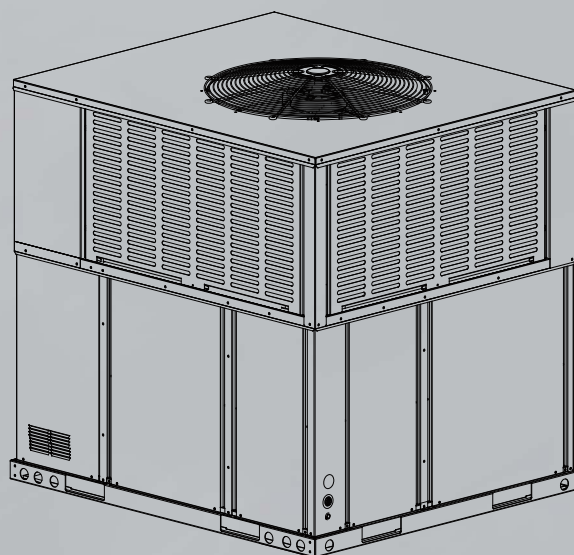


ComfortStar®

INSTALLATION INSTRUCTIONS

PACKAGE HEAT PUMP
CCRT-INV
19 SEER SERIES
R410a



Thank you very much for purchasing our product,
Before using your unit , please read this manual carefully and keep it for future reference.
The figure shown in this manual is for reference only and may be slightly different from the actual product.

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All phases of this installation must comply with NATIONAL, STATE, AND LOCAL CODES.
The figure shown in this manual is for reference only and may be slightly different from the actual product.

1. KEY TO SYMBOLS AND SAFETY INSTRUCTIONS

1.1 Key to symbols



Warnings in this document are identified by a warning triangle. Keywords at the start of a warning indicate the type and seriousness of the ensuing risk if measures to prevent the risk are not taken.



This symbol indicates important information where there is no risk to people or property.

The following keywords are defined and can be used in this document:

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION indicates a hazardous situation which, if not avoided, could result in minor to moderate injury.

NOTICE is used to address practices not related to personal injury.

1.2 Safety

Please read before proceeding



CAUTION:

- This document is customer property and is to remain with this unit. Please return to service information pack upon completion of work.
- These instructions do not cover all variations in systems or provide for every possible contingency to be met in connection with the installation.
- Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to your installing dealer or local distributor.



This document contains a wiring diagram and service information. This is customer property and is to remain with this unit. Please return to service information pack upon completion of work.



CAUTION

A manufactured (mobile) home installation must conform with the Manufactured Home Construction and Safety Standard, Title 24 CFR, Part 3280, or when this Standard is not applicable, the Standard for Manufactured Home Installations (Manufactured Home Sites, Communities and Set-Ups), ANSI/NCS A225.1, and/or MH Series Mobile Homes, CAN/CSA Z240.



CAUTION:

This information is intended for use by individuals possessing adequate backgrounds of electrical and mechanical experience. Any attempt to repair a central air conditioning product may result in personal injury and/or property damage.



WARNING: HAZARDOUS VOLTAGE

- Failure to follow this warning could result in property damage, severe personal injury or death.
- Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized.



WARNING: REFRIGERANT OIL

Any attempt to repair a central air conditioning product may result in property damage, severe personal injury, or death. These units use R-410A refrigerant which operates at 50 to 70% higher pressures than R-22. Use only R-410A approved service equipment. Refrigerant cylinders are painted a "Rose" color to indicate the type of refrigerant and may contain a "dip" tube to allow for charging of liquid refrigerant into the system. All R-410A systems with variable speed compressors use a PVE oil (FV50S or equivalent) that readily absorbs moisture from the atmosphere to limit this "hygroscopic" action. The system should remain sealed whenever possible. If a system has been open to the atmosphere for more than 4 hours, the compressor oil must be replaced. Never break a vacuum with air and always change the driers when opening the system for component replacement.



CAUTION: HOT SURFACE

May cause minor to severe burning. Failure to follow this Caution could result in property damage or personal injury.



CAUTION: CONTAINS REFRIGERANT

Failure to follow proper procedures can result in personal illness or injury or severe equipment damage. System contains oil and refrigerant under high pressure. Recover refrigerant to relieve pressure before opening system.



CAUTION: GROUNDING REQUIRED

Failure to inspect or use proper service tools may result in equipment damage or personal injury. Reconnect all grounding devices. All parts of this product that are capable of conducting electrical current are grounded. If grounding wires, screws, straps, clips, nuts or washers used to complete a path to ground are removed for service, they must be returned to their original position and properly fastened.



CAUTION: LOCATION RESTRICTIONS

Only use this unit in well-ventilated spaces and ensure that there are no obstructions that could impede the airflow into and out of the unit. Do not use this unit in the following locations:

- Locations with mineral oil.
- Locations with saline atmospheres, such as seaside locations.
- Locations with sulphurous atmospheres, such as near natural hot springs.
- Where high voltage electricity is present, such as in certain industrial locations.
- On vehicles or vessels, such as trucks or ferry boats.
- Where exposure to oily or very humid air may occur, such as kitchens.
- In proximity to sources of electromagnetic radiation, such as high-frequency transmitters or other high strength radiation devices.



WARNING: BRAZING REQUIRED

Failure to inspect lines or use proper service tools may result in equipment damage or personal injury. If using existing refrigerant lines, make certain that all joints are brazed, not soldered.



WARNING: HIGH CURRENT LEAKAGE

Failure to follow this warning could result in property damage, severe personal injury or death. Grounding is essential before connecting electrical supply.

2. INSTALLATION

2.1 Inspection

As soon as unit is received, it should be inspected and noted for possible shipping damage during transportation. It is shipper's responsibility to cover the cost of shipping damage. Manufacturer or distributor will not accept the claims from dealer for any transportation damage.

2.2 Limitations

Refer to Fig. 2-6, 2-7, 2-8, 2-9 for unit physical data and to Table 6-1 & 13-1 for electrical data. If components are to be added to a unit they must meet local codes, they are to be installed at the dealer's and /or the customer's expense. Size of unit for proposed installation should be based on heat loss / heat gain calculations made in accordance with industry recognized procedures identified by the Air Conditioning Contractors of America.

Table 2-1

Model	Net Weight	Gross Weight
CCRT60-1INV	561 lbs(255kg)	596 lbs(271kg)
CCRT36-1INV	412 lbs(187kg)	432 lbs(196kg)

2.3 Pre-Installation

Before installation, carefully check the following:

1. Unit should be installed in accordance with national and local safety codes, including but not limit to ANSI/NFPA No. 70 or Canadian Electrical Code Part 1, C22.1, local plumbing and wastewater codes and any other applicable codes.
2. For rooftop installation, be sure the structure has enough strength to support the weight of unit. Unit should be installed on roof curb and leveled.
3. For ground level installation, a level slab should be used.
4. Condenser airflow should not be restricted.
5. On applications when a roof curb is used, the unit must be positioned on the curb so the front of the unit is tight against the curb.

2.4 Rigging And Handling

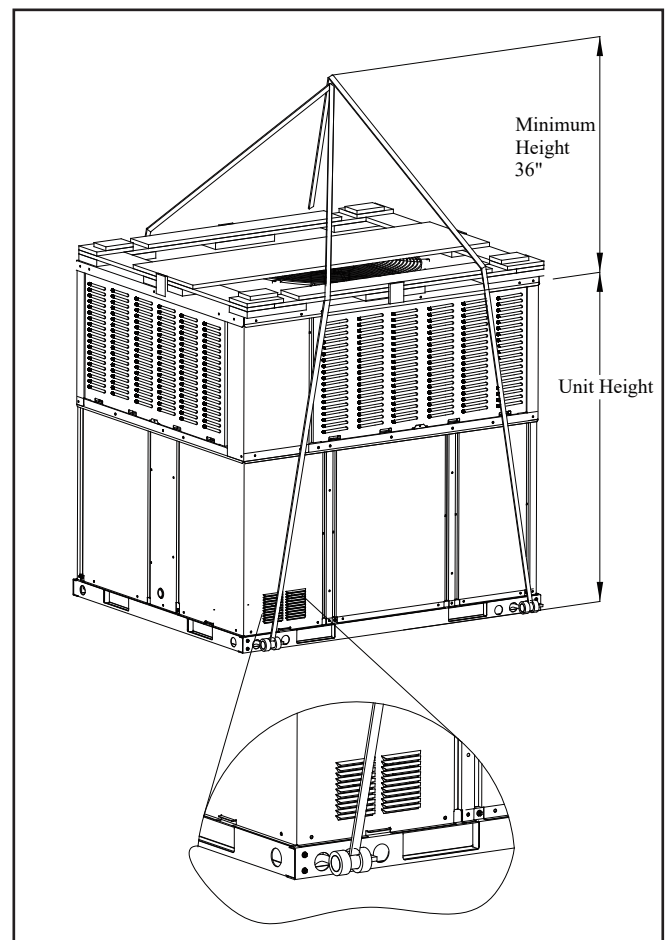


Figure 2-1

Exercise care when moving the unit. Do not remove any packaging until the unit is near the place of installation. Rig the unit by attaching chain or cable slings to the lifting holes provided in the base rails. Spreader bars, whose length exceeds the largest dimension across the unit, MUST be used across the top of the unit.



CAUTION:

Before lifting, make sure the unit weight is distributed equally on the rigging cables so it will lift evenly.



CAUTION:

All panels must be secured in place when the unit is lifted. The condenser coils should be protected from rigging cable damage with plywood or other suitable material.

2.5 Location restrictions

Ensure the top discharge area is unrestricted for at least 60 inches above the unit.

Do not locate outdoor unit near bedrooms since normal operational sounds may be objectionable.

Position unit to allow adequate space for unobstructed airflow, wiring, refrigerant lines, and serviceability.

Allow a minimum of 12 in. clearance on one side of access panel to a wall and a minimum of 24 in. on the adjacent side of access panel.

Maintain a distance of 24 in. between units.

Position unit where water, snow, or ice from roof or overhang cannot fall directly on unit.

See Fig.2-3 and Fig.2-4.

Cold climate considerations (heat pump only)



Precautions must be taken for units being installed in areas where snow accumulation and prolonged below-freezing temperatures occur.

- Units should be elevated 3-12 inches above the pad or rooftop, depending on local weather. This additional height will allow drainage of snow and ice melted during defrost cycle prior to its refreezing. Ensure that drain holes in unit base pan are not obstructed, preventing drainage of defrost water (Fig.2-4).
- If possible, avoid locations that are likely to accumulate snow drifts. If not possible, a snow drift barrier should be installed around the unit to prevent a build-up of snow on the sides of the unit.

Note: Make sure that Condensate Drain side is not higher than the other side.

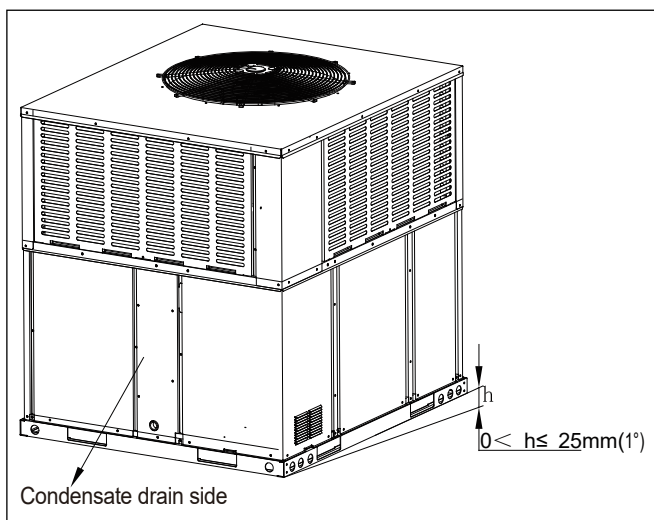


Figure 2-2

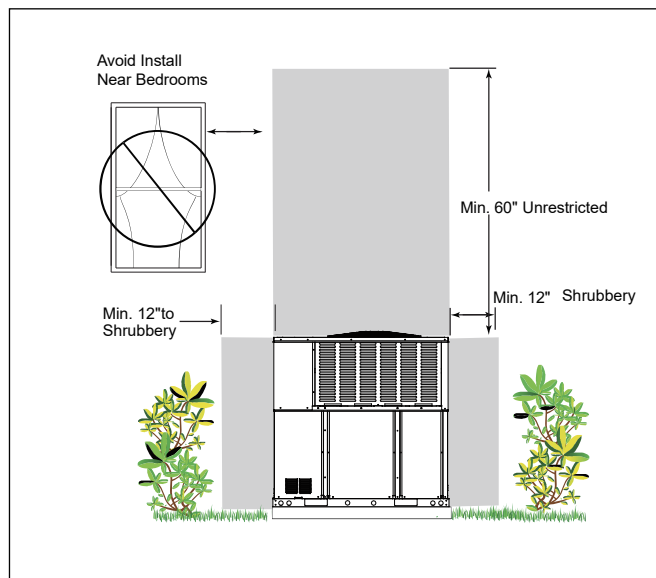


Figure 2-3

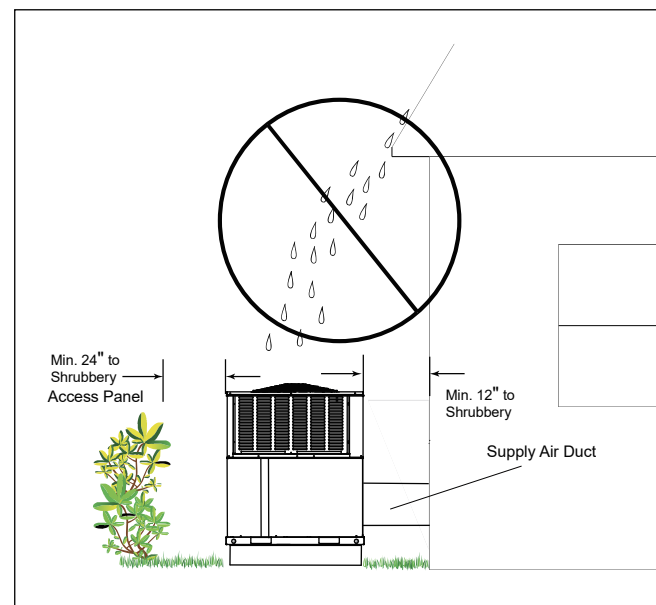


Figure 2-4

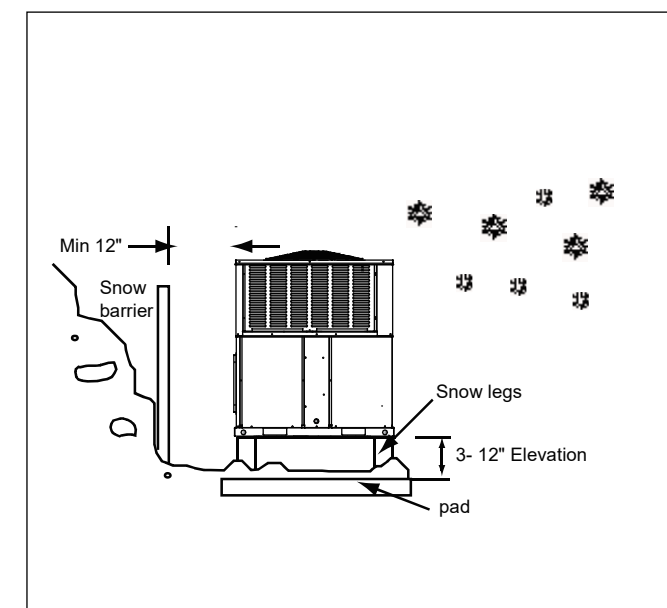
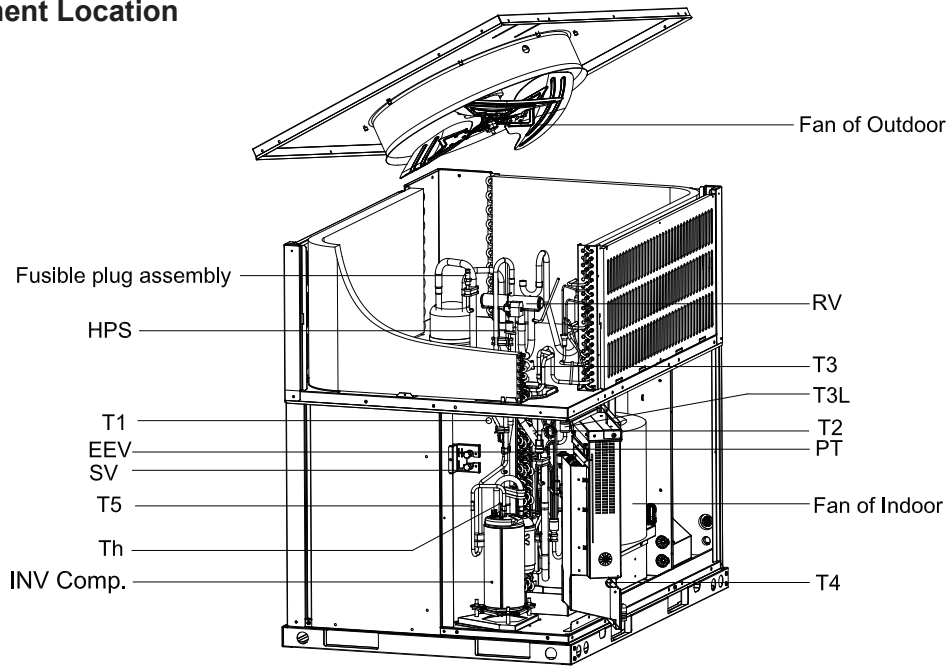


Figure 2-5

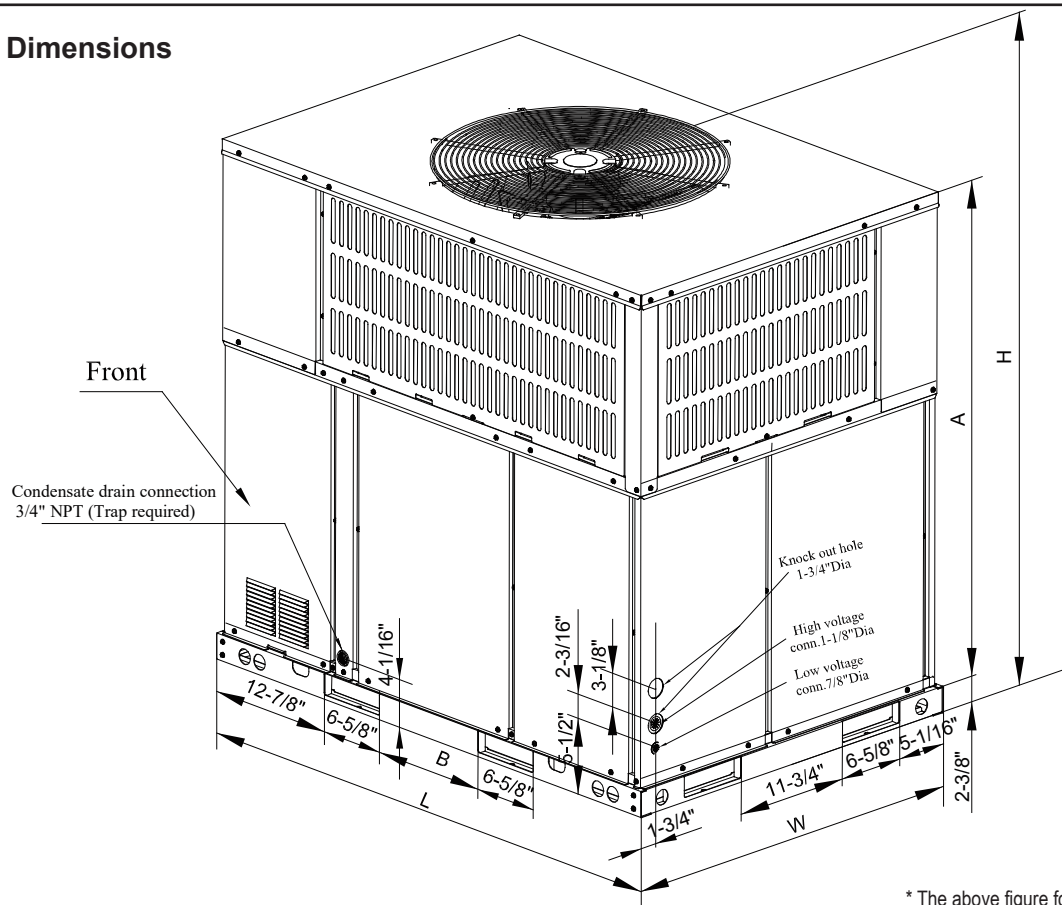
Component Location



* The above figure for reference purpose only.

