ↓

Replace the PCB.

The compressor doesn't stop, after the set temperature is reached.

↓

Check the wiring.

No ↓

Check whether the unit can turn off using the remote controller.

No ↓

Check whether all te mperature sensors a re n ormal, comparing with the resistance table. If not, replace the sensor.

No ↓

Replace the PCB.

The compressor cycles on/off frequently.

Check whether the airflow is blocked.

No

Check if the fan motor isn't working.

No

Check whether capacitor of compressor is working normally.

No

Check whether the relay of compressor on PCB works normally.

No

Replace the PCB.

No

Check whether the capillary tube is blocked.

No

Replace the capillary.

No

Replace the compressor.

Temperature controller doesn't work or is unstable.

Check whether the set temperature is reached.

No

Test the several higher temperature set points and check whether unit works normally.

No

Check the wiring.

No

Check whether the unit is correctly installed.

No

Check the temperature controller. Replace if failed.

Water drips from the unit.

↓

Check whether the ambient humidity is too high.

No ↓

Check whether the indoor outlet airflow foam is wet if water is dripping from the louvers.

No ↓

Check whether the unit is correctly installed.

No ↓

Check whether the air outlet foam is installed normally.

No ↓

Check whether the foam of evaporator base is damaged.

No ↓

Check whether the drain passage of evaporator is blocked. Replace if failed.

Temperature controller interrupts frequently.

↓

Check whether the set temperature is reached.

No ↓

Check the wiring.

No ↓

Check whether the compressor is in the protection mode or 3 minute time delay.

No ↓

Check the specification of temperature controller. Replace if failed

Not heating or not heating enough. (Cooling and Electric Heater)

Check the mode.

No

Check whether the airflow speed is too low.

No

Check the heat load of the room.

No

Check the specification of PTC-heater.

Fan motor speed can't change. (Electric Control)

Check the wiring.

No

Check the capacitor of fan motor. Replace if failed.

No

Replace the PCB.

No

Check the resistance of fan motor and replace the motor if failed.

Fan motor speed can't change. (Mechanical Control)

Check whether the selector is damaged.

No

Check whether the capacitor of fan motor is in the range from 95% to 105% of rated capacity. Replace the capacitor if failed.

No

Check the resistance of fan motor and replace if failed.

8.2 General Troubleshooting

PROBLEM P	OSSIBLE CAUSE	REMARK
Fan motor doesn't run.	No power	Check voltage at electrical outlet. Correct if none.
	Power supply cord	Check voltage at the power cord terminal. Replace the power cord if none.
	Wire disconnected or connection loose	Connect wire. Refer to wiring diagram for terminal identification. Repair or replace loose terminal.
	Main switch failure	Check and replace the main switch if failure.
	Capacitor (Discharge capacitor before testing)	Test capacitor. Replace if not within +/-10% of manufacturer's rating. Replace if shorted, open or damaged.
	Will not rotate	Fan blade hitting shroud or blower hitting scroll. Realign assembly. Check fan motor bearings. Replace the motor if motor shaft do not rotate.
Fan motor runs intermittently	Cycles on overload.	Check voltage. Call an electrician if not within limits.
		Test capacitor. Replace if not within +/-10% of manufacturer's rating.
		Check bearings. Replace the motor if the fan blade cannot rotate freely.
		Pay attention to any change from high speed to low speed. Replace the motor if the speed does not change.
Fan motor noise.	Fan	Replace the fan if cracked, out of balance, or partially missing.
	Blower	Replace the blower if cracked, out of balance, or partially missing.
	Loose screws	Tighten them.
	Worn bearings	Replace the motor if knocking sounds continue when running or loose, or the motor hums or noise appears to be internal while running.
Compressor does not to stop although room temperature has reached set temperature.	Thermostat	Check and replace the thermostat.

