

**ComfortStar®**

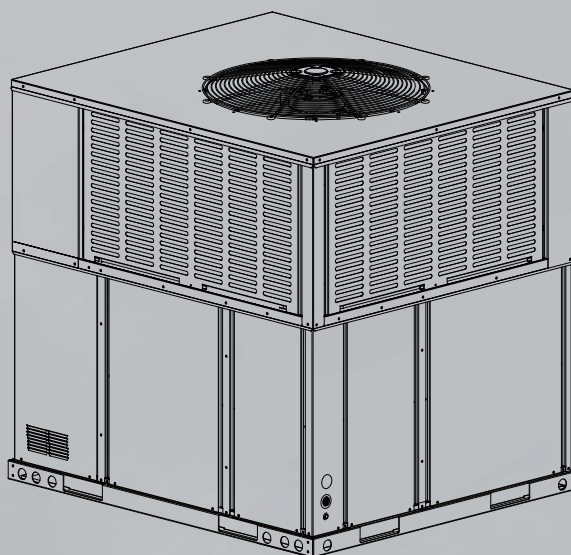
# INSTALLATION INSTRUCTIONS

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.



# TABLE OF CONTENTS

## CONTENTS

## PAGE

|  |    |
|--|----|
| 1.0 KEY TO SYMBOLS AND SAFETY INSTRUCTIONS.....  | 4  |
| 1.1 KEY TO SYMBOLS.....  | 4  |
| 1.2 SAFETY.....  | 4  |
| 2.0 INSTALLATION.....  | 5  |
| 2.1 INSPECTION .....   | 5  |
| 2.2 LIMITATIONS .....  | 5  |
| 2.3 PRE-INSTALLATION .....   | 5  |
| 2.4 RIGGING AND HANDING.....   | 5  |
| 2.5 LOCATION RESTRICTIONS.....   | 6  |
| 2.6 Roof Curb.....   | 13 |
| 3.0 DUCTWORK.....  | 14 |
| 4.0 CONDENSATE DRAIN CONNECTION.....   | 15 |
| 4.1 INSTALL DRAIN PIPE.....  | 15 |
| 5.0 FILTERS.....   | 15 |
| 6.0 ELCETRICAL WIRING.....   | 15 |
| 6.1 POWER WIRING .....   | 15 |
| 6.2 GROUNDING .....  | 15 |
| 6.3 CONTROL WIRING .....   | 15 |
| 7.0 SYSTEM START UP.....   | 17 |
| 8.0 SYSTEM CHARGE ADJUSTMENT.....  | 17 |
| 8.1 CHARGING:WEIGH-IN METHOD.....  | 17 |
| 8.2 SUBCOOLING CHARGING AND REFRIGERANT ADJUSTMENT IN<br>COOLING(ABOVE 55°FOUTDOOR TEMP) ..... | 17 |
| 9.0 SYSTEM OPERATION AND TROUBLESHOOTING.....  | 19 |
| 9.1 CONTROL LOGIC DESCRIPTION.....   | 19 |
| 9.2 SENSORS (THERMISTORS/PRESSURE TRANSDUCER).....   | 19 |
| 9.3 DEFROST DESCRIPTION.....   | 19 |
| 9.4 COMPRESSOR CRANKCASE HEATER DESCRIPTION.....   | 20 |
| 9.5 REVERSING VALVE OPERATION.....   | 20 |
| 9.6 PROTECTION FUNCTIONS.....  | 20 |
| 9.7 PARAMETER POINT CHECK TABLE.....   | 20 |
| 9.8 CONTROL BOARD OVERVIEWS.....   | 22 |
| 9.9 ERROR CODE TROUBLESHOOTING.....  | 26 |
| P1/P5.....   | 26 |
| P3/P0/P2.....  | 27 |
| P4/PH/E4.....  | 28 |
| F1/C3/E7/E6.....   | 29 |
| E9/H0/E5.....  | 30 |
| P6/L0-L9/ATL.....  | 31 |

|  |    |
|--|----|
| 10.0 CARE AND MAINTENANCE.....               | 35 |
| 10.1 CLEANING PRECAUTIONS.....               | 35 |
| 10.2 CHANGING YOU AIR FILTER.....            | 35 |
| 10.3 MAINTENACE-LONG PERIODS OF NON-USE..... | 35 |
| 10.4 MAINTENANCE-PRE-SEASON INSPECTION.....  | 35 |
| 11.0 PRODUCT FEATURES.....                   | 36 |
| 11.1 STANDARD FEATURES.....                  | 36 |
| 11.2 CABINET FEATURES.....                   | 36 |
| 12.0 PRODUCT SPECIFICATIONS.....             | 36 |
| 13.0 AHRI 210/240 PERFORMANCE DATE.....      | 37 |