Figure 2-6 (a)

Unit Dimensions



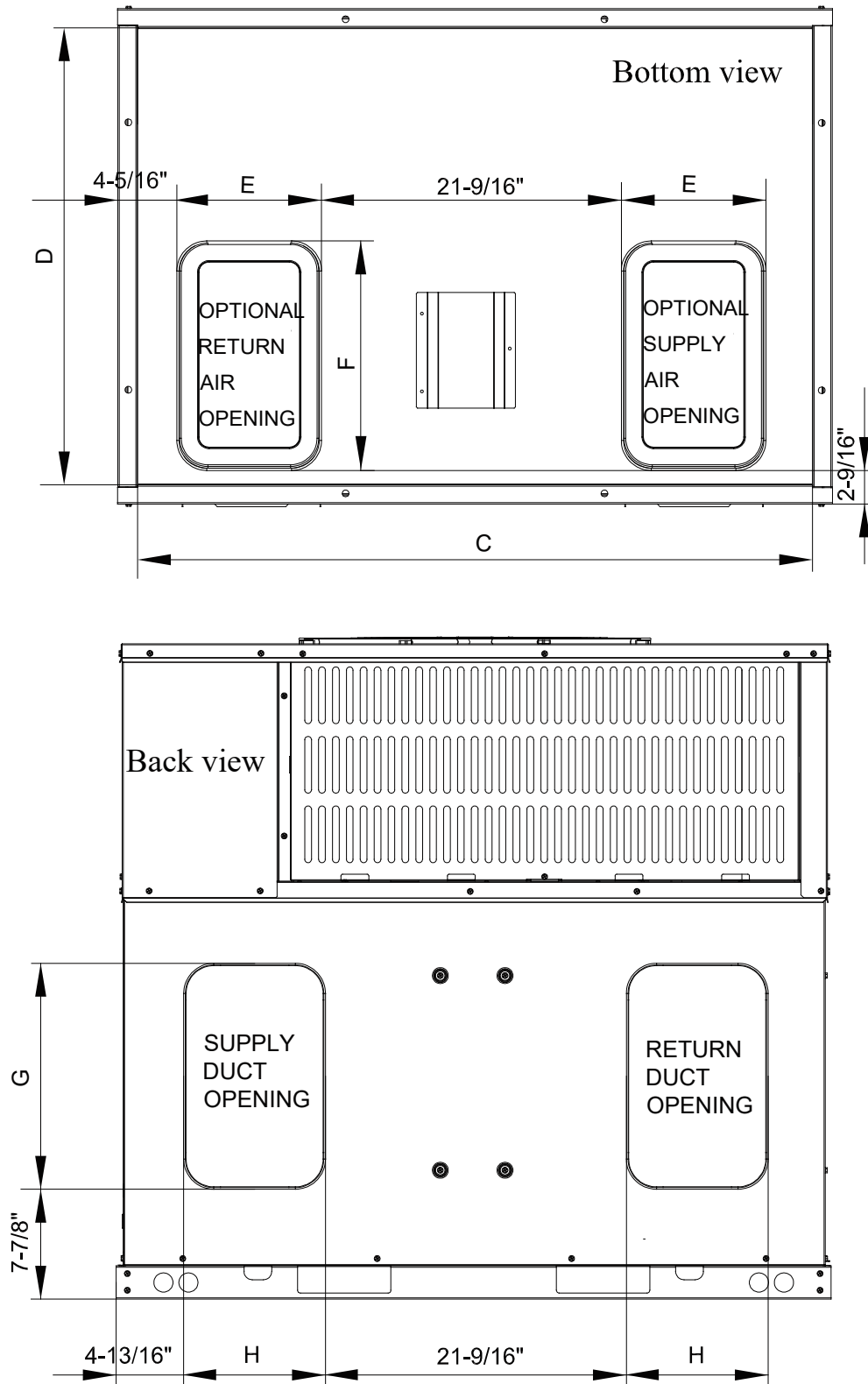
* The above figure for reference purpose only.

Figure 2-7 (a)

Model size	Dimensions				
Heat Pump	"L" in.[mm]	"W" in.[mm]	"H" in.[mm]	"A" in.[mm]	"B" in.[mm]
CCRT36-1INV	50-11/16 [1287]	35-1/16 [891]	46-13/16 [1190]	44-1/16 [1120]	11-3/4 [298]
CCRT60-1INV	51-9/16 [1310]	44-13/16 [1140]	51-7/16 [1306]	47-5/16 [1202]	19-11/16 [500]

Table 2-4

Dimensions Back and Bottom



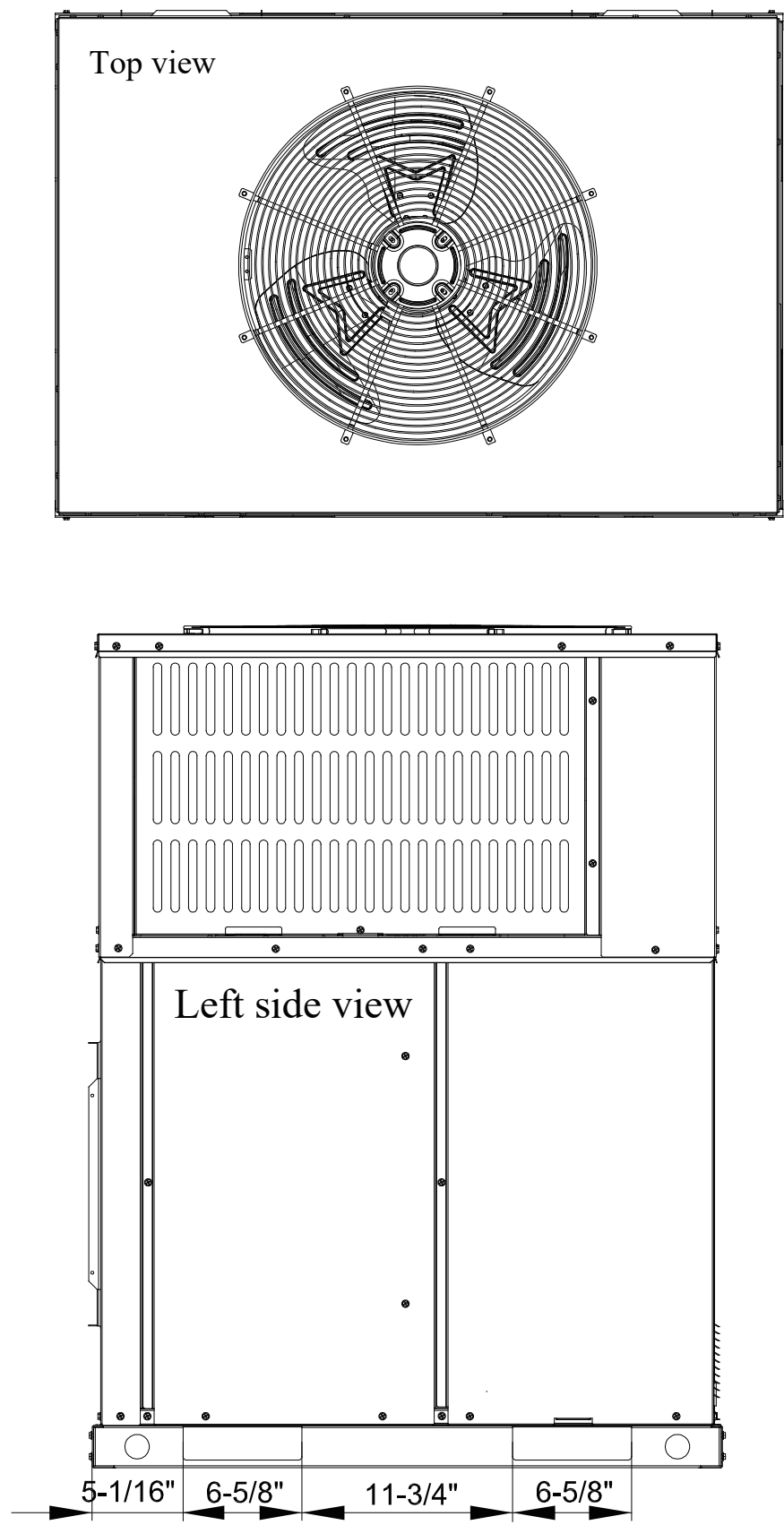
* The above figure for reference purpose only.

Figure 2-8 (a)

Model size	Dimensions					
Heat Pump	"C" in.[mm]	"D" in.[mm]	"E" in.[mm]	"F" in.[mm]	"G" in.[mm]	"H" in.[mm]
CCRT36-1INV	47-13/16 [1215]	32-1/4 [820]	9-15/16 [252]	15-7/8 [403]	15-3/4 [400]	9-3/4 [249]
CCRT60-1INV	49-1/4 [1250]	42-1/2 [1080]	14-1/8 [358]	16-1/8 [409]	15-7/8 [403]	13-7/8 [352]

Table 2-5

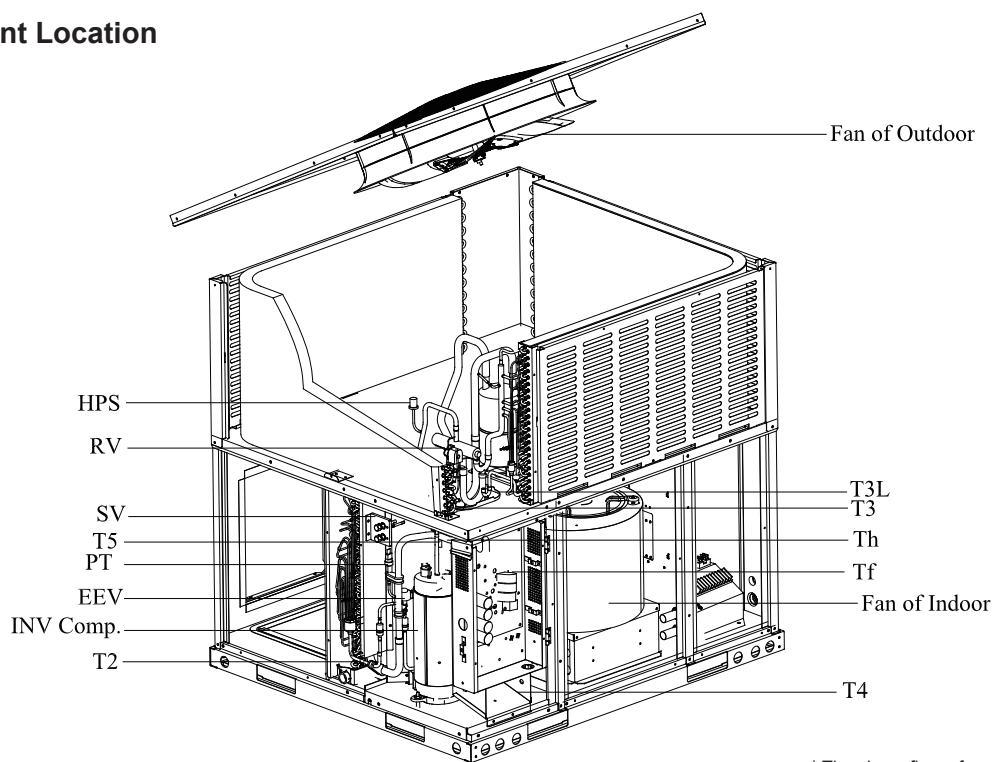
Dimensions Right and Top



* The above figure for reference purpose only.

Figure 2-9 (a)

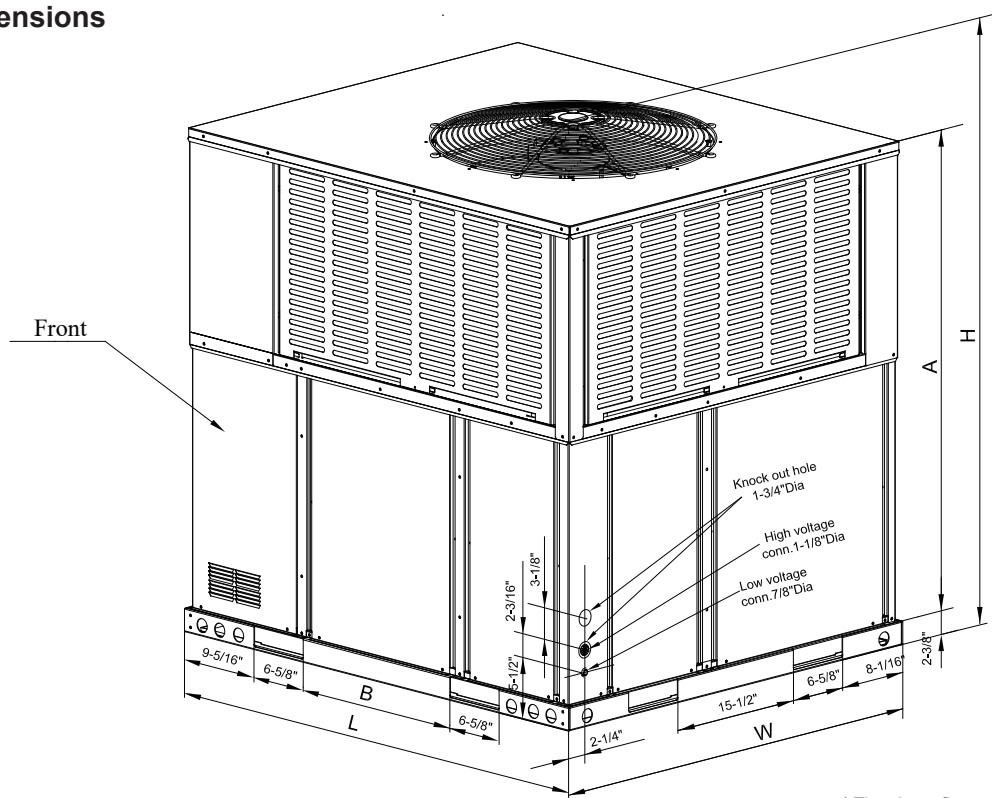
Component Location



* The above figure for reference purpose only.

Figure 2-6 (b)

Unit Dimensions



* The above figure for reference purpose only.

Figure 2-7 (b)

Model size	Dimensions				
Heat Pump	"L" in.[mm]	"W" in.[mm]	"H" in.[mm]	"A" in.[mm]	"B" in.[mm]
CCRT36-1INV	50-11/16 [1287]	35-1/16 [891]	46-13/16 [1190]	44-1/16 [1120]	11-3/4 [298]
CCRT60-1INV	51-9/16 [1310]	44-13/16 [1140]	51-7/16 [1306]	47-5/16 [1202]	19-11/16 [500]

Table 2-2

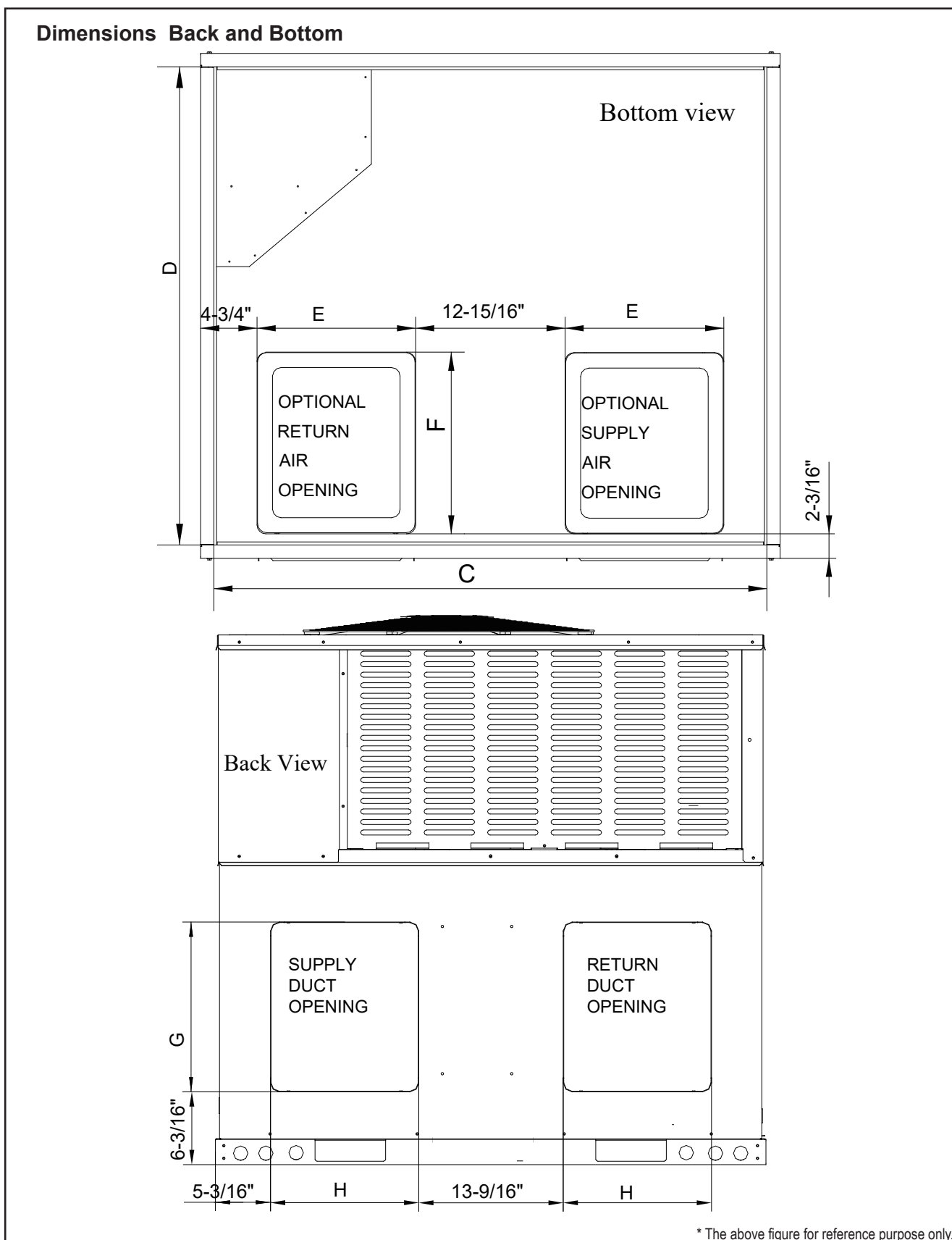
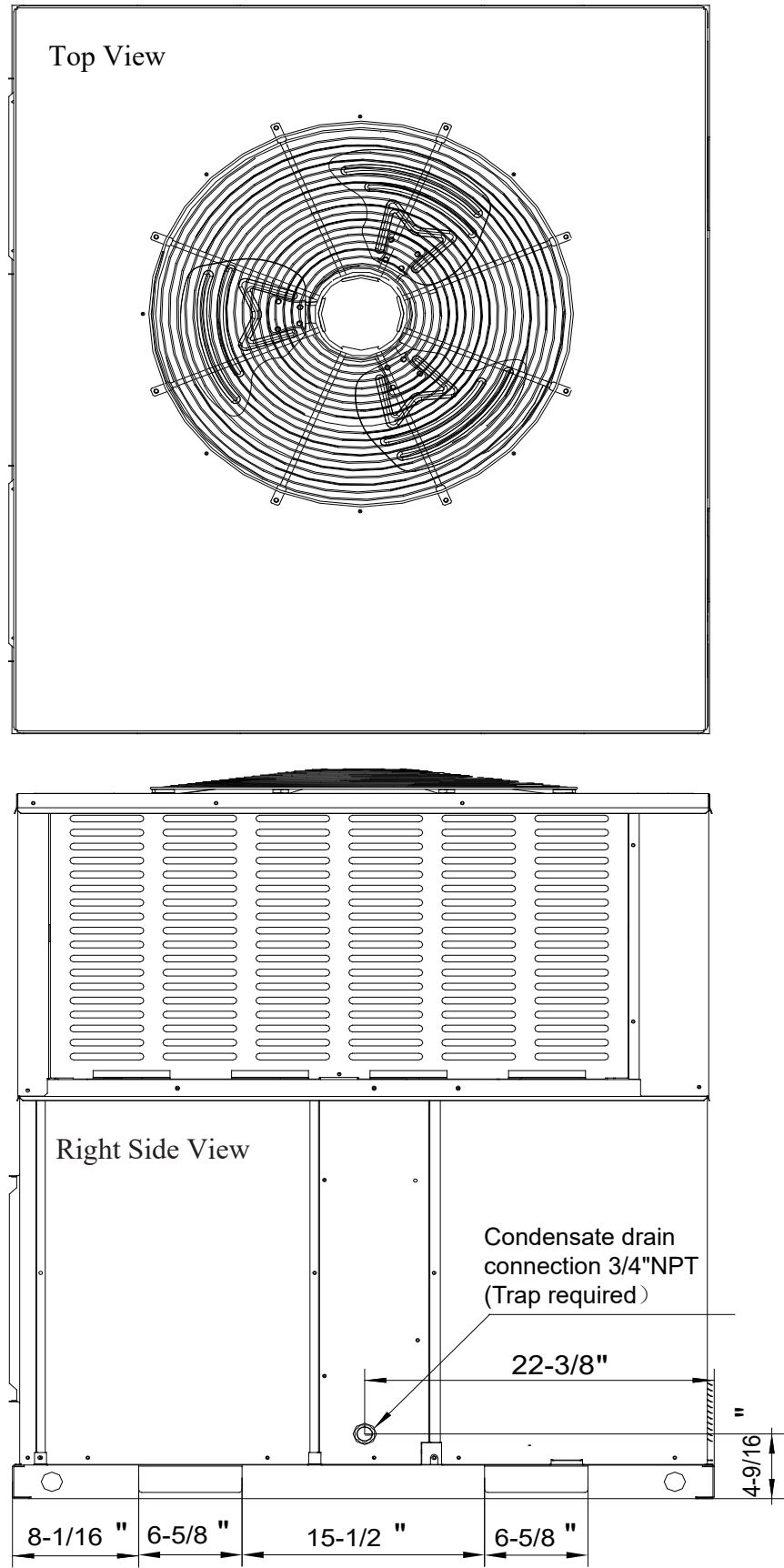


Figure 2-8 (b)

Model size	Dimensions					
Heat Pump	"C" in.[mm]	"D" in.[mm]	"E" in.[mm]	"F" in.[mm]	"G" in.[mm]	"H" in.[mm]
CCRT36-1INV	47-13/16 [1215]	32-1/4 [820]	9-15/16 [252]	15-7/8 [403]	15-3/4 [400]	9-3/4 [249]
CCRT60-1INV	49-1/4 [1250]	42-1/2 [1080]	14-1/8 [358]	16-1/8 [409]	15-7/8 [403]	13-7/8 [352]

Table 2-3

Dimensions Right and Top



* The above figure for reference purpose only.