PROBLEM P	OSSIBLE CAUSE	REMARK
Insufficient cooling or heating.	Air filter	Clean or replace if restricted.
	Vent door	Close if open.
	Unit undersized	Determine if the unit is properly sized for the area to be cooled or heated.
	Condenser and Evaporator	Clean if restricted.
	Fan motor	Check the fan capacitor and replace if not within +/-10% of manufacturer's rating.
	Room structure	Take proper measures to make sure doors and windows are sealed well.
	Air flow	Clean or remove if any barrier is found to block the inlet/outlet wind flow of the unit (drapes, shrubs, etc.).
	Sunlight	Add a awning if the unit is exposed to direct sunlight or move the unit to another window that's not exposed to direct sunlight.
	Refrigerant loss	Check the tubes for leakage. Reclaim the refrigerant, correct the leakage points and recharge.
	Capillary tube	Regulate the flow of capillary tube and ensure the evaporating temperature is appropriate, if the evaporator is frosted. Replace if blocked. Repair joint if leaking.
	Compressor	The inlet and outlet valve of the compressor may be damaged, making the low pressure connected with the high pressure. The refrigerating system can not produce high pressure and low pressure. Replace the compressor after checking for the reason of failure.
	Heat sources	Reduce if too many (dryers, electric heaters, small appliances, etc.)
	Drainage	If drainage is blocked it will increase the efficiency in cooling mode, but will cause the condenser to frost in heating mode. Remove any obstacles.
Stop instantly after startup.	Refrigerant	If the amount of the refrigerant is too large, making the compressor load too large. Reclaim and recharge the refrigerant after checking for the reason of failure.
	Compressor	The compressor is seized. Replace after checking for the reason of failure.

PROBLEM P	OSSIBLE CAUSE	REMARK
No cooling or heating.	No power	Check the voltage. Call an electrician if not within correct limits of +/- 10% of nominal voltage rating required.
	Wiring	Check terminals. Repair and correct if loose.
	Temperature setting	Check and adjust the thermostat.
	Main switch setting	Check and adjust the main switch setting.
	Reversing valve wire	Check the resistance of reversing valve wire. Replace the wire if short, open or damaged.
	Reversing valve	If the reversing valve is blocked, the heating mode will not operate. Replace the reversing valve after checking the reason for failure.
Compressor will not run while fan motor runs.	Voltage	Check voltage. Call Supply Authority if not within limits of +/- 10% of nominal voltage rating required.
	Wiring	Check the wire connections, if loose, repair or replace the terminal. If wires are off, refer to wiring diagram for identification, and replace. Check wire locations. If not per wiring diagram, correct.
	Main switch failure	Check and replace the main switch if failed.
	Capacitor (Discharge capacitor before testing)	Check the capacitor. Replace if not within +/-10% of manufacturer's rating. Replace if shorted, open, or damaged.
	Thermostat	Check the thermostat setting if not at the coolest (in cooling mode) or the warmest (in heating mode). Try adjusting these settings.
	Compressor	Check the compressor for open circuit or ground. If open or grounded, replace the compressor.
Excessive noise.	Copper tubing	If copper tubing is rubbing against the cabinet and vibrating while operating, remove the cabinet and carefully rearrange tubing to not contact cabinet, compressor, shroud and barrier.
The unit starts and stops frequently.	Power supply	The input power supply voltage is too low or not within +/- 10% of nominal voltage rating required. Call an electrician if not within limits.
	Outdoor temperature	When the outdoor temperature is too high, the compressor will go into a protection mode or 3 minute time delay.

8.3 Troubleshooting Cooling

PROBLEM	POSSIBLE CAUSE	TO CORRECT
Compressor does not run.	Low voltage.	Check for voltage at compressor. 115 volt and 230 volt units will operate at 10% voltage variance
	Thermostat not set cold enough or inoperative.	Set thermostat to coldest position. Test thermostat and replace if inoperative.
	Compressor hums but cuts off on overload.	Hard start compressor. Direct test compressor. If compressor starts, add starting components.
	Open or shorted compressor windings.	Check for continuity and resistance.
	Open overload.	Test overload protector and replace if inoperative. Test capacitor and replace if inoperative.
	Open capacitor.	Test for continuity in all positions.
	Inoperative system switch.	Replace if inoperative.
	Broken, loose or incorrect wiring.	Refer to appropriate wiring diagram to check wiring.
Fan motor does not run.	Inoperative system switch.	Test switch and replace in inoperative.
	Broken, loose or incorrect wiring.	Refer to applicable wiring diagram.
	Open capacitor.	Test capacitor and replace if inoperative.
	Fan speed switch open.	Test switch and replace if inoperative.
	Inoperative fan motor.	Test fan motor and replace if inoperative. (Be sure internal overload has had time to reset.)
Does not cool, or cools only slightly.	Undersized unit.	Refer to Sizing Charts.
	Thermostat open or inoperative.	Set to coldest position. Test thermostat and replace if necessary.
	Dirty filter.	Clean as recommended in Owner's Manual.
	Dirty or plugged condenser or evaporator coil.	Use steam or detergents to clean.
	Poor air circulation in area being cooled.	Adjust discharge air louvers. Use high fan speed.
	Fresh air or exhaust air door open on applicable models.	Close doors. Instruct customer on use of this feature.
	Low capacity – undercharge.	Check for leak and make repair.
	Compressor not pumping properly.	Check amperage draw against nameplate. If not conclusive, make pressure test.