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

|  |                 |
|--|-----------------|
|  | <b>CAUTION:</b> |
| <ul style="list-style-type: none"><li>• This document is customer property and is to remain with this unit. Please return to service information pack upon completion of work.</li><li>• These instructions do not cover all variations in systems or provide for every possible contingency to be met in connection with the installation.</li><li>• 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.</li></ul> |                 |

|  |
|--|
|  |
| 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. |

|  |                |
|--|----------------|
|  | <b>CAUTION</b> |
| 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. |                |

|   |                 |
|---|-----------------|
|   | <b>CAUTION:</b> |
| 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. |                 |

|   |                                   |
|---|-----------------------------------|
|   | <b>WARNING: HAZARDOUS VOLTAGE</b> |
| <ul style="list-style-type: none"><li>• Failure to follow this warning could result in property damage, severe personal injury or death.</li><li>• Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized.</li></ul> |                                   |

|   |                                 |
|---|---------------------------------|
|   | <b>WARNING: REFRIGERANT OIL</b> |
| 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. |                                 |

|   |                             |
|---|-----------------------------|
|   | <b>CAUTION: HOT SURFACE</b> |
| May cause minor to severe burning. Failure to follow this Caution could result in property damage or personal injury. |                             |

|  |                                      |
|--|--------------------------------------|
|  | <b>CAUTION: CONTAINS REFRIGERANT</b> |
| 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. |                                      |

|  |                                    |
|--|------------------------------------|
|  | <b>CAUTION: GROUNDING REQUIRED</b> |
| 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 Handing

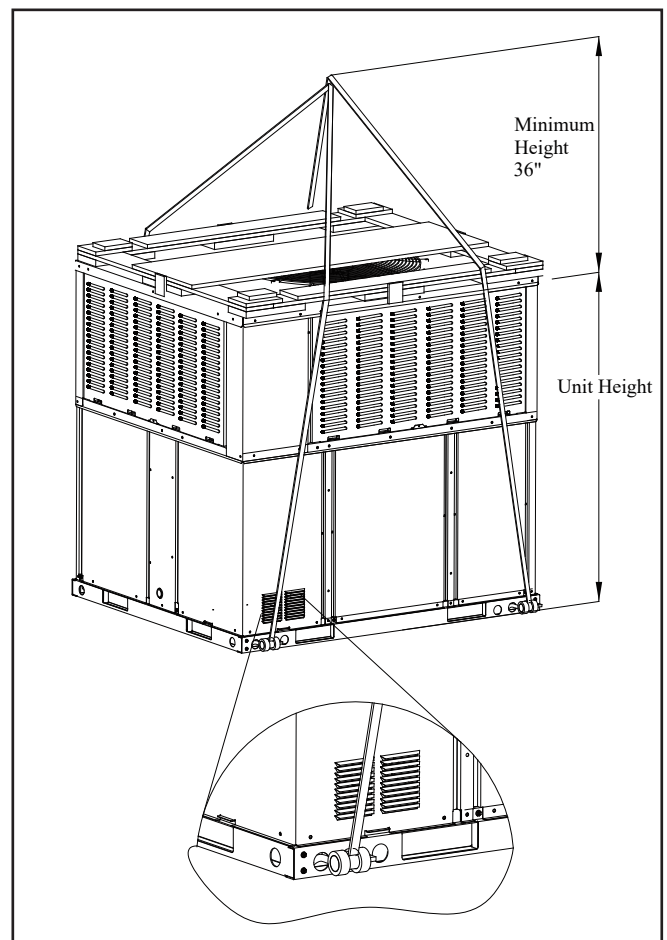


Figure 2-1

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.