Figure 2-9 (b)

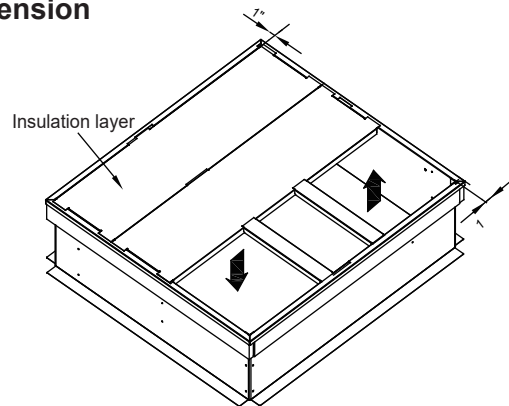
2.6 Roof Curb

On applications when a roof curb is used, the unit must be positioned on the curb so the front of the unit is tight against the curb. (See Fig. 2-10 ROOF CURB DIMENSIO)



For units applied with a roof curb, the minimum clearance may be reduced from 1 inch to 1/2 inch between combustible roof curb material and this supply air duct.

Roof Curb Dimension



Supply and return air (including duct support rails) shown are typical for bottom duct applications. For location of horizontal duct applications (on back of unit), refer to unit dimension details.

Figure 2-10

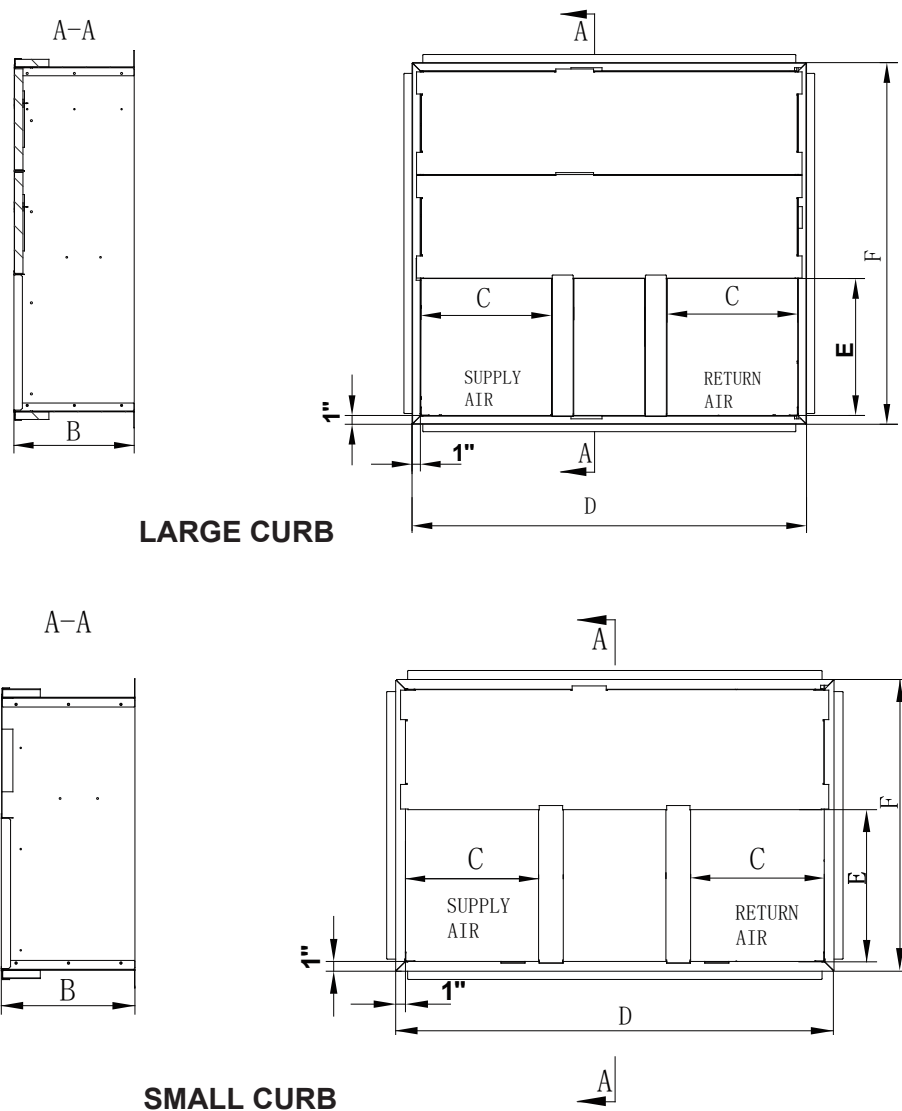


Figure 2-11

* The above figure for reference purpose only.

CURB	Dimensions(Inches)				
	"B" in.[mm]	"C" in.[mm]	"D" in.[mm]	"E" in.[mm]	"F" in.[mm]
LARGE	14-1/4 [362]	15-1/4 [387]	46-1/16 [1170]	16 [406]	42-3/16 [1070]
SMALL	14-1/4 [362]	14 [356]	46-1/16 [1170]	16 [406]	30-5/8 [778]

Table 2-6

3. DUCTWORK

Ductwork should be sized and installed by the installing contractor in accordance with the Manual D from the Air Conditioning Contractors of America, and all national, state and local codes.



On ductwork exposed to outside air space, use at least 2" of insulation and a vapor barrier. Flexible joint may be used to reduce noise.

A closed return duct system shall be used. This shall not preclude use of economizers or ventilation air intake. Flexible joints may be used in the supply and return duct work to minimize the transmission of noise.



CAUTION:

When fastening duct work to the side duct flanges on the unit, insert the screws through the duct flanges only. DO NOT insert the screws through the casing. Outdoor duct work must be insulated and waterproofed.



NOTE:

Be sure to note supply and return openings. Refer to Fig. 2-7 for information concerning supply and return air duct openings.

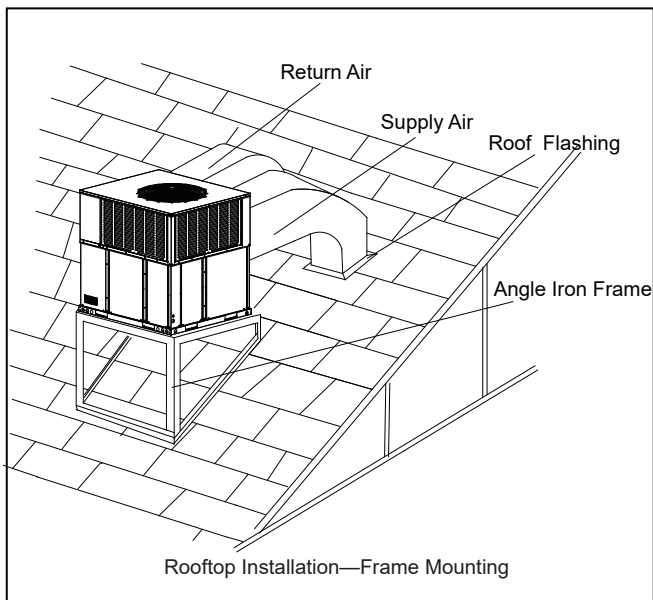


Figure 3-1

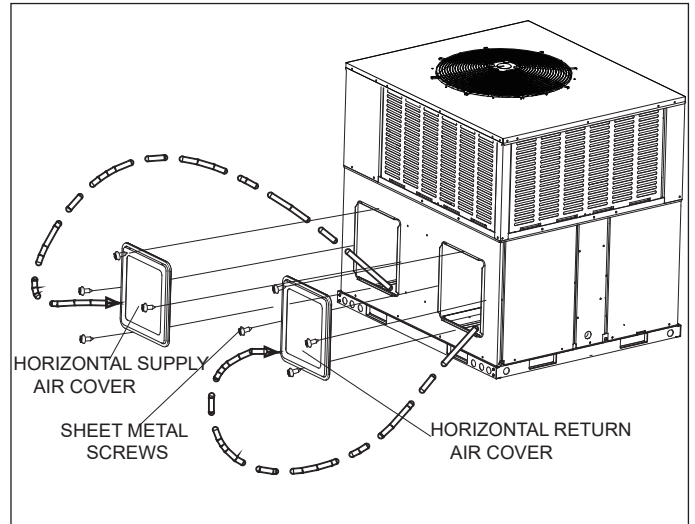


Figure 3-2

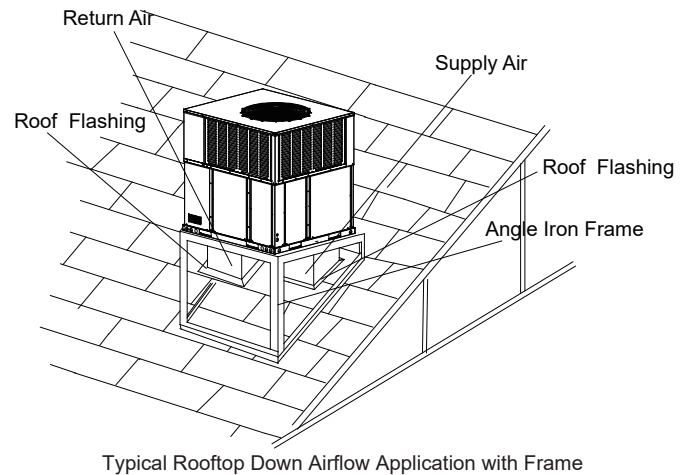


Figure 3-3

After the unit is installed, there should be no open passages through the supporting structure that would permit flame or hot gases from a fire originating in the space below the supporting structure to travel to the space above that structure.



NOTE:

A unit with electric heaters with an inlet or outlet duct that penetrates the building structure supporting the unit shall be provided with a mounting base of noncombustible material so designed that, after the unit is installed, there will be no open passages through the supporting structure that would permit flame or hot gases from a fire originating in the space below the supporting structure to travel to the space above that structure. If the unit is intended to be installed on a supporting structure of combustible material, the base shall be so designed that the required clearance will be maintained between the supporting unit mounting base, and shall extend not less than 76 mm (3 in.) below the upper surface of the supporting structure, except that, in a unit designed for use only in a mobile home, the distance shall be not less than 19 mm (3/4 in.).

4. CONDENSATE DRAIN CONNECTION

Consult local codes for special requirements.

To provide extra protection from water damage, install an additional drain pan, provided by installer, under the entire unit with a separate drain line. Manufacturer will not be responsible for any damages due to the failure to follow these requirements.

4.1 Install drain pipe

1. Use the provided female NPT threaded fitting for outside connection and make sure that drain holes are not blocked.
2. Insulation may be needed for drain line to prevent sweating.
3. Use a sealing compound on male pipe threads. Install the condensate drain line (NPT) to spill into an open drain.
4. Ensure a trap is included in the condensate drain line.
5. Make sure that the outlet of the trap is at least 1 in. (25mm) lower than the drain pan condensate connection to prevent the pan from overflowing (see Fig 4-1).
6. Unit must be slightly inclined toward drain connection.(See Figure 2-2).

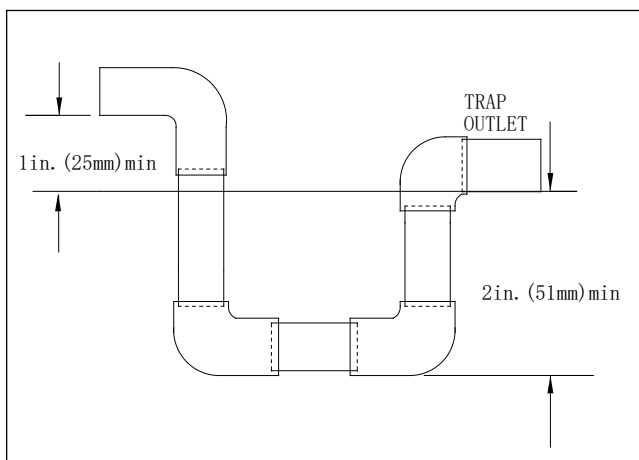


Figure 4-1

5. FILTERS

Units are shipped without a filter or filter racks. It is the responsibility of the installer to secure a filter in the return air ductwork or install a filter/frame Kit.

The filter must always be used and must be kept clean. Dirty filters may cause insufficient air delivery, decreasing unit efficiency and increasing operation costs and wear-and tear on the unit and controls.

Filters should be checked monthly; this is especially important since this unit is used for both heating and cooling. Filter Recommend the size see Table 5-1

Model	No.	Size Recommended in.
CCRT36-1INV	1	16×14×1
CCRT60-1INV	1	16×14×1

Table 5-1

6. ELECTRICAL WIRING

Field wiring must comply with the National Electric Code (NEC) or Canadian Electrical Code (CEC) and any applicable local ordinance.



WARNING:

Disconnect all power to unit before installing or servicing. More than one disconnect switch may be required to de-energize the equipment. Hazardous voltage can cause severe personal injury or death.

6.1 Power wiring

1. Proper electrical power should be available at unit. Voltage tolerance should not be over 10% from rating voltage.
 2. If any of the wire must be replaced, replacement wire must be the same type as shown in nameplate, wiring diagram and electrical data sheet.
 3. Install a branch circuit disconnect of adequate size to handle starting current, located within sight of, and readily accessible to the unit.
 4. ELECTRIC HEATER - If the Electric Heater is installed, unit may be equipped with 30~60A. circuit breakers or fuse. These breaker(s) protect the internal wiring in the event of a short circuit and serve as a disconnect.
- Circuit breakers installed within the unit do not provide over-current protection of the supply wiring and therefore may be sized larger than the branch circuit protection.

- Supply circuit power wiring must be 221 °F minimum copper conductors only. See Electrical Data in this section for ampacity, wire size and circuit protector requirements. Supply circuit protective devices may be either fuses or "HACR" type circuit breakers. 1-3/8" knockouts inside the cabinet are provided for connection of power wiring to electric heater.
- Connection of power wiring is separated from the machine power wiring.

6.2 Grounding



WARNING:

The unit must be permanently grounded. Failure to do so can result in electrical shock causing personal injury or death.

- The unit must be electrically grounded in accordance with local codes or the national electric code.
- Grounding may be accomplished by attaching ground wire(s) to ground lug(s) provided in the unit wiring compartment.

6.3 Control wiring

IMPORTANT: Class 2 low voltage control wiring SHOULD NOT be run in conduit with main power wiring and must be separated from power wiring, unless class 1 wire of proper voltage rating is used.

- Low voltage control wiring should be 18 AWG color-coded. For lengths longer than 50 ft, 16 AWG wire should be used.
- 7/8" holes can be used for control wires going into the unit.
- Make sure, after installation, separation of control wiring and power wiring has been maintained.
Thermostat should be mounted on an inside wall about 58" from floor and will not be affected by unconditioned air, sun and/or heat exposure. Follow the instruction carefully because there are many wiring requirements.
See Figure 6-1 、 6-2, Table 6-1.

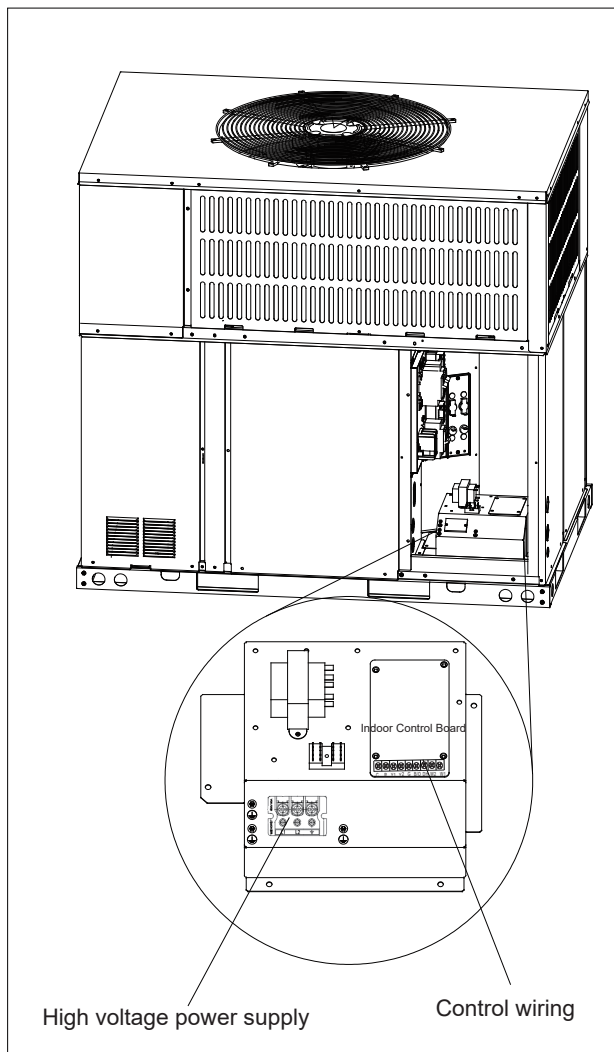


Figure 6-1

* The above figure for reference purpose only.

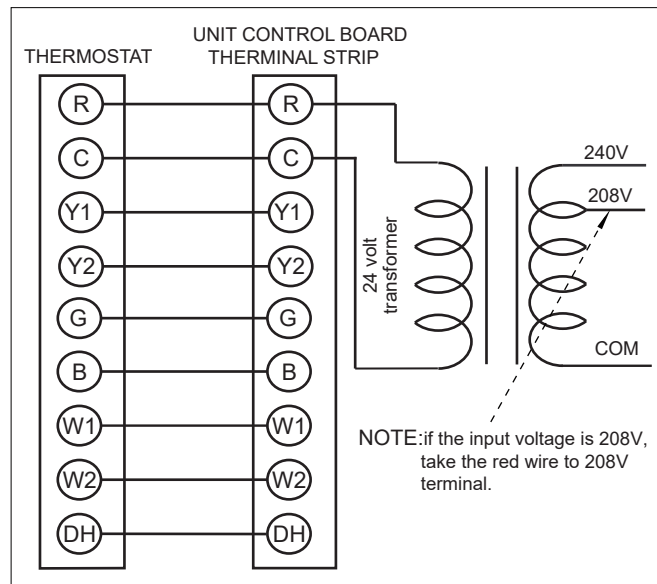


Figure 6-2 Typical Field Control Wiring Diagram

- *** B wire must be used with heat pump system only, reversing valve energizes at the heating mode, and cut off at the cooling mode.
- ** Minimum wire size of 18 AWG wire should be used for all field installed 24 volt wire.
- * Only required on units with supplemental electric heat.

CAUTION:

Label all wire prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

Table 6-1: 19 SEER Heat Pump W/Without Electric Heat

Size (Tons)	Volt	Compressors (each)		OD Fan Motors (each)	Supply Blower Motor	Unit Circuit	
		RLA	LRA	FLA	FLA	MCA (Amps)	Max Fuse/ Breaker Size(Amps)
60(5.0)	208/230-1-60	27A	52A	2.1A	6.0A	41.9	60
36(3.0)	208/230-1-60	19A	52A	1.4A	3.5A	28.7	45

Heater Circuit (208/230V)					
Model	kW	Stages	Amps	MCA (Amps)	Max Fuse/ Breaker Size(Amps)
EHK-05J	3.8/5	1	18.1/20.8	23/26	25/30
EHK-08J	5.6/7.5	1	27.1/31.3	34/40	35/40
EHK-10J	7.5/10	1	36.1/41.7	46/53	50/60
EHK-15J	11.3/15	2	54.2/62.5	68/79	70/80
EHK-20J	15/20	2	72.2/83.3	91/105	100/110

1. Minimum Circuit Ampacity.
2. Maximum Over Current Protection per Standard UL 1995.
3. Fuse or HACR circuit breaker size installed at factory or field installed.

7. SYSTEM START UP

1. Ensure Sections 1,2,3,4,5 and 6 have been completed.
2. Set System Thermostat to OFF.

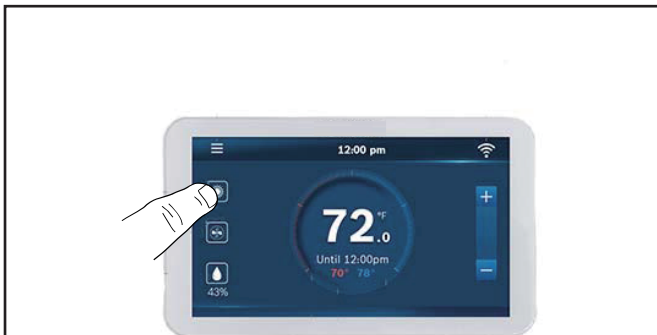


Figure 7-1

3. Turn on disconnect to apply power to the indoor and outdoor units.

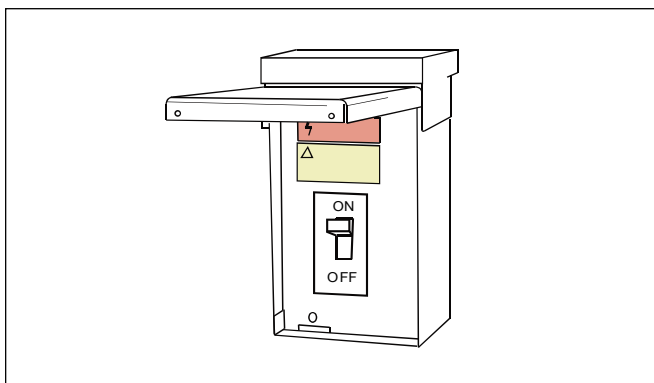


Figure 7-2

4. Wait one (1) hour before starting the unit if compressor crankcase heater is used and the outdoor ambient temperature is below 70 °F.