PROBLEM	POSSIBLE CAUSE	TO CORRECT
Unit does not run.	Fuse blown or circuit tripped.	Replace fuse, reset breaker. If repeats, check fuse or breaker size. Check for shorts in unit wiring and components.
	Power cord not plugged in.	Set switch correctly.
	System switch in "Off" position.	Test for continuity in each switch position.
	Inoperative system switch.	Check wiring and connections.
	Loose or disconnected wiring at switch or other components.	Reconnect per wiring diagram.
Thermostat does not turn unit off.	Thermostat contacts stuck.	Replace thermostat.
	Thermostat set at coldest point.	Turn to higher temperature setting to see if the unit cycles off.
	Incorrect wiring.	Refer to appropriate wiring diagram.
	Unit undersized for area to be cooled.	Refer to Sizing Chart.
Evaporator coil freezes up.	Dirty filter.	Clean as recommended in Owner's Manual.
	Restricted air flow.	Check for dirty or obstructed coil - clean as required or remove obsticales.
	Inoperative thermostat.	Test for shorted thermostat or stuck contacts.
	Short of refrigerant.	De-ice coil and check for leak.
	Inoperative fan motor.	Test fan motor and replace if inoperative.
	Partially restricted capillary.	De-ice coil. Check temperature differential across coil. Touch test coil return bends for same temperature. Test for low running current.
Compressor runs continually, does not cycle off.	Excessive heat load.	Unit undersized. Test cooling performance of unit. Replace with larger unit.
	Restriction in line.	Check for partially iced coil. Check temperature split across coil.
	Refrigerant leak.	Check for oil at silver soldered connections. Check for partially iced coil. Check split across coil. Check for low running amperage.
	Thermostat contacts stuck	Check operation of thermostat. Replace if contacts remain closed.
	Thermostat incorrectly wired.	Refer to appropriate wiring diagram.

PROBLEM	POSSIBLE CAUSE	TO CORRECT
Compressor attempts to start, or runs for short periods only.	Overload inoperative. Opens too soon.	Check operation of unit. Replace overload if system operation is satisfactory.
	Compressor attempts to start before system pressures are equalized.	Allow a minimum of 2 minutes for pressures to equalize before attempting to restart.
Cycles on overload.	Low or fluctuating voltage.	Check voltage with unit operating. Check for other appliances on circuit. Air conditioner should be on separate circuit for proper voltage, and be fused separately.

8.4 Troubleshooting Heating (Cooling/Electric Heater Models)

PROBLEM P	OSSIBLE CAUSE	TO CORRECT
Fan Operates – heating element does not come on.	Heater relay or contactor coil open.	Check continuity of coil. Inspect, test continuity with ohmmeter.
	Heater relay or contactor stuck open, pitted or burned.	Check continuity – if open, replace.
	High limit control open.	Check continuity. Check reason for failure.
	Open thermal fuse.	Check voltage across heater terminals.
	Open or shorted element.	Check amperage draw of heater.
	Loose connections.	Tighten all terminals.
Heating inadequate.	Restricted filter.	Clean as recommended in Owner's Manual.
	Cycling high limit control.	Control is set to open at 155°F± 5°F (68.3°C +/- 15°C) and close at 130°F± 8°F (54.4°C +/- 13°C). If cycling prematurely, replace control.
	Exhaust or fresh air door open.	Check position of fresh air door control slide. Adjust cable if door does not close properly.
Fan operates in "Constant" speed, but not in "Auto"	Fan relay contacts open.	Check continuity of fan relay. NOTE: Some models have fan relay energized during heating cycle while others do not.
	Inoperative system switch.	Check connections on system switch and fan relay.
	Loose connection.	Check connections on system switch and fan relay.
Long "off" and "on" cycles.	Heat anticipator (resistor) shorted.	Disconnect power to unit. Remove resistor from thermostat bulb block. Plug in unit and allow to operate. Feel resistor for heat. If no heat is felt, replace resistor.
	Defective temperature sensor.	Replace temp. sensor and check operation.