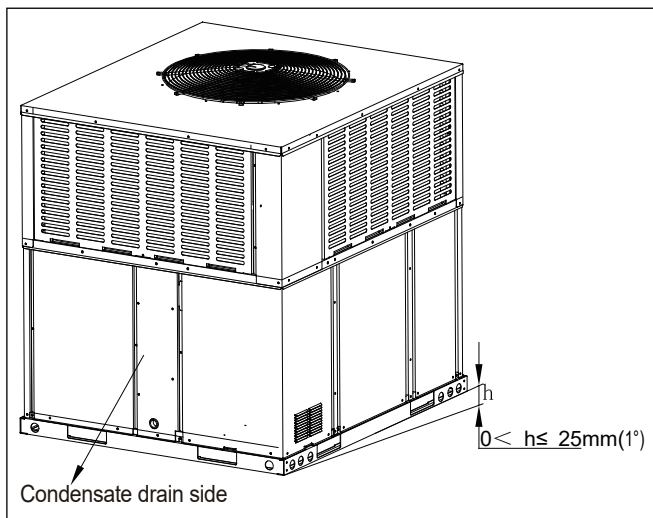


Figure 2-2

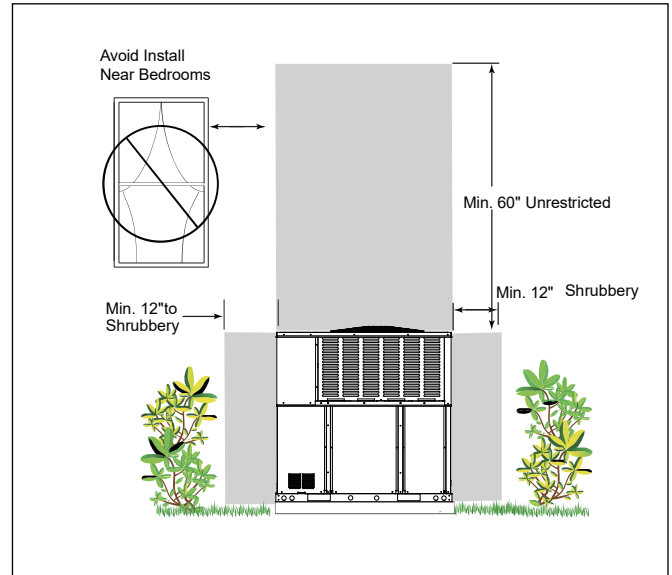


Figure 2-3