Figure 7-3

5. Set system thermostat to ON.



Figure 7-4

8. SYSTEM CHARGE ADJUSTMENT

8.1 Charging: weigh-in method

Weigh-in method is recommended for the initial installation, or anytime a system charge is being replaced. Weigh-in method can also be used when power is not available to the equipment site or operating conditions (indoor/Outdoor temperatures) are not in range to verify with the subcooling charging method.

Model	Refrigerant charge (lb-oz)
60	12-9
36	7-8

Table 8-1

8.2 Subcooling charging and refrigerant adjustment in cooling (above 55°F outdoor temp.)

1. Check the outdoor ambient temperatures.

Subcooling (in cooling mode) is the only recommended method of charging above 55°F outdoor ambient temperatures.

For outdoor ambient temperatures below 55°F, use weigh-in charge method.



It is important to return in the spring or summer to accurately charge the system in the cooling mode when outdoor ambient temperature is above 55°F.

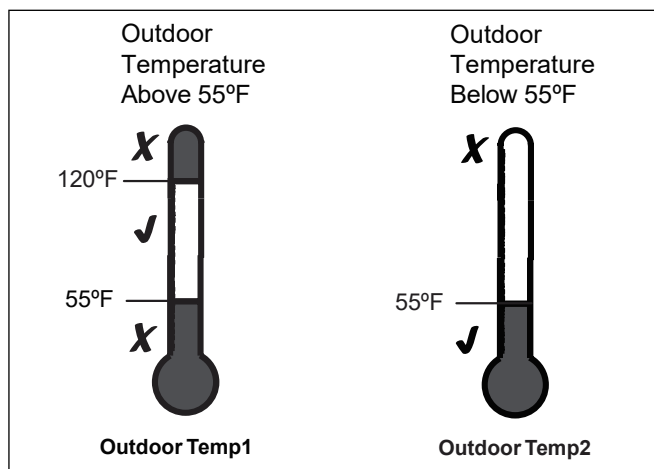


Figure 8-1

For best results the indoor temperature should be kept between 70°F to 80°F.

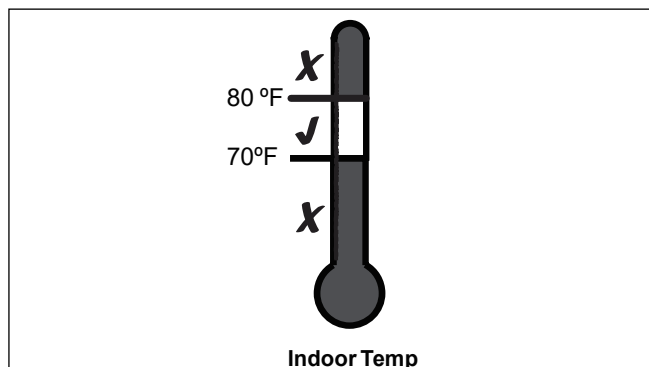


Figure 8-2

2. Stabilize the system.

After starting the system in cooling mode, short press “FORCE” button, and a “┐” symbol should appear. System may take 10 minutes to ramp up. Operate the system for a minimum of twenty (20) minutes.

After twenty (20) minutes stabilization period operating at 60 Hertz , maintain continuous operation while adjusting refrigerant charge . After adjusting, operate system for a minimum of five (5) minutes for system to stabilize, otherwise repeat step 3.

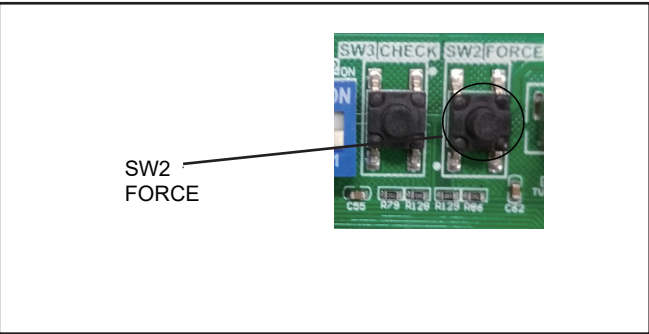


Figure 8-3

3. Check subcooling value on liquid line (According to Table 9-2)

- ▶ Check Liquid Line Temp.(T3L)= _____°F
- ▶ Check Condenser Temp.(T3) = _____°F
- ▶ Calculate subcooling value = T3-T3L_____°F

Model	Design subcooling
60/36	12°F ± 4°F

Table 8-2

4. Adjust refrigerant level to attain proper subcooling.

Add refrigerant if the subcooling reading from Table 8-3 is lower than the designed value (Table 8-2).

- ▶ Connect gauges to refrigerant bottle and unit as illustrated (Fig 8-4).
- ▶ Purge all hoses.
- ▶ Open tank.
- ▶ Stop adding refrigerant when subcooling matches the charging chart (Table 8-2) Final Subcooling value.

Recover refrigerant if the subcooling reading from Table 8-3 is higher than the designed value (Table 8-2).

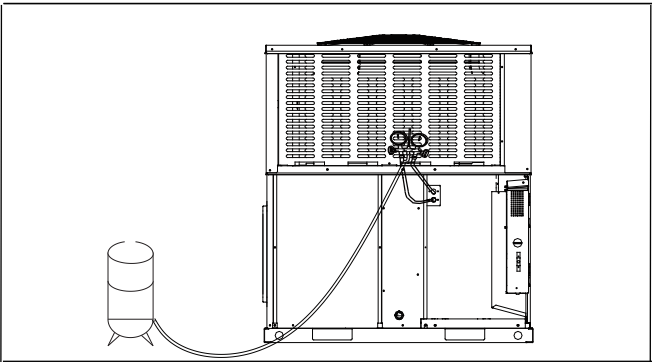


Figure 8-4

5. Stabilize the system.

- ▶ Wait 5 minutes for the system condition to stabilize between adjustments.

When the subcooling match the chart, the system is properly charged.

- ▶ Remove gauges.
- ▶ Replace service port caps to prevent leaks. Tighten finger tight plus an additional 1/6 turn.

6. Record System Information for reference (Table 8-3).
Record system pressures and temperatures after charging is complete.

Description	Value
Outdoor model number	
Measured Outdoor Ambient	°F
Measured Indoor Ambient	°F
Check Liquid Line Temp.(T3L)	°F
Check Condenser Temp.(T3)	°F
Calculate subcooling value=T3-T3L	°F

Table 8-3

9. SYSTEM OPERATION AND TROUBLESHOOTING

9.1 Control logic description

- ▶ The variable speed system adopts the same 24VAC control as any conventional heat pump.
- ▶ The compressor's speed is controlled based on coil pressures monitored by pressure transducer. To ensure stable and adequate capacity, the compressor speed will modulate relative to evaporator pressure during cooling operation and relative to condensing pressure during heating operation. The target pressure can automatically adjust based on compressor operation so optimal capacity can be achieved. Target pressure can manually be adjusted (SW4) to achieve improved dehumidification and capacity demands.

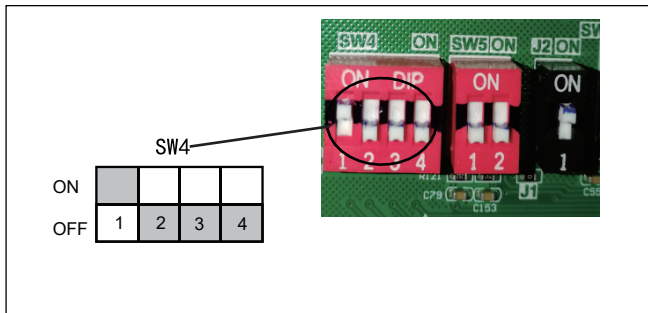


Figure 9-1

SW4-1	ON	Must be set at ON position *
	OFF	Unused
SW4-2	ON	Unused
	OFF	Must be set at OFF position *
SW4-3	ON	Adaptive capacity output disable
	OFF	Adaptive capacity output enable *
SW4-4	ON	Accelerated cooling/heating
	OFF	Normally cooling/heating *
SW5-1 Enter defrost	ON	Operating time is reduced by 10%
	OFF	Normal *
SW5-2 Quit defrost	ON	Defrosting extended for 60 seconds
	OFF	Normal *

Table 9-1

9.2 Sensors (thermistors/pressure transducer)

- ▶ T3 = Outdoor Coil Temperature (Table 9-14)
 - High/Low temperature protection
 - Outdoor fan control (cooling mode)
 - Defrost control (heating mode)
- ▶ T4 = Ambient Temperature (Table 9-14)
 - Operating condition permission
 - Defrosting condition permission
 - Outdoor fan control (heating mode)
- ▶ T5 = Compressor Discharge Temperature (Table 9-15)
 - High/Low temperature protection
 - Electronic Expansion Valve (EEV) (ODU/heating mode only)
- ▶ TF = IPM Radiator Temperature (Table 9-15)
 - Inverter High Temperature Protection
- ▶ Pressure transducer (Table 9-16)
 - Operating speed control
 - Electronic Expansion Valve (EEV) control
 - High pressure protection (heating mode)
 - Low pressure protection (cooling mode)

- ▶ Th = Compressor Suction Temperature (Table 9-14)
 - Outside Electronic Expansion Valve control
- ▶ T2 = Indoor Coil Temperature (Table 9-14)
 - Indoor Fan control
- ▶ T3L = Outdoor Line Liquid Temperature (Table 9-14)
 - Calculate subcooling valve on liquid line

9.3 Defrost description

- ▶ The Demand Defrost Control (DDC) monitors the ODU coil temperature using thermistor (T3). A second thermistor (T4) monitors outdoor ambient temperature. Based on these parameters, as well as accumulative run time and high pressure, the DDC calculates proper initiation of defrost.
- ▶ Any one of the three conditions is required to enter defrost:
 1. The calculated temperature difference between the outdoor temperature (T4) and the coil temperature (T3) is called Delta T. After Delta T is achieved and continues for 3 minutes.
 - $T4 \geq 39^{\circ}\text{F}$, Delta T = 18°F
 - $T4 \geq 30^{\circ}\text{F}$, Delta T = 16°F
 - $T4 \geq 19^{\circ}\text{F}$, Delta T = 14°F
 - When $T4 < 19^{\circ}\text{F}$, $T3 < 9^{\circ}\text{F}$, accumulative compressor run time ≥ 80 minutes.
 2. After "Minimum Run Time" (MRT) is achieved. MRT is based on outdoor ambient temperature (T4), for example:
 - MRT is 4 hours when: $T4 < 23^{\circ}\text{F}$
 - MRT is 2 hours when: $23^{\circ}\text{F} \leq T4 < 42^{\circ}\text{F}$
 3. After the high pressure saturation temperature drops below 82°F for 20 minutes.
- ▶ Defrost will terminate once outdoor coil temperature (T3) reaches 64°F for a period of 1 minute or defrost time has exceeded 8 minutes.
- ▶ Defrost Termination Settings (SW5) offers different defrost termination options for enhanced defrost for different geographical and outdoor conditions. See Table9-1

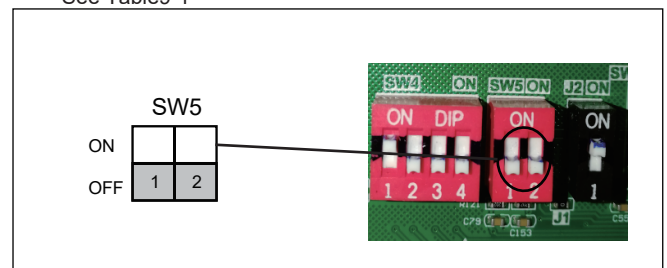


Fig. 9-2

- ▶ Manual Defrost:
 1. System must have a call for heat and have been operating for a minimum of 8 minutes.
 2. Press "Force" button on inverter board for 6 seconds to begin forced defrost.
 3. Wait approximately 40 seconds for defrost to initiate.
 4. Once defrost initiates, the display will indicate "dF".
 5. Defrost will terminate automatically, after which the display will indicate running speed.
 6. If a second defrost is required, repeat steps 2-5 after 5 minutes.

9.4 Compressor crankcase heater description

Refrigerant migration during the OFF cycle can result in noisy start-ups, therefore a CrankCase Heater (CCH) is used to minimize refrigerant migration thereby minimizing start-up noise and/or bearing “wash out”. All CCHs must be installed on the lower half of the compressor shell. Its purpose is to warm the compressor during the OFF cycle, driving refrigerant from compressor. At initial start-up or after extended shutdown periods, allow CCH to be energized for at least 12 hours prior to compressor operation by applying line voltage to heat pump with thermostat OFF.

- ▶ CCH operation energizes:
 1. First time line voltage is applied and compressor discharge temperature $T5 < 54^{\circ}\text{F}$.
 2. In process of defrosting.
 3. Compressor stops running for 3 hours and outdoor ambient temperature $T4 < 41^{\circ}\text{F}$ or $T5 < 54^{\circ}\text{F}$.
- ▶ CCH operation de-energizes:
 1. Compressor discharge temperature $T5 \geq 61^{\circ}\text{F}$.

9.5 Reversing valve operation

- ▶ Reversing valve energizes during heat mode and de-energizes in cool mode.



During a heat call on first time operation the unit will run 1 minute in cooling to build up pressure for reversing valve to change.

9.6 Protection functions

- ▶ Outdoor coil temperature protection (T3)
 - i. If $T3 > 142^{\circ}\text{F}$, compressor is de-energized
 - ii. If $T3 < 129^{\circ}\text{F}$, compressor is energized
- ▶ Ambient temperature protection (T4)
 - i. If $23^{\circ}\text{F} \leq T4 < 125^{\circ}\text{F}$, unit can operate in cooling
 - ii. If $-4^{\circ}\text{F} \leq T4 < 86^{\circ}\text{F}$, unit can operate in heating
 - iii. If $T4 < 6.8^{\circ}\text{F}$, heat pump will provide 24V control to indoor unit energizing electric heat (if installed).
- ▶ Discharge Temperature (DT) protection (T5)
 - i. If $DT > 230^{\circ}\text{F}$ during cooling mode, the compressor will stop.
 - ii. If $DT < 185^{\circ}\text{F}$ during cooling mode, the compressor will restart.
 - iii. If $DT > 230^{\circ}\text{F}$ during heating mode, the compressor will stop.
 - iv. If $DT < 185^{\circ}\text{F}$ during heating mode, the compressor will restart.
- ▶ High Pressure (HP) protection (mechanical open/close pressure switch)
 - i. High pressure switch opens at $P > 580$ PSIG, the compressor and outdoor fan stop.
 - ii. High pressure switch closes at $P < 435$ PSIG, the compressor and outdoor fan restart.

- ▶ Low Pressure (LP) protection
 - i. If Low Pressure < 43.5 PSI for 5 minutes during cooling mode, the compressor and outdoor fan will stop. The system will attempt to run again after 3 minutes.
- ▶ Module (inverter) protection (TF)
 - i. If $TF > 154^{\circ}\text{F}$, the compressor and outdoor fan will stop.
 - ii. If $TF < 142^{\circ}\text{F}$, the compressor and outdoor fan will restart.



In keeping with product improvement, we reserve the right to make changes without notice.

9.7 Parameter point check table

- ▶ To display system parameters, press the “Check” button to index through the series of parameters available. The first time you press the “Check” button, it will display the sequence, and after 1 second it will display the value of the parameter. If you press the “Check” button again, it will display the next sequence.
- ▶ After 20 seconds on same parameter, display will revert back to normal status.

SW3
CHECK

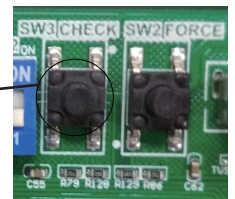


Figure 9-3

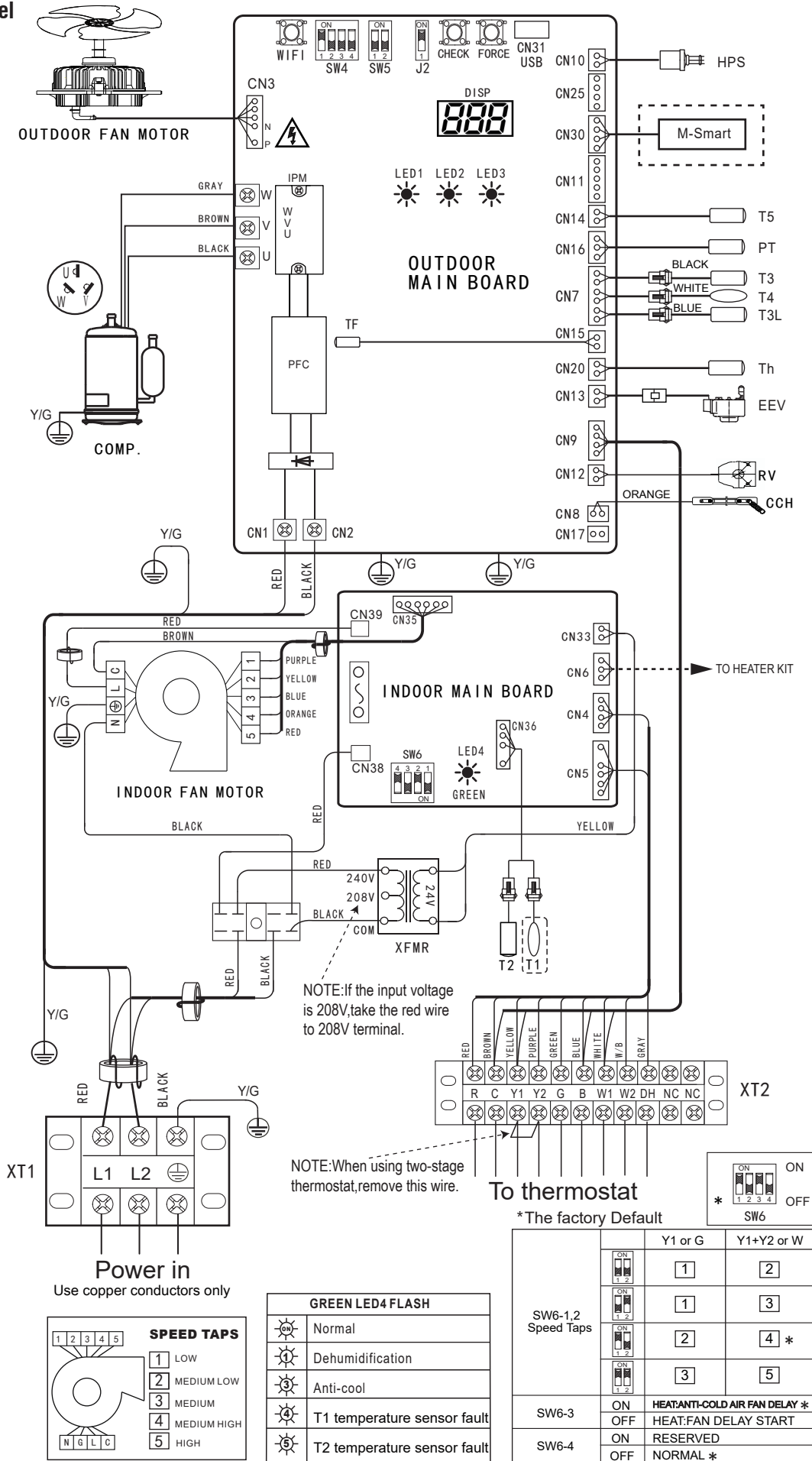
- ▶ Normal Status, last two digits will display under following conditions
 - i. Unit not operating (Standby Mode); “outdoor ambient temperature”.
 - ii. Unit operating; displays “compressor operating frequency”.
- ▶ If a system protection is active, first digit will display “status code”.

No.	Point check content	Example	Remark
0	Outdoor unit capacity	RH5	RH5=Heat pump 5 ton
1	Outdoor unit mode	2	0 standby, 2 cooling, 3 heating
2	Outdoor unit set compressor speed(Hz)	66	66 Hz
3	T3(outdoor coil temp.) (°F)	108	108 °F
4	T4 (outdoor ambient temp.) (°F)	95	95 °F
5	T5 (compressor discharge temp.) (°F)	140	140 °F
6	Th (compressor suction temp.) (°F)	55	55 °F
7	T3L(liquid line temp.) (°F)	99	99 °F
8	Tf (module temp.) (°F)	120	120 °F
9	Pe (evaporating pressure) (PSI)	140	140 psi
10	Pc (condensing pressure) (PSI)	380	380 psi
11	Tes (target of the evaporating temp.) (only use for cooling mode) (°F)	43	43 °F
12	Te (evaporating temp.) (°F)	43	43 °F
13	Tcs (target of the condensing temp.) (only use for heating mode) (°F)	106	106 °F
14	Tc (condensing temp.) (°F)	106	106 °F
15	Target of the compressor discharge superheat (only use for heating mode) (°F)	36	36 °F
16	Compressor discharge superheat (°F)	36	36 °F
17	Opening of EEV	200	200 p(0~480)
18	Fan speed	9	9 speed
19	Compressor current (A)	10	10 A
20	Alternating voltage	230	230 V
21	Compressor input dc voltage	380	380 V
22	Continuous running time of the compressor	35	35 min
23	Last Fault Code	00	see table 9-4
24	Software version	01	V1.0
25	Remark“--”	--	--

Table 9-2

9.8 Control board overviews

For 60k model





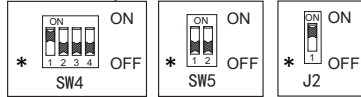
WARNING
ELECTRIC HAZARD 380V VOLTS DC

WAIT 3 MINUTES AFTER DISCONNECTING POWER, THEN VERIFY DC VOLTAGE LESS THAN 42 VDC AT INVERTER

TEST POINTS P-N. COMPONENTS MAY STORE A DANGEROUS ELECTRICAL POTENTIAL OF 380 VOLTS DC.