PROBLEM	POSSIBLE CAUSE	TO CORRECT
Fan motor does not operate in "Constant" speed or "Auto" speed.	Defective motor.	Check and replace.
	Open or shorted capacitor.	Replace capacitor and check.
	Condenser fan frozen to Chassis.	Check if drain pan valve is open. If not, replace.
	Loose connections.	Check all connections. Check voltage to fan motor.
Unit does not heat.	Fuse link.	Check fuse link for continuity. If defective, replace.
	Heating element shorted.	Check amperage draw of element. If no amperage, replace.
	Incorrect wiring.	Check voltage to element. If voltage is okay, check wiring.
	Heat relay or heater contactor coil open.	Defective coil. Test coil for continuity.

9. INSTALLATION ACCESSORY LIST

Part list for CD Series:

No.	Part No.	Part Name	Quantity
1	202921890000	Grille(Aluminum)	1
2	201121890009	Grille(plastic)	1
3	201121890006	Stuffer seal	1
4	201121890007	Trim Frame(side legs)	2
5	201121890008	Trim Frame(top & bottom legs)	2

10. CHARACTERISTIC OF TEMPERATURE SENSOR

Temp.°F (°C)	Resistance KΩ	Temp.°F (°C)	Resistance KΩ	Temp.°F (°C)	Resistance KΩ
14 (-10)	62.2756	62.6 (17)	14.6181	111.2 (44)	4.3874
16 (-9)	58.7079	64.4 (18)	13.918	113 (45)	4.2126
18 (-8)	56.3694	66.3 (19)	13.2631	114.8 (46)	4.0459
194. (-7)	52.2438	68 (20)	12.6431	116.6 (47)	3.8867
21.2 (-6)	49.3161	69.8 (21)	12.0561	118.4 (48)	3.7348
23 (-5)	46.5725	71.6 (22)	11.5000	120.2 (49)	3.5896
25 (-4)	44.0000	73.4 (23)	10.9731	122 (50)	3.4510
26.6 (-3)	41.5878	75.2 (24)	10.4736	123.8 (51)	3.3185
28.4 (-2)	39.8239	77 (25)	10.0000	125.6 (52)	3.1918
30.2 (-1)	37.1988	78.8 (26)	9.5507	127.4 (53)	3.0707
32 (0)	35.2024	80.6 (27)	9.1245	129.2 (54)	2.959
33.8 (1)	33.3269	82.4 (28)	8.7198	131 (55)	2.8442
35.6 (2)	31.5635	84.2 (29)	8.3357	132.8 (56)	2.7382
37.4 (3)	29.9058	86 (30)	7.9708	134.6 (57)	2.6368
39.2 (4)	28.3459	87.8 (31)	7.6241	136.4 (58)	2.5397
41 (5)	26.8778	89.6 (32)	7.2946	138.2 (59)	2.4468
42.8 (6)	25.4954	91.4 (33)	6.9814	140 (60)	2.3577
44.6 (7)	24.1932	93.2 (34)	6.6835	141.8 (61)	2.2725
46.4 (8)	22.5662	95 (35)	6.4002	143.6 (62)	2.1907
48.2 (9)	21.8094	96.8 (36)	6.1306	145.4 (63)	2.1124
50 (10)	20.7184	98.6 (37)	5.8736	147.2 (64)	2.0373
51.8 (11)	19.6891	100.4 (38)	5.6296	149 (65)	1.9653
53.6 (12)	18.7177	102.2 (39)	5.3969	150.8 (66)	1.8963
55.4 (13)	17.8005	104 (40)	5.1752	152.6 (67)	1.830
57.2 (14)	16.9341	105.8 (41)	4.9639	154.4 (68)	1.7665
57 (15)	16.1156	107.6 (42)	4.7625	156.2 (69)	1.7055
60.8 (16)	15.3418	109.4 (43)	4.5705	158 (70)	1.6469

Design, material, performance data and components
subject to change without notice.

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