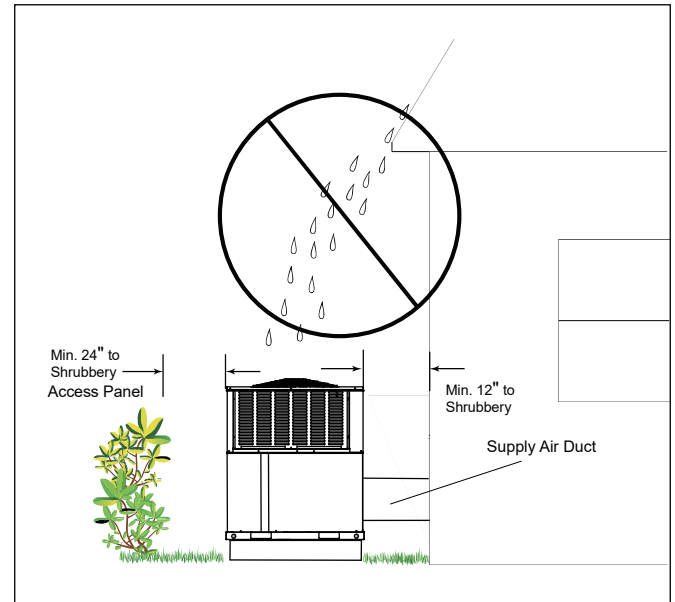


Figure 2-4

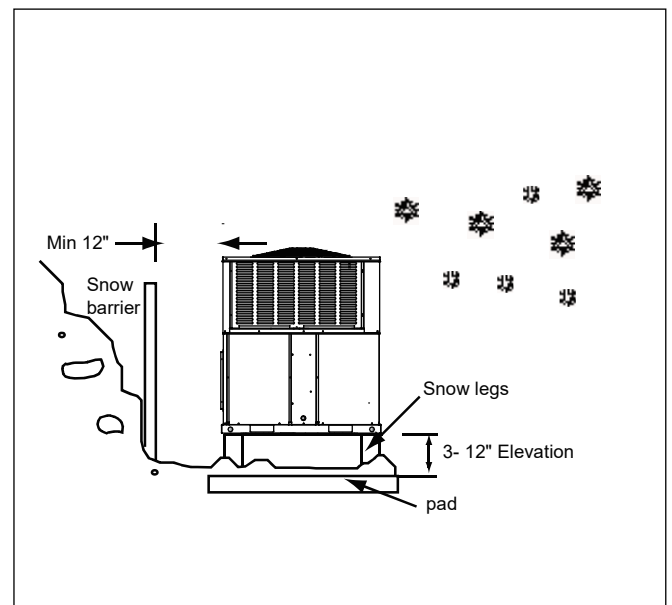
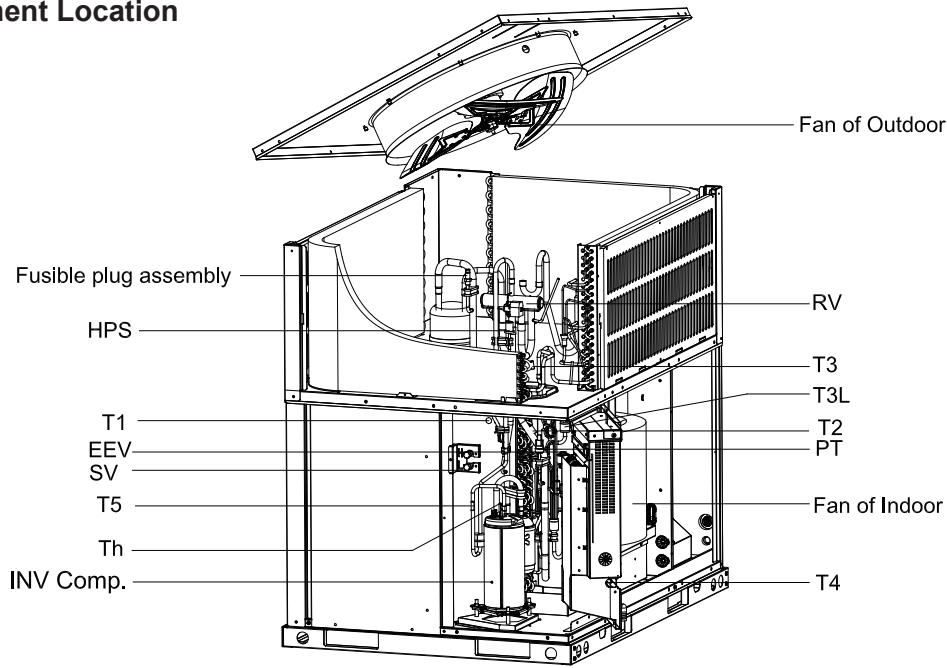