FAILURE TO FOLLOW THIS WARNING COULD RESULT IN PERSONAL INJURY OR DEATH.

*The factory Default



SW4-1	ON	Must be set at ON position *
	OFF	Unused
SW4-2	ON	Unused
	OFF	Must be set at OFF position *
SW4-3	ON	Adaptive capacity output disable
	OFF	Adaptive capacity output enable *
SW4-4	ON	Accelerated cooling/heating
	OFF	Normally cooling/heating *
SW5-1 Enter defrost	ON	Operating time is reduced by 10%
	OFF	Normal *
SW5-2 Quit defrost	ON	Defrosting extended for 60 seconds
	OFF	Normal *

J2	J2	For 60K model *
	J2	For 48K model

Detailed reference manual instructions

WIFI		Wifi setting(reserve)
CHECK	PRESS 1s	Check the system parameters
	PRESS 6s	Test mode(Not used)
FORCE	PRESS 1s	Forced cooling/heating (Charge model)
	PRESS 6s	Forced defrosting

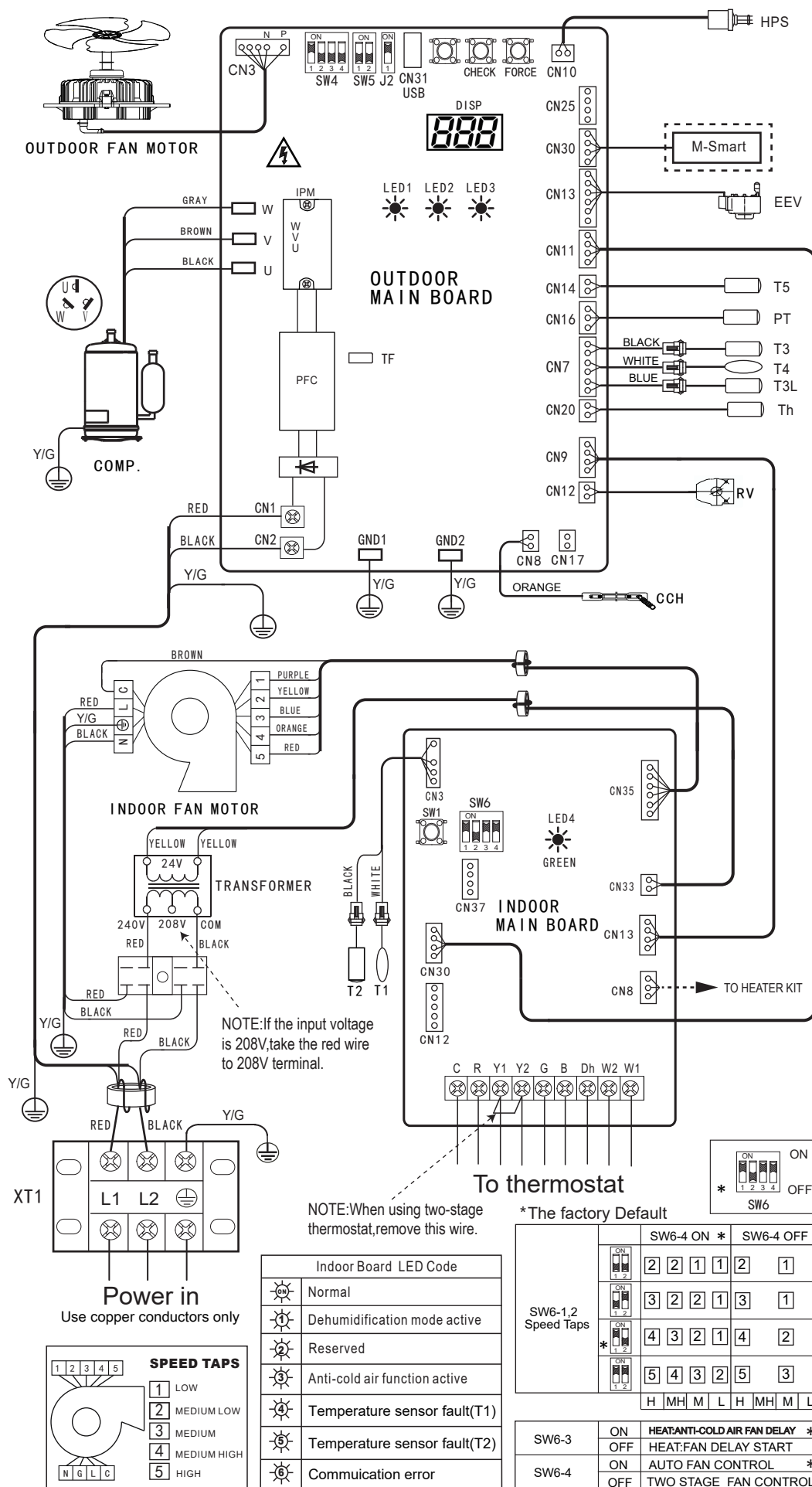
HPS	High pressure switch
T5	Comp. discharge temp. sensor
PT	Pressure transducer
T3	Condensor temp. sensor
T4	Ambient temp. sensor
T3L	Condensor outlet temp. sensor
TF	Radiator temp. sensor
Th	Comp. return temp. sensor
EEV	Electric expansive valve
RV	Reversing valve
CCH	Crankcase heater
COMP.	Compressor
TEMP.	Temperature

LED1 GREEN	ON	Comp. running
	FLASH	LED2 ON IPM Module fault
		LED2 OFF Standby
LED2 RED	ON	Fault
	OFF	No fault
LED3 GREEN	ON	Power on
	OFF	Power off

CODE	Fault description
C3	The coil sensor is seated fault in cooling(T3)
E4	Temperature sensor fault(T3,T4,T5,Th,T3L,TF)
E5	High/Low voltage protection
E6	DC fan motor fault
E7	Compressor discharge sensor is seated fault (T5)
E9	EEPROM fault
F1	High pressure switch(HPS) fault
H0	Communication fault in main control chip
H5	5 times (P2) protection in 100 minutes, lockup
H8	Pressure transducer fault (PT)
L0-L9	The IPM module protection(only for analysis)
P0	High module radiator temperature protection (TF)
P1	High pressure protection (HPS)
P2	Low pressure protection in cooling or heating (PT)
P3	Compressor over current protection
P4	High T5 protection
P5	Condensor coil temperature protection in cooling (T3)
P6	IPM module protection
P8	DC fan motor hurricane/typhoon protection
PH	Low discharge superheat protection
AtL	Ambient Temperature Limited T4 (heat pump)

CODE	Description
F	Forced operation mode
L	Running indication under T3 limited condition
D	Running indication under T5 limited condition
P	Compression ratio protection limit
F	Running indication under TF limited condition
C	Running indication under current limited condition
U	Running indication under low voltage limited condition
A	Running indication under return oil model
dF	Running indication under defrost model

Number	Point check content
0	Outdoor unit capacity,example:H3=Heat pump 3 ton
1	Outdoor unit mode:0-standby,2-cooling,3-heating
2	Outdoor unit set compressor speed(Hz)
3	T3:outdoor coil temp.(°F)
4	T4:outdoor ambient temp.(°F)
5	T5:compressor discharge temp.(°F)
6	Th:compressor suction temp.(°F)
7	T3L:(liquid line temp.)(°F)
8	TF:module temp.(°F)
9	Pe:evaporating pressure(PSI)
10	Pc:condensing pressure(PSI)
11	Tes:target evaporating temp.(only for cooling mode)(°F)
12	Te:evaporating temp.(°F)
13	Tcs:target condensing temp(only for heating mode)(°F)
14	Tc:condensing temp.(°F)
15	Target of the compressor discharge superheat (heating mode only):Target value (°F)
16	Compressor discharge superheat(°F)
17	Opening of EEV:Actual value
18	Outdoor fan speed
19	Compressor current(A)
20	Power AC voltage Input(V)
21	DC voltage(V)
22	Continuous running time of the compressor(min)
23	Last fault code
24	Software version
25	Remark"--"





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FAILURE TO FOLLOW THIS WARNING COULD RESULT IN PERSONAL INJURY OR DEATH.

*The factory Default



SW4-1	ON	Must be set at ON position *
	OFF	Unused
SW4-2	ON	Unused
	OFF	Must be set at OFF position *
SW4-3	ON	Adaptive capacity output disable
	OFF	Adaptive capacity output enable *
SW4-4	ON	Accelerated cooling/heating
	OFF	Normally cooling/heating *
SW5-1 Enter defrost	ON	Operating time is reduced by 10%
	OFF	Normal *
SW5-2 Quit defrost	ON	Defrosting extended for 60 seconds
	OFF	Normal *

	PRESS 1s	Check the system parameters
	PRESS 6s	Test mode(Not used)
	PRESS 1s	Forced cooling/heating (Charge model)
	PRESS 6s	Forced defrosting

HPS	High pressure switch
T5	Comp. discharge temp. sensor
PT	Pressure transducer
T3	Condensor temp. sensor
T4	Ambient temp. sensor
T3L	Condensor outlet temp. sensor
Th	Comp. return temp. sensor
TF	Control board module temperature
T1	Return air temp. sensor
T2	Indoor coil temp. sensor
EEV	Electric expansive valve
RV	Reversing valve
CCH	Crankcase heater
COMP.	Compressor
TEMP.	Temperature

 GREEN	ON	Comp. running
	FLASH	LED2 ON IPM Module fault
		LED2 OFF Standby
 RED	ON	Fault
	OFF	No fault
 GREEN	ON	Power on
	OFF	Power off

CODE	Fault description
C3	The coil sensor is seated fault in cooling(T3)
E4	Temperature sensor fault(T3,T4,T5,Th,T3L,TF)
E5	High/Low voltage protection
E6	DC fan motor fault
E7	Compressor discharge sensor is seated fault (T5)
E9	EEPROM fault
F1	High pressure switch(HPS) fault
H0	Communication fault in main control chip
H5	5 times (P2) protection in 100 minutes, lockup
H8	Pressure transducer fault (PT)
L0-L9	The IPM module protection(only for analysis)
P0	High module temperature protection (TF)
P1	High pressure protection (HPS)
P2	Low pressure protection in cooling or heating (PT)
P3	Compressor over current protection
P4	High T5 protection
P5	Condensor coil temperature protection in cooling (T3)
P8	DC fan motor hurricane/typhoon protection
PH	Low discharge superheat protection
AtL	Ambient Temperature Limited T4 (heat pump)

CODE	Description
	Forced operation mode
L	Running indication under T3 limited condition
D	Running indication under T5 limited condition
P	Compression ratio protection limit
F	Running indication under TF limited condition
C	Running indication under current limited condition
U	Running indication under low voltage limited condition
A	Running indication under return oil model
dF	Running indication under defrost model

Number	Point check content
0	Outdoor unit capacity, example: H3=Heat pump 3 ton
1	Outdoor unit mode: 0-standby, 2-cooling, 3-heating
2	Outdoor unit set compressor speed(Hz)
3	T3: outdoor coil temp.(°F)
4	T4: outdoor ambient temp.(°F)
5	T5: compressor discharge temp.(°F)
6	Th: compressor suction temp.(°F)
7	T3L: (liquid line temp.)(°F)
8	TF: module temp.(°F)
9	Pe: evaporating pressure(PSI)
10	Pc: condensing pressure(PSI)
11	Tes: target evaporating temp.(only for cooling mode)(°F)
12	Te: evaporating temp.(°F)
13	Tcs: target condensing temp(only for heating mode)(°F)
14	Tc: condensing temp.(°F)
15	Target of the compressor discharge superheat (heating mode only): Target value (°F)
16	Compressor discharge superheat(°F)
17	Opening of EEV: Actual value
18	Outdoor fan speed
19	Compressor current(A)
20	Power AC voltage Input(V)
21	DC voltage(V)
22	Continuous running time of the compressor(min)
23	Last fault code
24	Software version
25	T1: Return air temp.(°F)
26	T2: Indoor coil temp.(°F)
27	Indoor fan speed
28	Ts: Assume thermostat set point temp.(°F)
29	Remark"..."

9.9 Error code troubleshooting

Error Code	Description
P1	High pressure switch(HPS)protection
P5	Condenser coil temperature(T3) protection in cooling
P3	Compressor over current protection

Table 9-3

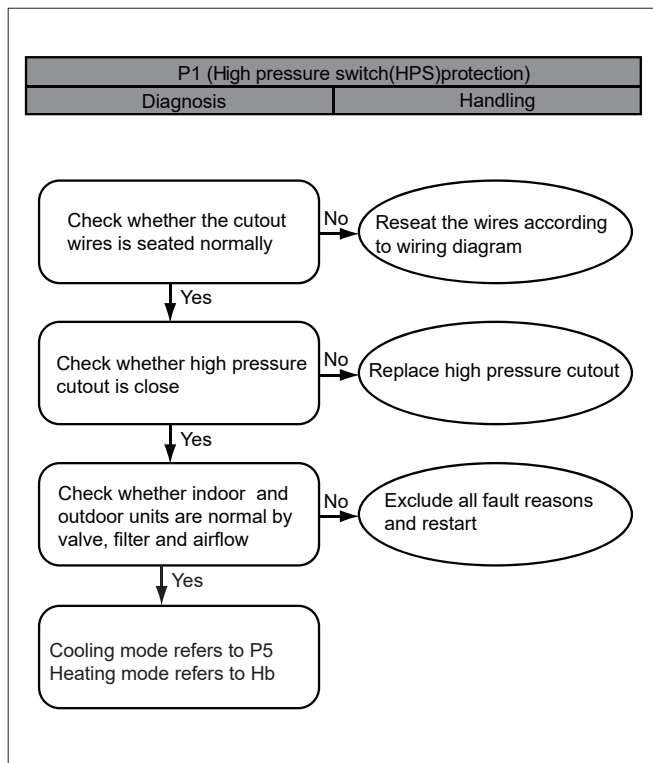


Figure 9-4

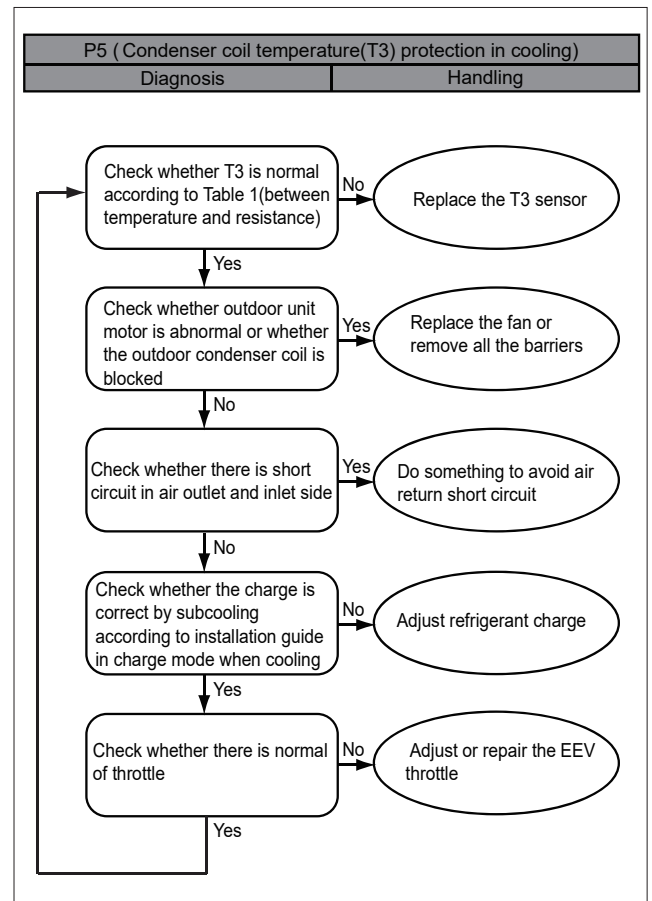


Figure 9-5

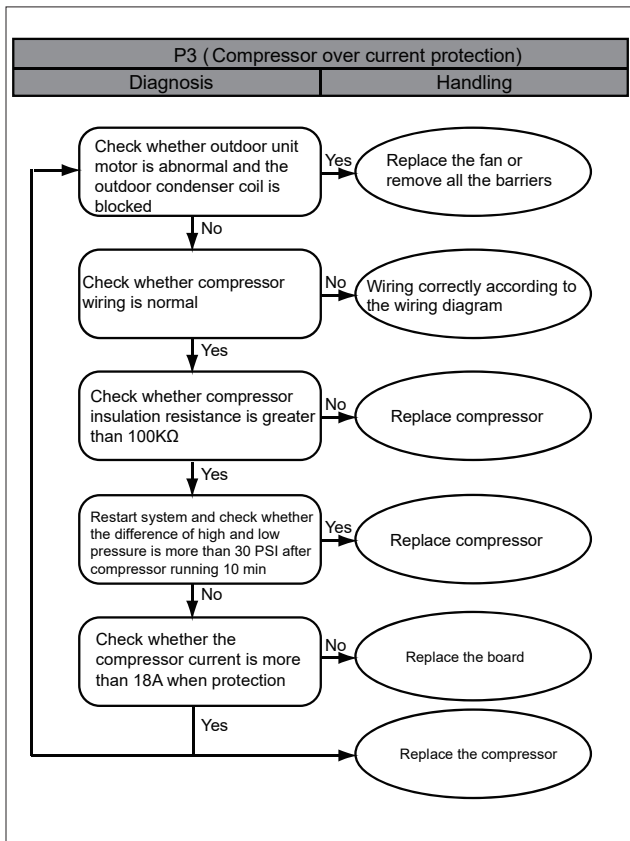


Figure 9-6

Error Code	Description
P0	High module radiator temperature (TF) protection

Table 9-4

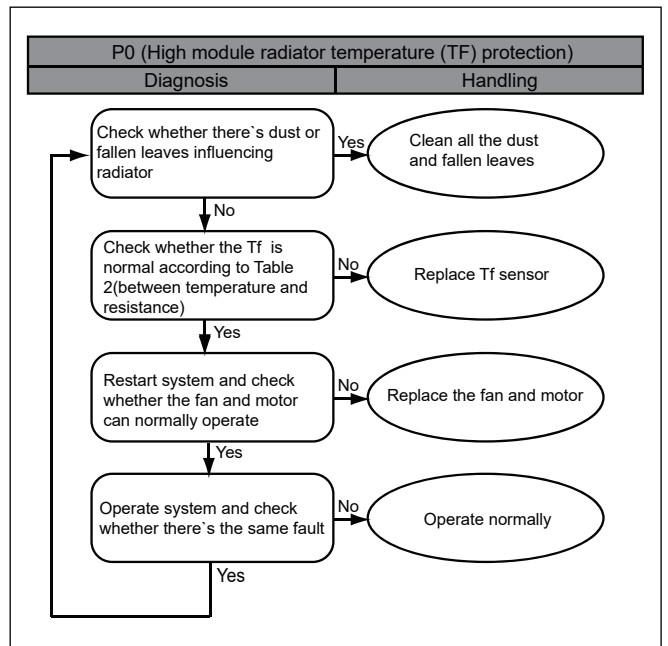


Figure 9-7

Error Code	Description
P2	Low pressure(PT) Protection
H5	System lockup, 5 times (P2) protection in 100 minutes
P4	High compressor discharge temperature(T5) protection

Table 9-5

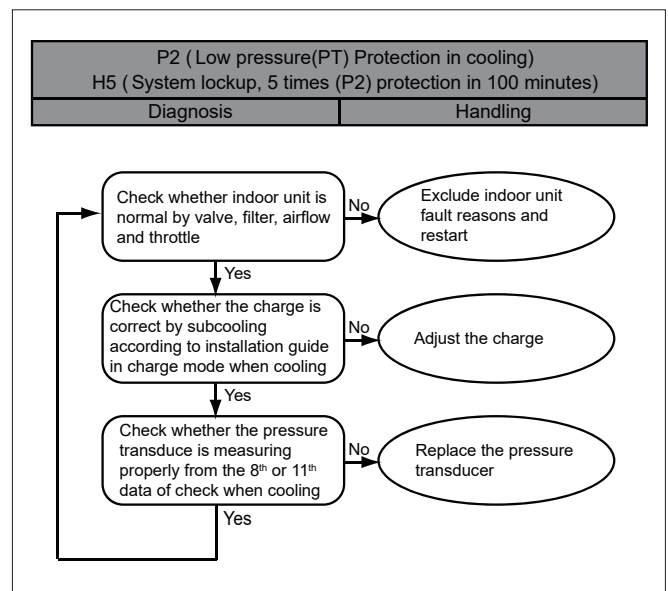


Figure 9-8

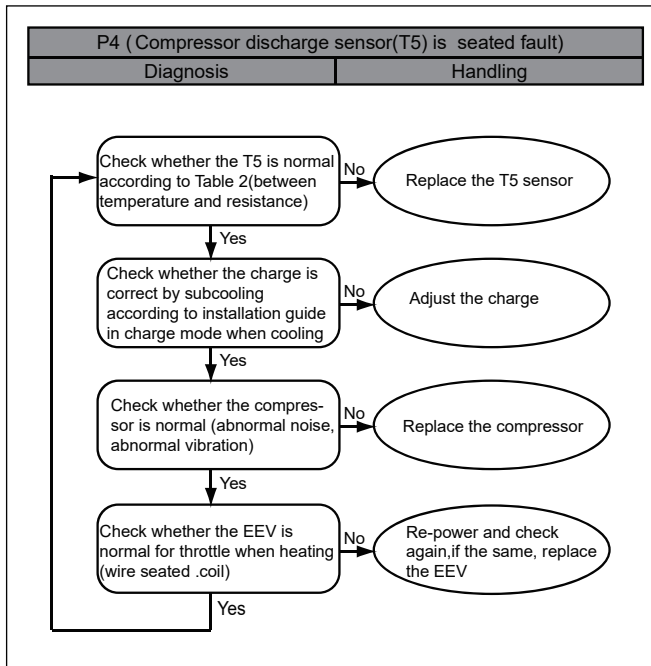


Figure 9-9

Error Code	Description
PH	Low discharge superheat protection

Table 9-6

Error Code	Description
E4	Temperature sensor fault(T3, T4, T5, Th,T3L,Tf)
F1	High pressure switch(HPS) fault

Table 9-7

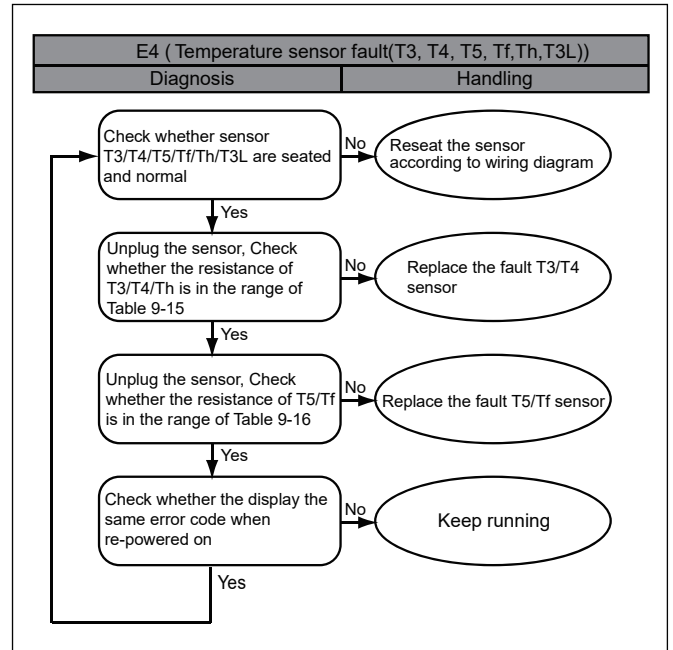


Figure 9-11

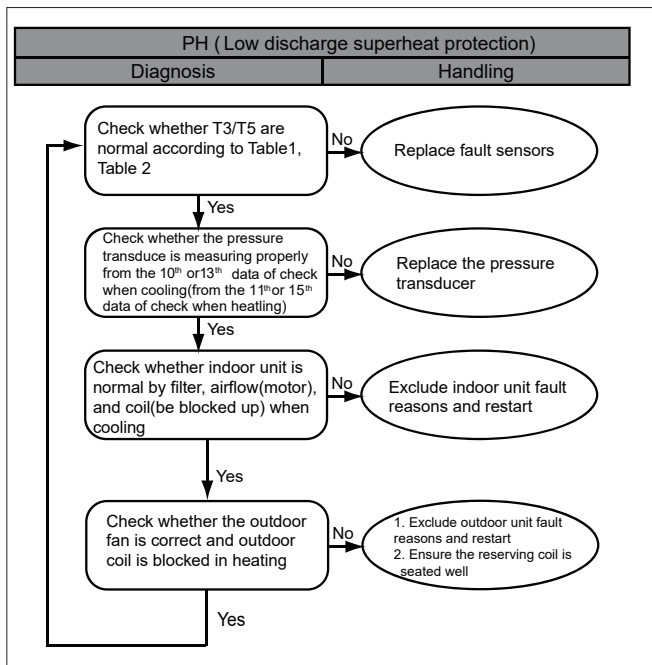


Figure 9-10

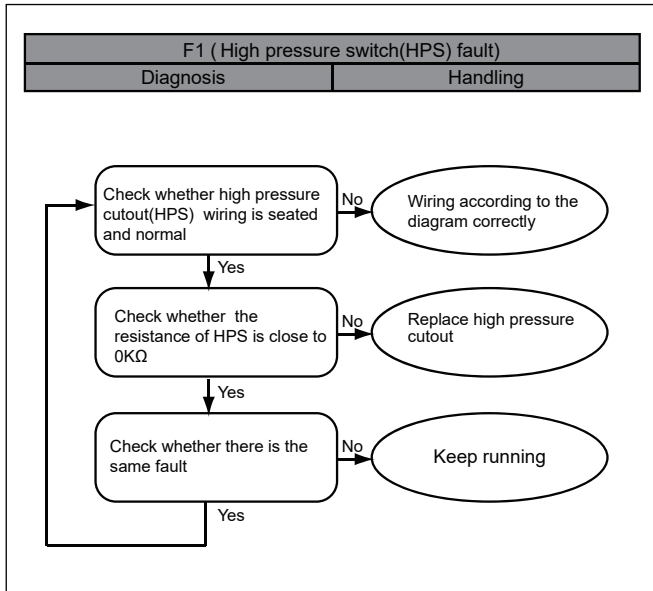


Figure 9-12

Error Code	Description
C3	Condenser coil sensor(T3) is seated fault in cooling
E7	Compressor discharge sensor(T5) is seated fault

Table 9-8

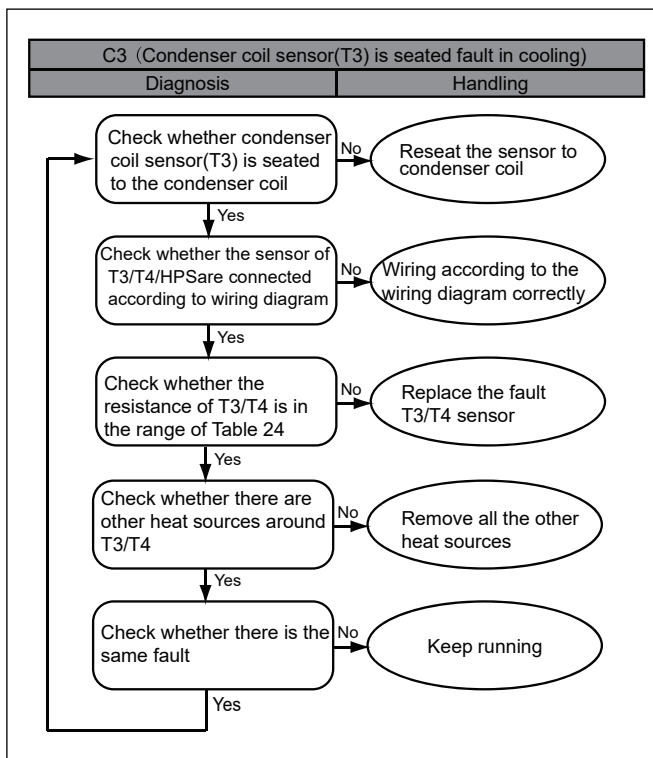


Figure 9-13

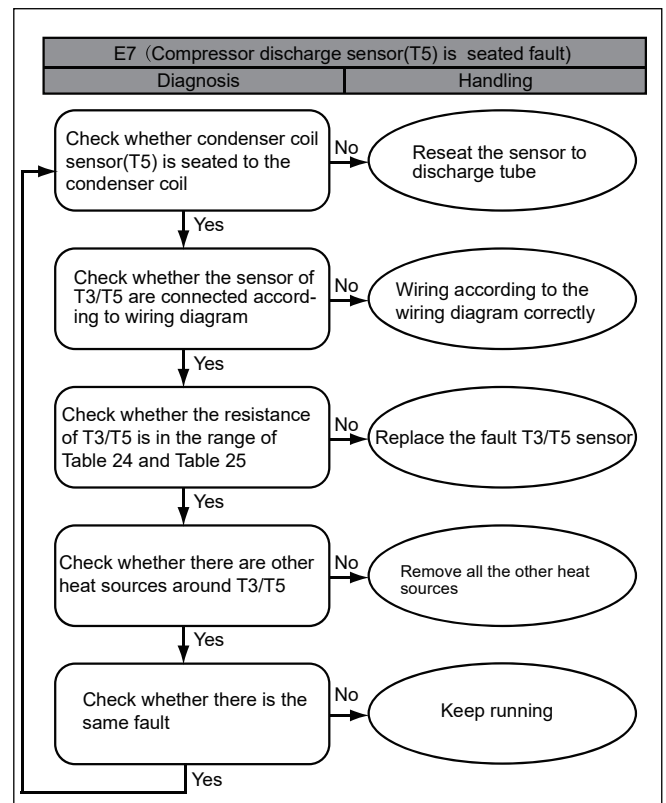


Figure 9-14

Error Code	Description
E6	DC fan motor fault

Table 9-9

When E6 appears occasionally, you don't need to do anything, the system will restart automatically after 6 minutes, of course, if you check the system of running, it will be better. When Eb appears, you need to check the motor.

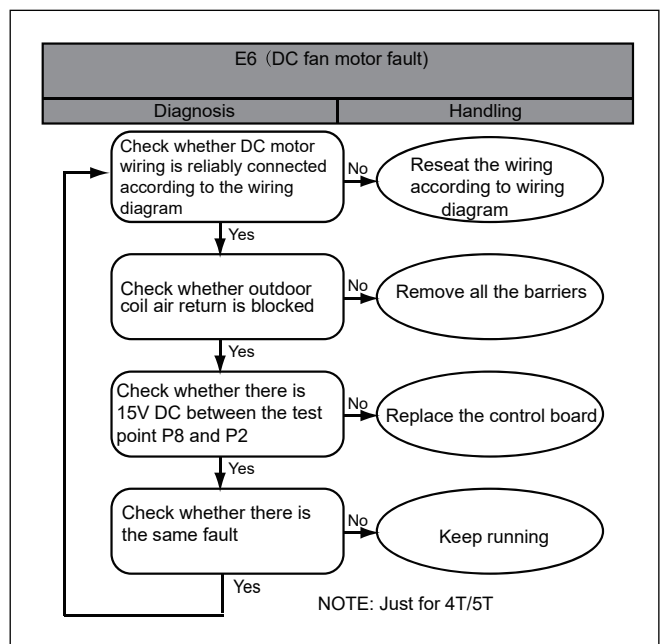


Figure 9-15

Error Code	Description
E9	EEPROM fault
H0	Communication fault in main control chip
E5	High/low voltage protection

Table 9-10

When E9/H0/E5 appears occasionally, and the system restart to run normally after power supply again, you don't need to do anything. Otherwise, you need to check the system.

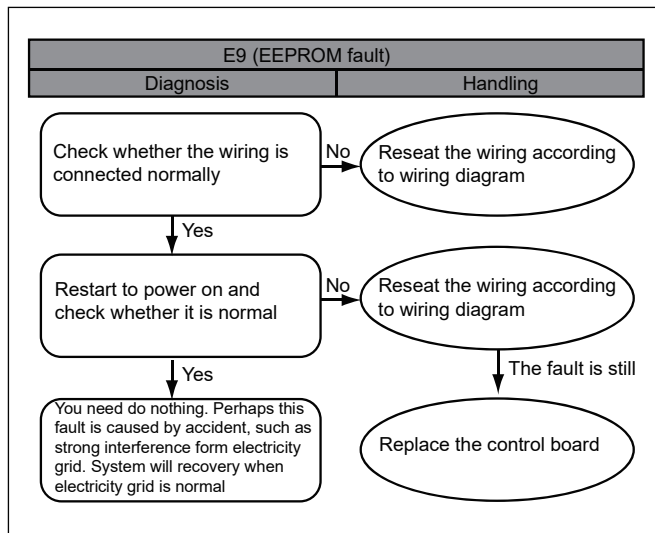


Figure 9-15

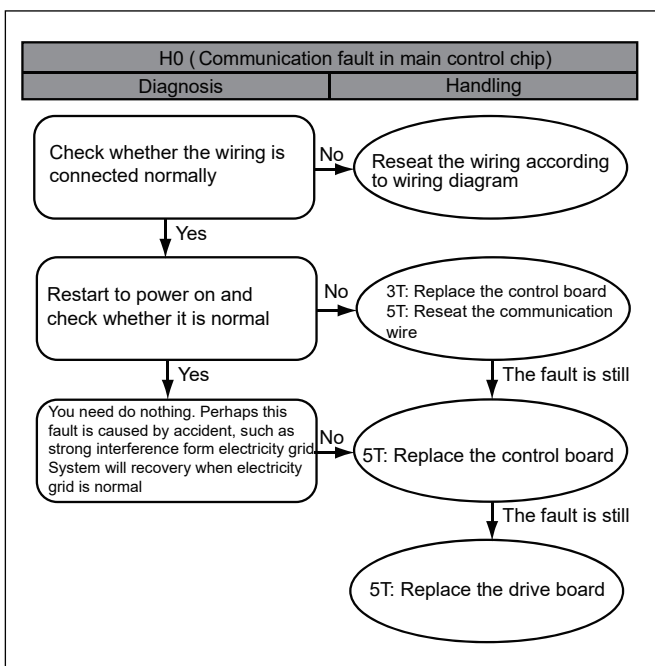


Figure 9-16

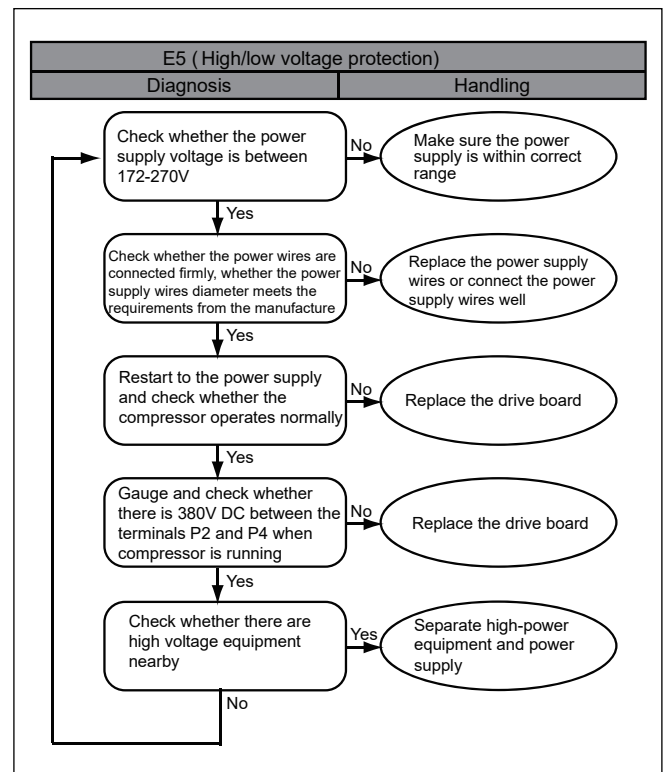


Figure 9-17

Error Code	Description
P6	IPM module protection
L0-L9	IPM module protection (the same as P6, only for analysis)

Table 9-11

When P6/L0-L9 appears occasionally, you don't need to do anything, the system will restart automatically after 6 minutes, of course, if you check the system of running, it will be better.

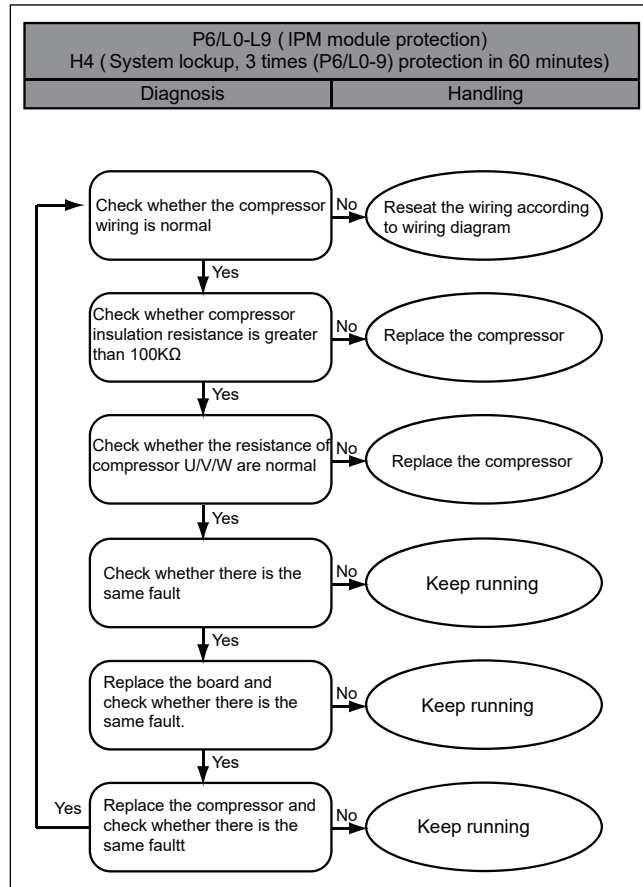


Figure 9-18

Error Code	Description
AtL	Ambient Temperature Limited

Table 9-12


When the ambient temperature returns to within the operating range, the system recovery automatically.

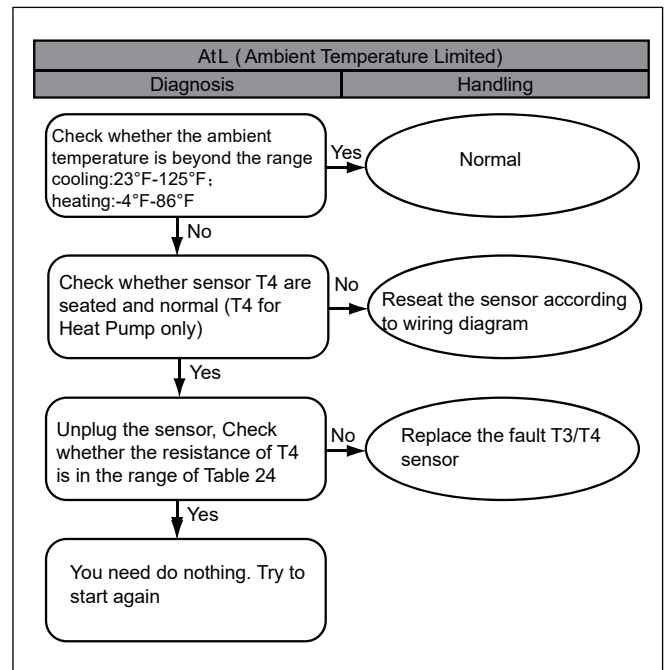


Figure 9-19

TEMP	TEMP C	RESISTANCE kΩ	VOLTS DC	TEMP F	TEMP C	RESISTANCE kΩ	VOLTS DC
-5	-20.6	107.732	4.65	90	32.2	7.225	2.36
0	-17.8	93.535	4.6	95	35	6.401	2.21
5	-15	79.521	4.54	100	37.8	5.683	2.07
10	-12.2	67.795	4.47	105	40.6	5.057	1.93
15	-9.4	57.948	4.39	110	43.3	4.509	1.79
20	-6.7	49.652	4.3	115	46.1	4.028	1.67
25	-3.9	42.645	4.21	120	48.9	3.606	1.55
30	-1.1	36.710	4.1	125	51.7	3.233	1.43
40	4.4	27.386	3.86	130	54.4	2.902	1.32
45	7.2	23.732	3.73	135	57.2	2.610	1.22
50	10	20.610	3.59	140	60	2.350	1.13
55	12.8	17.939	3.45	145	62.8	2.119	1.04
60	15.6	15.648	3.3	150	65.6	1.914	0.96
65	18.3	13.681	3.15	155	68.3	1.731	0.88
70	21.1	11.987	2.99	160	71.1	1.574	0.82
75	23.9	10.527	2.83	165	73.9	1.416	0.75
80	26.7	9.265	2.67	170	76.7	1.276	0.68
85	29.4	8.172	2.52				