Figure 2-5

For 36k model

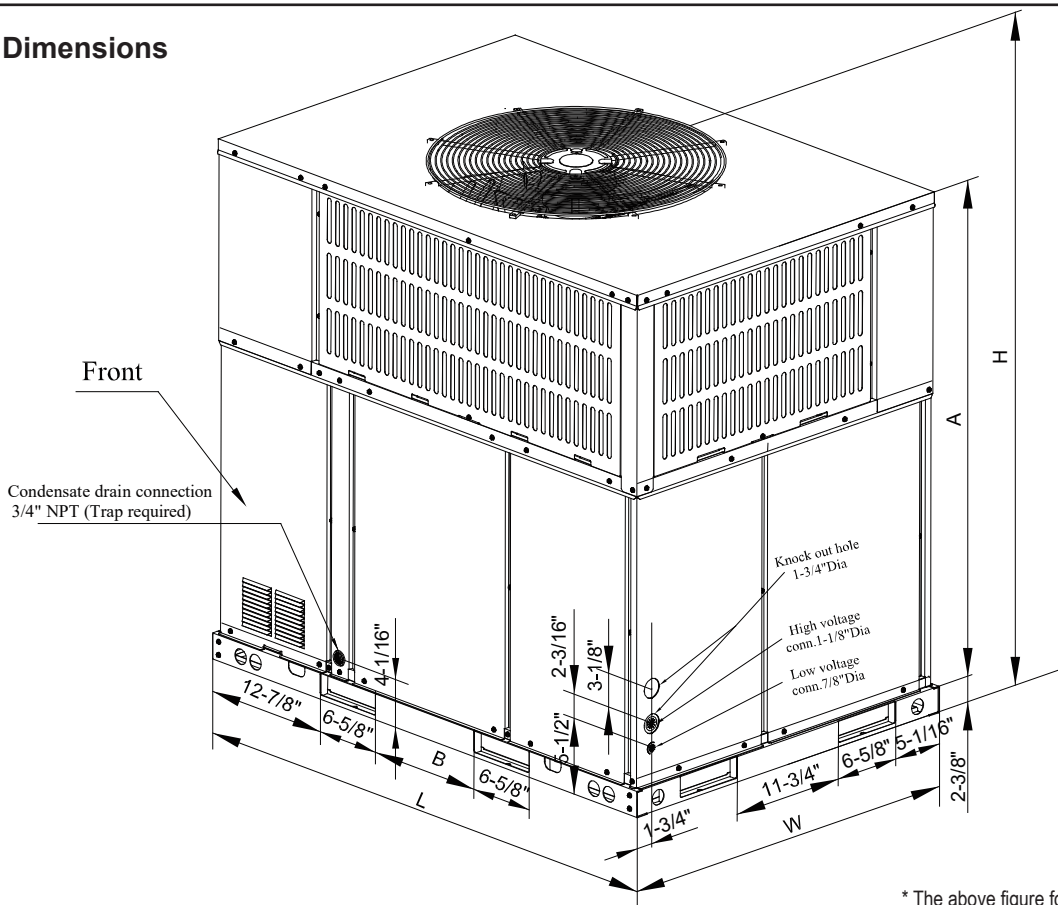
Component Location



\* 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