Table 9-13 for T2\T3\T4\Th\T3L

TEMP F	TEMP C	RESISTANCE kΩ	VOLTS DC	TEMP F	TEMP C	RESISTANCE kΩ	VOLTS DC
-5	-20.6	600.134	4.93	140	60	13.643	3.14
0	-17.8	505.551	4.92	145	62.8	12.359	3.03
5	-15	427.463	4.91	150	65.6	11.214	2.91
10	-12.2	362.739	4.89	155	68.3	10.227	2.8
15	-9.4	308.891	4.87	160	71.1	9.308	2.68
20	-6.7	265.398	4.85	165	73.9	8.485	2.56
25	-3.9	227.481	4.83	170	76.7	7.746	2.45
30	-1.1	195.601	4.8	175	79.4	7.105	2.34
35	1.7	168.707	4.77	180	82.2	6.504	2.23
40	4.4	146.695	4.74	185	85	5.963	2.13
45	7.2	127.258	4.7	190	87.8	5.474	2.02
50	10	110.707	4.66	195	90.6	5.032	1.92
55	12.8	96.572	4.61	200	93.3	4.645	1.83
60	15.6	84.465	4.56	205	96.1	4.28	1.73
65	18.3	74.411	4.51	210	98.9	3.949	1.64
70	21.1	65.408	4.45	215	101.7	3.648	1.56
75	23.9	57.634	4.39	220	104.4	3.383	1.48
80	26.7	50.904	4.32	225	107.2	3.133	1.4
85	29.4	45.258	4.24	230	110	2.904	1.32
90	32.2	40.152	4.16	235	112.8	2.694	1.25
95	35	35.699	4.08	240	115.6	2.503	1.18
100	37.8	31.807	3.99	245	118.3	2.334	1.12
105	40.6	28.398	3.89	250	121.1	2.172	1.06
110	43.3	25.506	3.8	255	123.9	2.024	1
115	46.1	22.861	3.7	260	126.7	1.888	0.95
120	48.9	20.529	3.59	265	129.4	1.767	0.9
125	51.7	18.47	3.48	270	132.2	1.651	0.85
130	54.4	16.708	3.37	275	135	1.544	0.8
135	57.2	15.085	3.26	280	137.8	1.446	0.76

Table 9-14 for T5 & Tf

NSK-BD035I					V= (7.9*PSIG*10-3)+0.5			
No.	V	Pe/Pc	No.	V	Pe/Pc	No.	V	Pe/Pc
		PSIG			PSIG			PSIG
1	0.69	24.4	56	1.37	110.6	111	2.54	258.5
2	0.7	26.0	57	1.39	112.5	112	2.56	262.0
3	0.72	27.7	58	1.4	114.5	113	2.59	265.6
4	0.73	29.4	59	1.42	116.5	114	2.62	269.2
5	0.75	31.2	60	1.43	118.6	115	2.65	272.8
6	0.76	33.1	61	1.45	120.6	116	2.68	276.5
7	0.78	35.0	62	1.47	122.7	117	2.71	280.2
8	0.79	37.0	63	1.48	124.8	118	2.74	284.0
9	0.81	39.0	64	1.5	127.0	119	2.77	287.8
10	0.82	41.1	65	1.52	129.1	120	2.8	291.6
11	0.84	43.2	66	1.53	131.3	121	2.83	295.5
12	0.85	44.3	67	1.55	133.5	122	2.86	299.3
13	0.86	45.4	68	1.57	135.8	123	2.89	303.3
14	0.87	46.6	69	1.59	138.0	124	2.92	307.2
15	0.88	47.7	70	1.61	140.3	125	2.95	311.3
16	0.89	48.9	71	1.62	142.6	126	2.98	315.3
17	0.89	50.0	72	1.64	145.0	127	3.02	319.4
18	0.9	51.2	73	1.66	147.3	128	3.05	323.5
19	0.91	52.4	74	1.68	149.7	129	3.08	327.7
20	0.92	53.7	75	1.7	152.1	130	3.12	331.9
21	0.93	54.9	76	1.72	154.6	131	3.15	336.1
22	0.94	56.2	77	1.74	157.1	132	3.18	340.4
23	0.95	57.5	78	1.76	159.6	133	3.22	344.7
24	0.96	58.8	79	1.78	162.1	134	3.25	349.0
25	0.97	60.1	80	1.8	164.6	135	3.29	353.4
26	0.98	61.4	81	1.82	167.2	136	3.32	357.9
27	0.99	62.8	82	1.84	169.8	137	3.36	362.4
28	1.01	64.1	83	1.86	172.5	138	3.39	366.9
29	1.02	65.5	84	1.88	175.1	139	3.43	371.4
30	1.03	66.9	85	1.9	177.8	140	3.46	376.0
31	1.04	68.4	86	1.92	180.5	141	3.5	380.7
32	1.05	69.8	87	1.94	183.3	142	3.54	385.4
33	1.06	71.3	88	1.97	186.1	143	3.57	390.1
34	1.07	72.7	89	1.99	188.9	144	3.61	394.9
35	1.09	74.3	90	2.01	191.7	145	3.65	399.7
36	1.1	75.8	91	2.03	194.6	146	3.69	404.5
37	1.11	77.3	92	2.06	197.5	147	3.73	409.5
38	1.12	78.9	93	2.08	200.4	148	3.77	414.4
39	1.13	80.5	94	2.1	203.4	149	3.8	419.4
40	1.15	82.1	95	2.13	206.4	150	3.84	424.4
41	1.16	83.7	96	2.15	209.4	151	3.88	429.5
42	1.17	85.3	97	2.17	212.4	152	3.93	434.6
43	1.19	87.0	98	2.2	215.5	153	3.97	439.8
44	1.2	88.7	99	2.22	218.6	154	4.01	445.0
45	1.21	90.4	100	2.25	221.8	155	4.05	450.3
46	1.23	92.1	101	2.27	224.9	156	4.09	455.6
47	1.24	93.8	102	2.3	228.1	157	4.13	461.0
48	1.25	95.6	103	2.32	231.4	158	4.18	466.4
49	1.27	97.4	104	2.35	234.6	159	4.22	471.9
50	1.28	99.2	105	2.38	238.0	160	4.26	477.4
51	1.3	101.0	106	2.4	241.3	161	4.31	482.9
52	1.31	102.9	107	2.43	244.7	162	4.35	488.6
53	1.33	104.8	108	2.45	248.1	163	4.39	494.2
54	1.34	106.7	109	2.48	251.5	164	4.44	499.9
55	1.36	108.6	110	2.51	255.0	165	4.48	505.7

Table 9-15

SYSTEM FAULTS		POWER SUPPLY OR HIGH VOLTAGE WIRING WHAT TO CHECK MODE	LOW VOLTAGE WIRING OR THERMOSTAT	CONTROL BOARD OR WIRING	INEFFICIENT COMP	RES ID AIRFLOW	RES O.D AIRFLOW	INEFFICIENT O.D FAN	REF O.D RADIATOR	REF UNDERCHARGE	REF OIR RESTRICTIONS	EEV OR COIL DEF.	REV OR COIL DEF.	SERVICE VALVE LEAKING	PT SENSOR DEF.	T3 SENSOR DEF.	T4 SENSOR DEF.	T5 SENSOR DEF.	T7 SENSOR DEF.	HPS SENSOR DEF.
SYSTEM	Display shows nothing	C	P			S														
		H	P			S														
	System won't start	C		P	P	S														S
		H		P	P	S														S
	Capacity is insufficiency	C					P	P	P	P					S	S			S	
		H					P	P	P	P			S		S	S			S	
SYSTEM	Display is not normal when running	C				P														
		H				P														
	Cool when heating requirement	H		P									S							
REFRIGERANT CIRCUIT	P1	C					P	P		S	P									
		H					P			S	P									
	P2/H5	C		P					P						S					
		H		P					P						S					
	P3	C					P	P	P	S	P									
		H					P	P	P	S	P									
	P5	C					P	P		S	S						S			
		H					P	P		S	S									
	P0	C					P	P	S											
		H					P	P	S											
	P4	C							P									S		
		H							P			S						S		
REFRIGERANT CIRCUIT	PH	C								P							S	S		
		H								P		P					S	S		
	C3(T3 is seated fault)	C															P			S
	E7(T5 is seated fault)	C															S	P		
		H															S	P		
	ALT(Ambient temp. beyond the license)	C																S		
		H																S		
ELECTRICAL OR CONTROL	E4	C															P	P	P	P
		H															P	P	P	P
	H8	C															P			
		H															P			
	F1	C															S			P
		H															S			P
	E6	C				S		P												
		H				S		P												
	P6	C			S	P														
		H			S	P														
	P8	C						P												
		H						P												
ELECTRICAL OR CONTROL	L0-L9	C			S	P														
		H			S	P														
	E9	C				P														
		H				P														
	H0	C				P														
		H				P														
	E5	C	P			S														
		H	P			S														

Table 9-16

10. CARE AND MAINTENANCE

10.1 Cleaning precautions

**CAUTION:**

- Any maintenance and cleaning of outdoor unit must be performed by qualified service personnel only.
- Any unit repairs must be performed by qualified service personnel only.

**DANGER: BEFORE CLEANING AND MAINTENANCE**

- Always turn off your heat pump and disconnect its power supply before cleaning or maintenance..

**CAUTION:**

Always turn off our heat pump and disconnect its power supply before cleaning or maintenance.

- Do not use chemicals or chemically treated cloths to clean the unit
- Do not use benzene, paint thinner, polishing powder or other solvents to clean the unit.

10.2 Changing your air filter

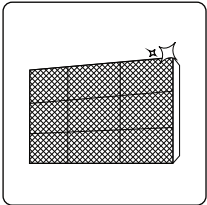
**CAUTION:**

- Before changing the filter or cleaning, turn off the unit and disconnect its power supply.
- When removing filter, do not touch metal parts in the unit. The sharp metal edges can cut you.

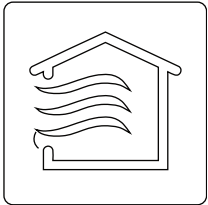
A clogged air conditioner can reduce the cooling efficiency of your unit, and can also be bad for your health. Make sure to change the filter every 3 months.

10.3 Maintenance – Long Periods of Non-Use

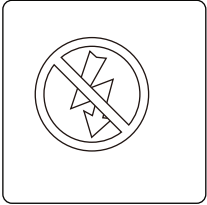
If you plan not to use your air conditioner for an extended period of time, do the following:



Change all filters



Turn on FAN function until unit dries out completely

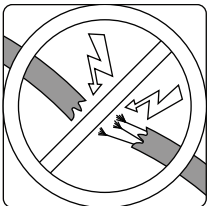


Turn off the unit and disconnect the power

Figure 10-1

10.4 Maintenance – Pre-Season Inspection

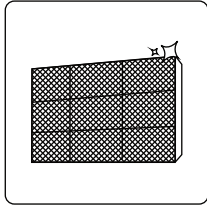
After long periods of non-use, or before periods of frequent use, do the following:



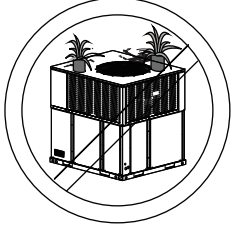
Check for damaged wires



Check for leaks



Verify all filters have been replaced and are new



Make sure nothing is blocking all air inlets and outlets

Figure 10-2

11. PRODUCT FEATURES

11.1 Standard features

- ▶ R-410A Chlorine-Free Refrigerant
- ▶ Load 25%-110%
- ▶ Intelligent Oil Return Technology
- ▶ Inverter Driven Rotary Compressor
- ▶ Crankcase Heater Standard
- ▶ Compressor Sound Blanket
- ▶ Multiple System Protection:
 - High pressure switch and low pressure transducer
 - Compressor liquid return protection
 - Compressor high or low compression ratio protection
 - Compressor high temperature protection
 - High / low voltage protection and over current protection
 - IPM and electronic control board high temperature protection
- ▶ AHRI certified; ETL listed

11.2 Cabinet features

- ▶ Unique fan-blade design
- ▶ Baked-on powder paint finish
- ▶ Wind Load compliant per Florida Building Code - 2010
- ▶ Wire fan discharge grille
- ▶ Steel louver coil guard
- ▶ Can be connected with two-stage indoor unit

12. PRODUCT SPECIFICATIONS

Component	Models 60	Models 36
Nominal Tonnage	5	3
ARI COOLING PERFORMANCE		
ARI net capacity (Btu) ¹	57000	34800
EER/EER2	12.5/11.2	12/10.6
SEER/SEER2	19/18	18.5/18
Nominal CFM	1800	1250
System power (kW)	4.5	2.9
Refrigerant type	R410a	R410a
Refrigerant charge (lb-oz)	12-9	7-8
ARI HEATING PERFORMANCE		
47°F Capacity rating (Btu)	57000	36000
System power (kW)	4.4	2.88
17°F Capacity rating (Btu)	44000	23000
System power (kW)	6.0	3.0
HSPF/HSPF2 (BTU/Watts-hr.)	10.0/9	9.0/8.1
DIMENSIONS (Inches)		
Length	51-9/16	50-11/16
Width	44-13/16	35-1/16
Height	51-7/16	46-13/16
OPERATING WT. (lbs)	562	420
COMPRESSORS		
Type	Rotary	Rotary
Quantity	1	1
CONDENSER COIL DATA		
Face area (Sq. Ft)	20.17	14.11
Rows	3+3	3+2
Fins per inch	17	17
Tube diameter(inch)	9/32	9/32
Circuitry type	interlaced	interlaced
EVAPORATOR COIL DATA		
Face area (Sq. Ft)	6.1	3.96
Rows	4	4
Fins per inch	17	17
Tube diameter(inch)	9/32	9/32
Circuitry type	interlaced	interlaced
Refrigerant control	EEV	EEV
CONDENSER FAN DATA		
Fan diameter (inch)	26-3/8	23-5/8
Type	Prop	Prop
Drive type	Direct	Direct
No. speeds	1	1
Number of motors	1	1
Motor HP each	1/4	1/4
RPM	200~880	200~950
Nominal total CFM	4100	3000
DIRECT DRIVE EVAP FAN DATA		
Quantity	1	1
Fan Size (Inch)	11×10-5/8	10×10
Type	Centrifugal	Centrifugal
No. speeds	5	5
Motor HP each	3/4	1/2
RPM	1075	1050
Electrical Data		
Voltage-Phase-Hz	208/230-1-60	208/230-1-60
Minimum Circuit Ampacity ²	41.9	28.7
Max. Overcurrent Protection ³	60	45
Min / Max Volts	173 / 269	173 / 269
Operating Range		
Cooling	23°F-125°F	23°F-125°F
Heating	-4°F-86°F	-4°F-86°F

Table 12-1

1. Tested and rated in accordance with AHRI Standard 210/240.
2. Wire size should be determined in accordance with National Electrical Codes; extensive wire runs will require larger wire sizes.



Always check the rating plate for electrical data on the unit being installed.

13. AHRI 210/240 PERFORMANCE DATA

CCRT36-1INV For Cooling																		
Indoor Airflow (SCFM)	Outdoor DB(°F)	IWB (°F)	59				63				67				71			
		IDB (°F)	70	75	80	85	70	75	80	85	70	75	80	85	70	75	80	85
950	65	TC	29.7	30.0	30.6	31.0	30.6	31.0	31.3	31.6	32.7	33.0	33.3	33.5	39.8	40.1	40.4	
		S/T	0.99	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.57	0.73	0.90	0.39	0.53	0.67	
		kW	1.61	1.63	1.64	1.64	1.64	1.66	1.67	1.69	1.69	1.70	1.72	1.74	2.13	2.15	2.18	
	75	TC	29.7	30.1	30.7	31.0	30.7	31.0	31.4	31.7	32.8	33.1	33.4	33.6	39.4	39.7	40.0	
		S/T	1.00	1.00	0.99	1.00	0.62	0.83	1.00	1.00	0.39	0.56	0.73	0.90	0.39	0.53	0.67	
		kW	1.78	1.80	1.83	1.83	1.83	1.85	1.87	1.88	1.87	1.90	1.92	1.94	2.35	2.37	2.39	
	85	TC	29.3	29.6	30.2	30.6	30.2	30.6	30.9	31.2	32.3	32.6	32.9	33.1	38.7	39.0	39.2	
		S/T	1.00	1.00	1.00	1.00	0.62	0.84	1.00	1.00	0.39	0.57	0.74	0.91	0.39	0.53	0.67	
		kW	2.01	2.03	2.05	2.05	2.05	2.08	2.10	2.12	2.12	2.14	2.16	2.18	2.66	2.69	2.71	
	95	TC	28.7	29.1	29.7	30.1	29.7	30.1	30.4	30.7	31.8	32.1	32.3	32.6	37.8	38.1	38.3	
		S/T	1.00	1.00	1.00	1.00	0.62	0.84	1.00	1.00	0.39	0.57	0.74	0.92	0.39	0.53	0.68	
		kW	2.42	2.44	2.47	2.47	2.47	2.49	2.52	2.54	2.56	2.58	2.60	2.63	3.17	3.19	3.22	
	105	TC	27.4	27.8	28.4	28.7	28.4	28.7	29.0	29.3	30.3	30.6	30.8	31.0	35.5	35.6	35.8	
		S/T	0.99	1.00	1.00	1.00	0.62	0.84	1.00	1.00	0.39	0.57	0.75	0.93	0.39	0.54	0.69	
		kW	2.90	2.93	2.96	2.96	2.96	2.99	3.02	3.06	3.06	3.09	3.11	3.14	3.70	3.71	3.72	
	115	TC	22.9	23.1	23.7	23.9	23.7	23.9	24.1	24.4	25.4	25.6	25.7	25.9	27.5	27.7	27.8	
		S/T	1.00	1.00	1.00	1.00	0.62	0.85	1.00	1.00	0.40	0.60	0.79	0.99	0.39	0.58	0.76	
		kW	2.61	2.64	2.67	2.67	2.67	2.71	2.73	2.76	2.78	2.80	2.82	2.83	2.91	2.93	2.94	
1250	65	TC	31.9	32.2	33.0	33.3	33.0	33.3	33.7	34.0	35.3	35.5	35.8	36.1	42.6	42.9	43.2	
		S/T	0.99	1.00	1.00	1.00	0.63	0.86	1.00	1.00	0.39	0.58	0.76	0.94	0.39	0.54	0.69	
		kW	1.88	1.90	1.92	1.92	1.92	1.94	1.96	1.98	1.97	2.00	2.02	2.04	2.44	2.47	2.49	
	75	TC	31.9	32.3	33.0	33.3	33.0	33.3	33.7	34.1	35.3	35.6	35.8	36.1	42.3	42.6	42.9	
		S/T	1.00	1.00	1.00	1.00	0.62	0.85	1.00	1.00	0.39	0.58	0.76	0.94	0.39	0.54	0.69	
		kW	2.05	2.08	2.10	2.10	2.10	2.12	2.14	2.16	2.16	2.18	2.21	2.23	2.57	2.60	2.62	
	85	TC	31.4	31.7	32.4	32.8	32.4	32.8	33.1	33.5	34.7	35.0	35.2	35.5	41.2	41.5	41.8	
		S/T	1.00	1.00	1.00	1.00	0.63	0.86	1.00	1.00	0.39	0.58	0.76	0.95	0.39	0.54	0.70	
		kW	2.26	2.28	2.32	2.32	2.32	2.34	2.36	2.39	2.39	2.41	2.43	2.46	2.96	2.98	3.01	
	95	TC	31.0	31.4	32.1	32.4	32.1	32.4	32.7	33.1	34.0	34.5	34.8	35.0	40.1	40.3	40.5	
		S/T	1.00	1.00	0.99	1.00	0.63	0.87	1.00	1.00	0.39	0.58	0.76	1.00	0.39	0.55	0.71	
		kW	2.69	2.72	2.75	2.75	2.75	2.77	2.81	2.84	2.85	2.87	2.90	2.92	3.48	3.51	3.54	
	105	TC	29.4	29.8	30.4	30.7	30.4	30.7	31.0	31.4	32.4	32.8	33.0	33.3	36.2	36.2	36.4	
		S/T	0.99	1.00	0.99	1.00	0.63	0.87	1.00	1.00	0.39	0.59	0.78	1.00	0.39	0.57	0.74	
		kW	3.20	3.23	3.27	3.27	3.27	3.31	3.34	3.37	3.38	3.41	3.44	3.47	3.75	3.77	3.79	
	115	TC	22.7	22.9	23.4	23.7	23.4	23.7	23.9	24.2	25.8	25.9	25.5	25.6	26.6	26.7	26.8	
		S/T	1.00	1.00	1.00	1.00	0.64	0.88	1.00	1.00	0.40	0.62	0.86	1.00	0.40	0.62	0.84	
		kW	2.66	2.69	2.72	2.72	2.72	2.74	2.77	2.80	2.85	2.86	2.86	2.87	2.90	2.91	2.92	
1350	65	TC	33.9	34.3	35.0	35.4	35.0	35.4	35.8	36.2	37.5	37.8	38.0	38.3	44.9	45.2	45.9	
		S/T	0.99	1.00	1.00	1.00	0.64	0.88	1.00	1.00	0.39	0.59	0.78	0.99	0.38	0.55	0.71	
		kW	2.20	2.22	2.24	2.24	2.24	2.27	2.29	2.32	2.32	2.34	2.37	2.39	2.80	2.82	2.84	
	75	TC	34.0	34.4	35.2	35.5	35.2	35.5	35.9	36.3	37.7	37.9	38.2	38.5	46.0	46.2	46.3	
		S/T	0.99	1.00	1.00	1.00	0.63	0.88	1.00	1.00	0.39	0.59	0.78	1.00	0.38	0.55	0.71	
		kW	2.26	2.28	2.32	2.32	2.32	2.34	2.36	2.39	2.39	2.41	2.43	2.46	3.08	3.09	3.09	
	85	TC	33.3	33.7	34.4	34.8	34.4	34.8	35.1	35.5	36.9	37.1	37.4	37.6	43.4	43.6	43.9	
		S/T	0.99	1.00	1.00	1.00	0.64	0.89	1.00	1.00	0.39	0.59	0.79	1.00	0.39	0.56	0.73	
		kW	2.56	2.58	2.61	2.61	2.61	2.64	2.66	2.69	2.70	2.72	2.74	2.76	3.29	3.32	3.34	
	95	TC	32.5	32.8	33.5	33.9	33.5	33.9	34.3	34.6	36.0	36.2	36.4	36.7	41.3	41.5	41.5	
		S/T	1.00	1.00	1.00	1.00	0.64	0.90	1.00	1.00	0.39	0.60	0.80	1.00	0.39	0.57	0.75	
		kW	3.00	3.04	3.07	3.07	3.07	3.10	3.13	3.16	3.18	3.20	3.22	3.24	3.71	3.72	3.72	
	105	TC	30.7	31.0	31.7	32.1	31.7	32.1	32.4	32.8	34.1	34.3	34.5	34.8	36.7	36.9	37.2	
		S/T	1.00	1.00	1.00	1.00	0.65	0.90	1.00	1.00	0.39	0.60	0.81	1.00	0.39	0.59	0.79	
		kW	3.53	3.56	3.60	3.60	3.60	3.64	3.68	3.72	3.74	3.77	3.79	3.82	3.93	3.95	3.99	
	115	TC	22.9	23.0	23.6	23.9	23.6	23.9	24.1	24.3	25.4	25.5	25.6	25.8	27.2	27.3	27.4	
		S/T	1.00	1.00	1.00	1.00	0.66	1.00	1.00	1.00	0.40	0.66	0.93	1.00	0.40	0.65	0.90	
		kW	2.76	2.79	2.83	2.83	2.83	2.86	2.88	2.91	2.95	2.96	2.98	2.99	3.08	3.09	3.10	