For 36k model

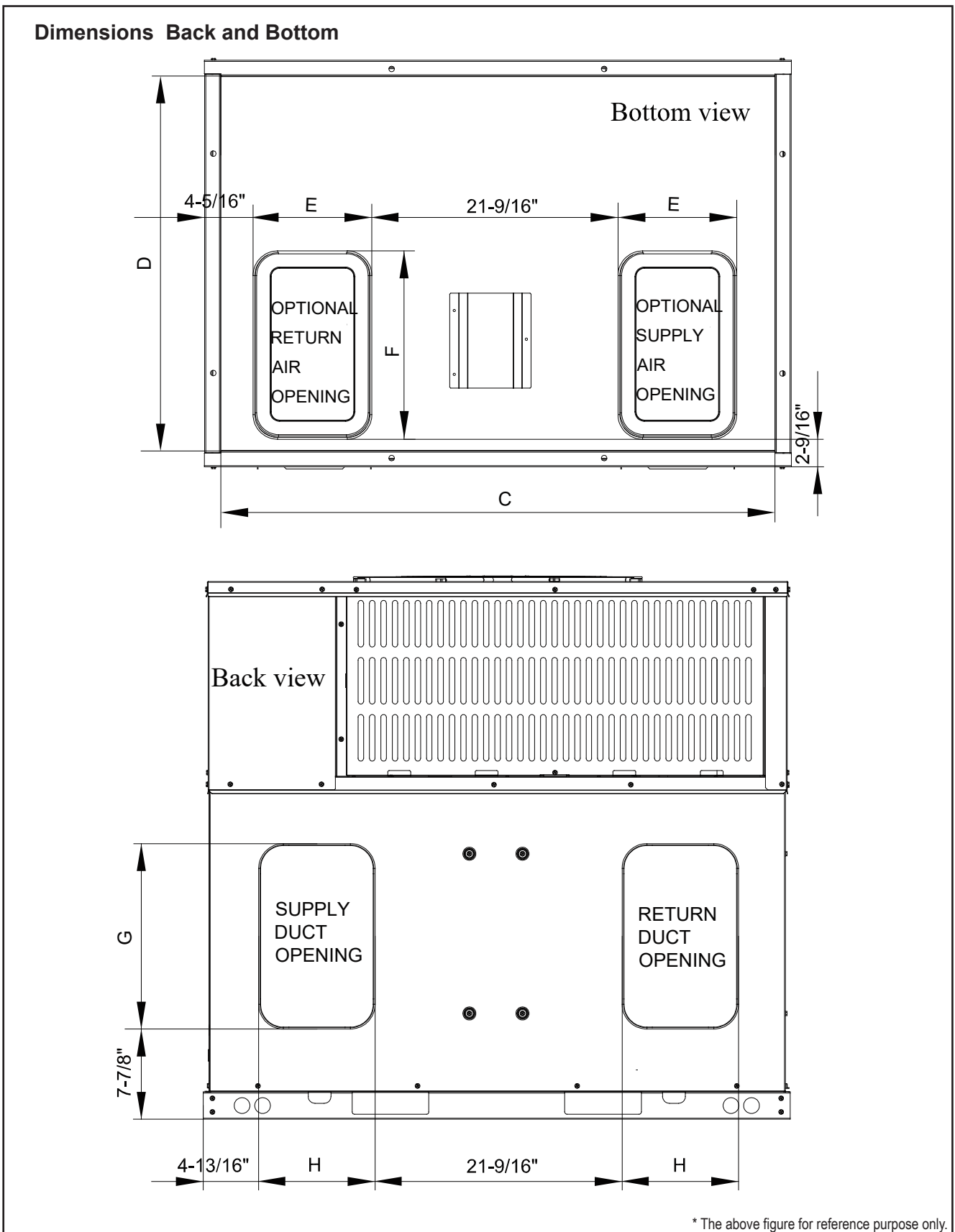


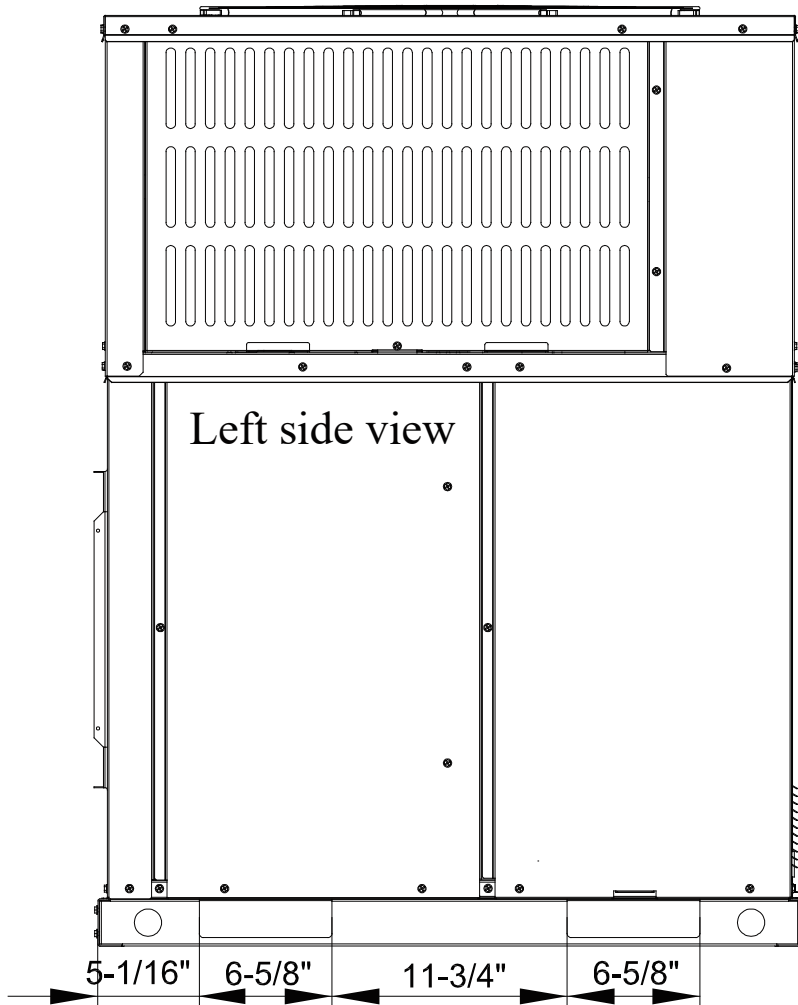
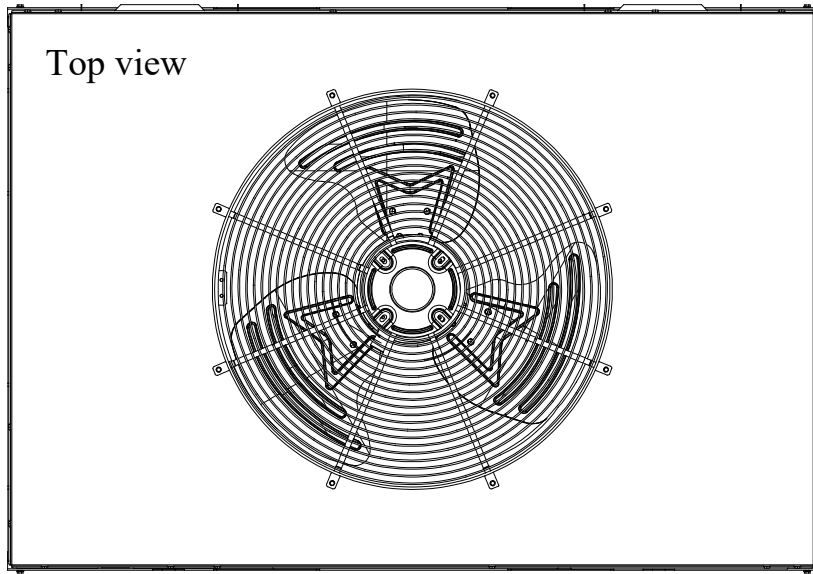
Figure 2-8 (a)