Table 13-1 (a)

TC refer to total capacity S/T: refer to the ratio of sensible heat and total capacity kW: refer to total input power

CCRT60-1INV For Cooling																		
Indoor Airflow (SCFM)	Outdoor DB	IWB(°F)	59				63				67				71			
		IDB(°F)	70	75	80	85	70	75	80	85	70	75	80	85	70	75	80	85
1500	65	TC	40.8	41	41.2	41.4	48.4	48.6	48.8	49.1	55.5	55.8	56.1	56.4	/	65	65.4	65.7
		S/T	0.81	1	1	1	0.55	0.73	0.93	1	0.36	0.53	0.7	0.85	/	0.36	0.5	0.64
		KW	2.22	2.22	2.22	2.22	2.37	2.37	2.37	2.37	2.83	2.83	2.83	2.83	/	3.33	3.33	3.33
	75	TC	40.8	41	41.2	41.4	48.4	48.6	48.8	49.1	55.5	55.8	56.1	56.4	/	65	65.4	65.7
		S/T	0.81	1	1	1	0.55	0.73	0.93	1	0.36	0.53	0.7	0.85	/	0.36	0.5	0.64
		KW	2.68	2.68	2.68	2.68	2.88	2.88	2.88	2.88	3.48	3.48	3.48	3.48	/	4.09	4.09	4.09
	85	TC	40.8	41	41.2	41.4	48.4	48.6	48.8	49.1	55.5	55.8	56.1	56.4	/	65	65.4	65.7
		S/T	0.81	1	1	1	0.55	0.73	0.93	1	0.36	0.53	0.7	0.85	/	0.36	0.5	0.64
		KW	3.18	3.18	3.18	3.18	3.59	3.59	3.59	3.59	4.19	4.19	4.19	4.19	/	5.05	5.05	5.05
	95	TC	40.8	41	41.2	41.4	48.4	48.6	48.8	49.1	55.5	55.8	56.1	56.4	/	65	65.4	65.7
		S/T	0.81	1	1	1	0.55	0.73	0.93	1	0.36	0.53	0.7	0.85	/	0.36	0.5	0.64
		KW	3.54	3.54	3.54	3.54	4.29	4.29	4.29	4.29	5.05	5.05	5.05	5.05	/	5.96	5.96	5.96
	105	TC	40.8	41	41.2	41.4	48.4	48.6	48.8	49.1	54.4	54.7	55	55.3	/	57.5	57.8	58.1
		S/T	0.81	1	1	1	0.55	0.73	0.93	1	0.36	0.53	0.7	0.85	/	0.36	0.5	0.64
		KW	4.28	4.28	4.28	4.28	5.21	5.21	5.21	5.21	5.86	5.86	5.86	5.86	/	5.98	5.98	5.98
	115	TC	40.8	41	40.4	41.4	42.2	42.4	42.6	42.8	44.4	44.7	44.9	45.1	/	46.9	47.1	47.4
		S/T	0.81	1	1	1	0.57	0.79	0.98	1	0.4	0.59	0.78	0.95	/	0.37	0.56	0.78
		KW	4.98	4.98	4.98	4.98	5.14	5.14	5.14	5.14	5.3	5.3	5.3	5.3	/	5.46	5.46	5.46
1800	65	TC	41.5	41.7	41.9	42.1	49.1	49.4	49.6	49.9	56.4	56.7	57	57.3	/	66.1	66.4	66.8
		S/T	0.85	1	1	1	0.57	0.76	0.97	1	0.38	0.55	0.73	0.89	/	0.37	0.52	0.67
		KW	2.24	2.24	2.24	2.24	2.39	2.39	2.39	2.39	2.85	2.85	2.85	2.85	/	3.36	3.36	3.36
	75	TC	41.5	41.7	41.9	42.1	49.1	49.4	49.6	49.9	56.4	56.7	57	57.3	/	66.1	66.4	66.8
		S/T	0.85	1	1	1	0.57	0.76	0.97	1	0.38	0.55	0.73	0.89	/	0.37	0.52	0.67
		KW	2.7	2.7	2.7	2.7	2.9	2.9	2.9	2.9	3.51	3.51	3.51	3.51	/	4.12	4.12	4.12
	85	TC	41.5	41.7	41.9	42.1	49.1	49.4	49.6	49.9	46.4	56.7	57	57.3	/	66.1	66.4	66.8
		S/T	0.85	1	1	1	0.57	0.76	0.97	1	0.38	0.55	0.73	0.89	/	0.37	0.52	0.67
		KW	3.21	3.21	3.21	3.21	3.61	3.61	3.61	3.61	4.22	4.22	4.22	4.22	/	5.09	5.09	5.09
	95	TC	41.5	41.7	41.9	42.1	49.1	49.4	49.6	49.9	56.4	56.7	57	57.3	/	66.1	66.4	66.8
		S/T	0.85	1	1	1	0.57	0.76	0.97	1	0.38	0.55	0.73	0.89	/	0.37	0.52	0.67
		KW	3.204	3.204	3.204	3.204	3.897	3.897	3.897	3.897	4.56	4.56	4.56	4.56		5.409	5.409	5.409
	105	TC	51.5	41.7	41.9	42.1	49.1	49.4	49.6	49.9	55.3	55.6	55.9	56.1	/	58.4	58.7	59
		S/T	0.85	1	1	1	0.57	0.76	0.97	1	0.38	0.55	0.73	0.89	/	0.38	0.53	0.68
		KW	4.31	4.31	4.31	4.31	5.25	5.25	5.25	5.25	5.9	5.9	5.9	5.9	/	6.02	6.05	6.02
	115	TC	41.5	41.7	41	42.1	42.9	43.1	43.3	43.5	45.1	45.4	45.6	45.8	/	47.6	47.9	48.1
		S/T	0.85	1	1	1	0.6	0.82	1	1	0.42	0.62	0.81	0.99	/	0.39	0.58	0.81
		KW	5.02	5.02	5.02	5.02	5.18	5.18	5.18	5.18	5.34	5.34	5.34	5.34	/	5.5	5.5	5.5
1900	65	TC	42.1	42.3	42.5	42.7	49.9	50.2	50.4	50.7	57.3	57.6	57.9	58.2	/	67.1	67.5	67.8
		S/T	0.88	1	1	1	0.59	0.79	1	1	0.4	0.58	0.76	0.93	/	0.39	0.54	0.7
		KW	2.26	2.26	2.26	2.26	2.42	2.42	2.42	2.42	2.88	2.88	2.88	2.88	/	3.39	3.39	3.39
	75	TC	42.1	42.3	42.5	42.7	49.9	50.2	50.4	50.7	57.3	57.6	57.9	58.2	/	67.1	67.5	67.8
		S/T	0.88	1	1	1	0.59	0.79	1	1	0.4	0.58	0.76	0.93	/	0.39	0.54	0.7
		KW	2.72	2.72	2.72	2.72	2.93	2.93	2.93	2.93	3.55	3.55	3.55	3.55	/	4.16	4.16	4.16
	85	TC	42.1	42.3	42.5	42.7	49.9	50.2	50.4	50.7	57.3	57.6	57.9	58.2	/	67.1	67.5	67.8
		S/T	0.88	1	1	1	0.59	0.79	1	1	0.4	0.58	0.76	0.93	/	0.39	0.57	0.7
		KW	3.24	3.24	3.24	3.24	3.65	3.65	3.65	3.65	4.27	4.27	4.27	4.27	/	5.14	5.14	5.14
	95	TC	42.1	42.3	42.5	42.7	49.9	50.2	50.4	50.7	57.3	57.6	57.9	58.2	/	67.1	67.5	67.8
		S/T	0.88	1	1	1	0.59	0.79	1	1	0.4	0.58	0.76	0.93	/	0.69	0.54	0.7
		KW	3.6	3.6	3.6	3.6	4.37	4.37	4.37	4.37	5.14	5.14	5.14	5.14	/	6.07	6.07	6.07
	105	TC	42.1	42.3	42.5	42.7	49.9	50.2	50.4	50.7	57.3	57.6	57.9	58.2	/	59.3	59.6	59.9
		S/T	0.88	1	1	1	0.59	0.79	1	1	0.4	0.58	0.76	0.93	/	0.4	0.55	0.71
		KW	4.35	4.35	4.35	4.35	5.31	5.31	5.31	5.31	5.96	5.96	5.96	5.96	/	6.08	6.08	6.08
	115	TC	42.1	42.3	42.5	42.7	49.9	50.2	50.4	50.7	57.3	57.6	57.9	58.2	/	48.4	48.6	48.9
		S/T	0.88	1	1	1	0.59	0.79	1	1	0.4	0.58	0.76	0.93	/	0.4	0.6	0.85
		KW	5.07	5.07	5.07	5.07	5.24	5.24	5.24	5.24	5.4	5.4	5.4	5.4	/	5.56	5.56	5.56

Table 13-1 (b)

TC refer to total capacity S/T: refer to the ratio of sensible heat and total capacity kW: refer to total input power

CCRT36-1INV For Heating																	
Airflow (CFM)	ID(°F)	OD(°F)	72	67	62	57	52	47	42	37	32	27	22	17	12	7	2
950	60	TC	42.4	42.4	42.3	42.3	42.2	40.7	36.1	32.7	30.1	28.9	26.3	22.8	21.7	20.3	19.2
		KW	2.36	2.52	2.74	2.97	3.21	3.23	3.07	2.94	2.85	3.11	3	2.86	2.77	2.7	2.62
	70	TC	32.8	32.6	32.8	32.7	32.4	32.3	31.2	30.6	29.6	28.4	25.6	22.4	21.2	20.0	19.0
		KW	1.77	1.86	2.05	2.19	2.35	2.56	2.78	3	3.12	3.38	3.24	3.09	2.99	2.91	2.82
	75	TC	27.6	27.5	27.5	27.5	27.5	27.5	26.2	25.7	25.4	24.4	23.6	21.3	20.1	18.7	17.3
		KW	1.47	1.58	1.71	1.84	2.01	2.18	2.29	2.48	2.65	2.88	3.07	3.22	3.12	3.03	2.94
	80	TC	22.7	22.7	22.7	22.7	22.6	22.6	21.7	21.3	21.1	20.0	19.4	17.5	17.8	18.1	17.1
		KW	1.22	1.3	1.41	1.53	1.64	1.78	1.88	2.07	2.19	2.31	2.46	2.61	2.82	3.07	3.06
1250	60	TC	47.4	47.4	47.3	46	43.4	41.2	36.7	33.2	30.7	29.4	26.4	23.3	22.1	20.7	19.6
		KW	2.79	2.96	3.19	3.28	3.19	3.16	3.03	2.9	2.84	3.09	2.97	2.85	2.77	2.7	2.63
	70	TC	36.7	36.5	36.2	36.2	36.2	36.0	34.7	32.4	30.1	28.7	26.0	23.0	21.6	20.2	19.2
		KW	2.04	2.18	2.31	2.5	2.72	2.88	3.21	3.17	3.08	3.34	3.22	3.07	2.99	2.91	2.83
	75	TC	30.9	30.8	30.6	30.8	30.7	30.3	29.3	28.8	28.5	27.3	25.7	21.6	20.4	19	17.5
		KW	1.71	1.82	1.94	2.13	2.25	2.43	2.63	2.84	3.04	3.31	3.36	3.2	3.11	3.02	2.94
	80	TC	25.3	25.3	25.3	25.3	25.3	25.2	24.4	23.6	23.4	22.3	21.7	19.7	20.0	18.7	17.3
		KW	1.41	1.49	1.62	1.74	1.87	2.01	2.19	2.3	2.46	2.65	2.83	2.98	3.22	3.15	3.05
1350	60	TC	52.8	51.9	49.0	46.9	44.2	41.9	37.2	33.7	31.2	29.9	27.0	23.6	22.4	21.1	20.0
		KW	3.28	3.36	3.28	3.26	3.18	3.16	3.03	2.93	2.86	3.11	3.01	2.89	2.83	2.75	2.69
	70	TC	40.6	40.4	40.4	40.4	40.3	40.3	36.4	32.9	30.6	29.2	26.5	23.2	22.0	20.7	19.6
		KW	2.34	2.49	2.71	2.92	3.15	3.4	3.31	3.18	3.11	3.36	3.24	3.1	3.03	2.96	2.88
	75	TC	34.6	34.4	34.4	34.0	34.0	33.9	32.9	32.1	30.2	28.8	26.1	22.0	20.8	19.3	18.0
		KW	1.99	2.11	2.3	2.4	2.6	2.82	3.05	3.28	3.24	3.51	3.38	3.23	3.15	3.07	2.99
	80	TC	28.4	28.3	28.3	28.3	28.3	28.2	26.9	26.4	26.2	25.0	24.2	21.7	20.5	19.1	17.7
		KW	1.66	1.75	1.9	2.01	2.19	2.35	2.47	2.66	2.83	3.06	3.24	3.37	3.27	3.19	3.1

Table 13-2 (a)

TC refer to total capacity S/T: refer to the ratio of sensible heat and total capacity kW: refer to total input power

CCRT60-1INV For Heating																	
Airflow (SCFM)	ID	OD	72	67	62	57	52	47	42	37	32	27	22	17	12	7	5
1500	60	TC	74.9	74.9	74.9	74.9	70.4	66.2	62.2	58.4	54.9	51.7	48.5	46.1	44.3	43.0	42.6
		KW	4.24	4.58	5.02	5.47	5.3	5.15	5.05	4.95	4.86	4.77	4.68	4.59	4.57	4.53	4.49
	70	TC	58.2	58.2	58.2	58.2	58.2	58.2	58.2	52.8	49.8	46.8	43.7	42.4	41.7	40.8	40.7
		KW	3.18	3.41	3.65	3.94	4.34	4.71	5.13	4.96	4.86	4.73	4.61	4.57	4.61	4.56	4.52
	75	TC	50.7	50.7	50.7	50.7	50.7	50.7	50.7	50.7	49.6	47.3	43.9	41.7	40.4	40.0	39.9
		KW	2.91	3.07	3.27	3.52	3.81	4.16	4.51	4.9	5.18	5.21	5.01	4.87	4.83	4.81	4.75
	80	TC	40.5	40.5	40.5	40.5	40.5	40.5	40.5	40.5	40.5	40.5	40.5	39.6	37.9	37.6	37.5
		KW	2.39	2.52	2.67	2.86	3.08	3.27	3.57	3.9	4.18	4.42	4.65	4.72	4.74	4.7	4.64
1750	60	TC	70.7	70.7	70.7	70.7	66.5	62.5	58.7	55.2	51.9	48.8	45.9	43.6	41.8	40.6	40.2
		KW	4.22	4.55	4.99	5.44	5.27	5.13	5.02	4.92	4.83	4.74	4.66	4.57	4.55	4.51	4.46
	70	TC	57.0	57.0	57.0	57.0	57.0	57.0	57.0	51.7	48.7	45.8	42.8	41.5	40.6	39.8	39.7
		KW	3.16	3.39	3.63	3.92	4.31	4.69	5.1	4.93	4.83	4.7	4.58	4.54	4.57	4.52	4.48
	75	TC	47.4	47.4	47.4	47.4	47.4	47.4	47.4	47.4	46.4	44.1	41	39	37.8	37.4	37.3
		KW	2.76	2.91	3.11	3.34	3.61	3.95	4.28	4.65	4.91	4.94	4.75	4.62	4.58	4.56	4.51
	80	TC	41.1	41.1	41.1	41.1	41.1	41.1	41.1	41.1	41.1	41.1	41.1	40.1	38.6	38.1	38.0
		KW	2.37	2.51	2.65	2.84	3.06	3.25	3.55	3.88	4.15	4.4	4.62	4.69	4.71	4.67	4.61
1900	60	TC	77.3	77.3	77.3	77.3	72.7	68.3	64.2	60.4	56.7	53.4	50.2	47.7	45.8	44.4	42.5
		KW	4.25	4.59	5.03	5.48	5.31	5.16	5.05	4.95	4.86	4.77	4.69	4.6	4.58	4.54	4.5
	70	TC	58.0	58.0	58.0	58.0	58.0	58.0	58.0	52.6	49.5	46.4	43.4	42.0	41.0	40.2	40.0
		KW	3.18	3.41	3.66	3.95	4.34	4.72	5.13	4.96	4.85	4.72	4.59	4.55	4.57	4.51	4.47
	75	TC	58.1	58.1	58.1	58.1	58.1	58.1	58.1	58.1	57.0	54.1	50.4	47.8	46.4	45.9	45.7
		KW	3.23	3.41	3.64	3.91	4.23	4.62	5.01	5.45	5.75	5.79	5.57	5.41	5.37	5.35	5.28
	80	TC	41.9	41.9	41.9	41.9	41.9	41.9	41.9	41.9	41.9	41.9	41.9	40.8	39.3	38.9	38.8
		KW	2.39	2.52	2.67	2.86	3.08	3.27	3.58	3.91	4.18	4.43	4.66	4.73	4.75	4.71	4.64

Table 13-2 (b)

TC refer to total capacity S/T: refer to the ratio of sensible heat and total capacity kW: refer to total input power

ECM-Airflow Performance (Standard CFM,Without Electric Heat)

Model Number	Motor Speed		SCFM								
			External Static Pressure-Inches W.C.[kPa]								
			0[0]	0.1[.02]	0.2[.05]	0.3[.07]	0.4[.10]	0.5[.12]	0.6[.15]	0.7[.17]	0.8[.20]
36	Tap (1)	SCFM	925	807	723	658	/	/	/	/	/
		Watts	114	120	126	130	/	/	/	/	/
		Amps	1.07	1.12	1.17	1.19	/	/	/	/	/
	Tap (2) - Factory	SCFM	1103	993	911	841	776	710	596	/	/
		Watts	162	169	175	181	187	193	197	/	/
		Amps	1.4	1.51	1.56	1.6	1.65	1.69	1.72	/	/
	Tap (3)	SCFM	1132	1084	1027	972	907	832	762	700	637
		Watts	193	201	207	214	221	229	238	243	247
		Amps	2.03	2.08	2.15	2.17	2.2	2.27	2.31	2.39	2.42
	Tap (4)	SCFM	1355	1310	1270	1180	1049	989	931	870	813
		Watts	296	301	307	312	318	323	327	331	336
		Amps	2.52	2.56	2.6	2.64	2.68	2.71	2.74	2.77	2.81
	Tap (5)	SCFM	1522	1465	1364	1291	1231	1177	1121	1066	1017
		Watts	426	432	438	443	448	452	456	460	466
		Amps	3.49	3.54	3.58	3.62	3.65	3.68	3.7	3.74	3.78

Table 13-3 (a)

Model Number	Motor Speed		SCFM								
			External Static Pressure-Inches W.C.[kPa]								
			0[0]	0.1[.02]	0.2[.05]	0.3[.07]	0.4[.10]	0.5[.12]	0.6[.15]	0.7[.17]	0.8[.20]
60	Tap (1)	SCFM	1385	1300	1230	1136	1045	959	867	787	717
		Watts	164	171	180	192	204	217	232	238	249
		Amps	1.43	1.48	1.56	1.64	1.74	1.84	1.94	1.99	2.07
	Tap (2) - Factory	SCFM	1489	1432	1352	1279	1172	1088	1013	934	863
		Watts	206	211	223	233	241	257	269	283	295
		Amps	1.76	1.8	1.89	1.96	2.02	2.13	2.24	2.34	2.43
	Tap (3)	SCFM	1638	1572	1511	1440	1368	1293	1205	1137	1067
		Watts	293	319	333	343	348	355	365	373	383
		Amps	2.41	2.61	2.71	2.78	2.82	2.87	2.93	3.01	3.06
	Tap (4)	SCFM	1964	1903	1840	1786	1724	1655	1591	1488	1427
		Watts	435	450	466	479	494	507	521	535	551
		Amps	3.51	3.67	3.71	3.86	3.96	4.07	4.17	4.27	4.38
	Tap (5)	SCFM	2293	2225	2193	2133	2090	2011	1877	1755	1614
		Watts	661	682	708	710	731	730	720	701	667
		Amps	5.13	5.29	5.49	5.52	5.67	5.66	5.59	5.45	5.17

Table 13-3 (b)