| Model size         | Dimensions      |               |               |              |              |              |
|--------------------|-----------------|---------------|---------------|--------------|--------------|--------------|
| Heat Pump          | "C" in.[mm]     | "D" in.[mm]   | "E" in.[mm]   | "F" in.[mm]  | "G" in.[mm]  | "H" in.[mm]  |
| <b>CCRT36-1INV</b> | 47-13/16 [1215] | 32-1/4 [820]  | 9-15/16 [252] | 15-7/8 [403] | 15-3/4 [400] | 9-3/4 [249]  |
| <b>CCRT60-1INV</b> | 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

For 36k model

Dimensions Right and Top

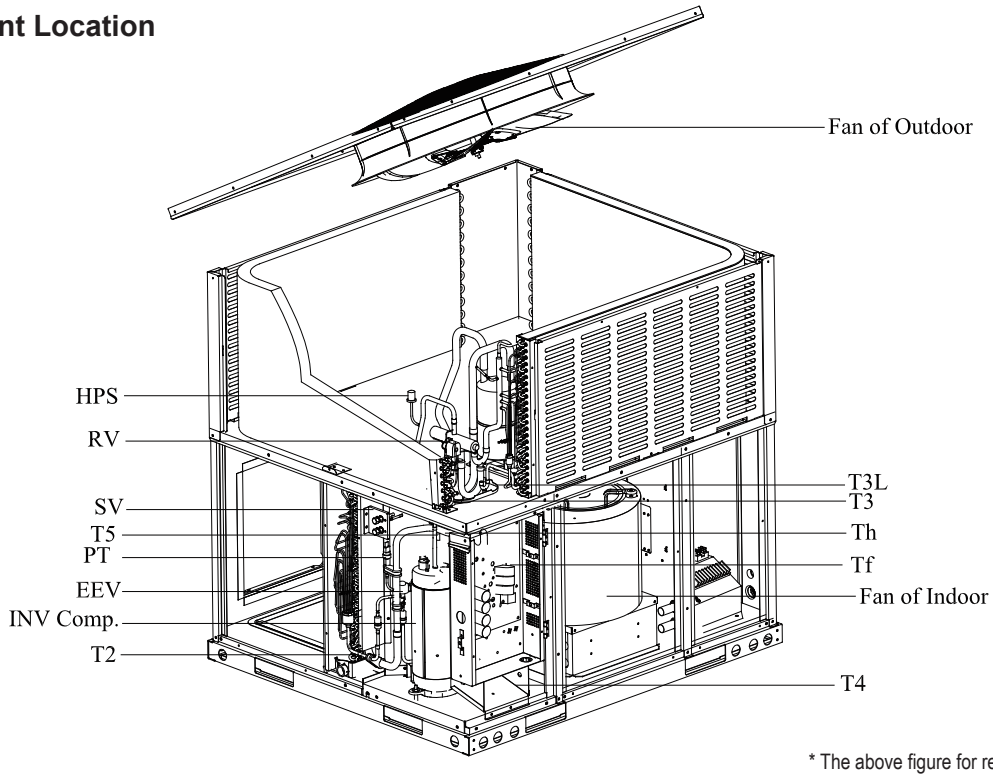


\* The above figure for reference purpose only.

Figure 2-9 (a)

For 60k model

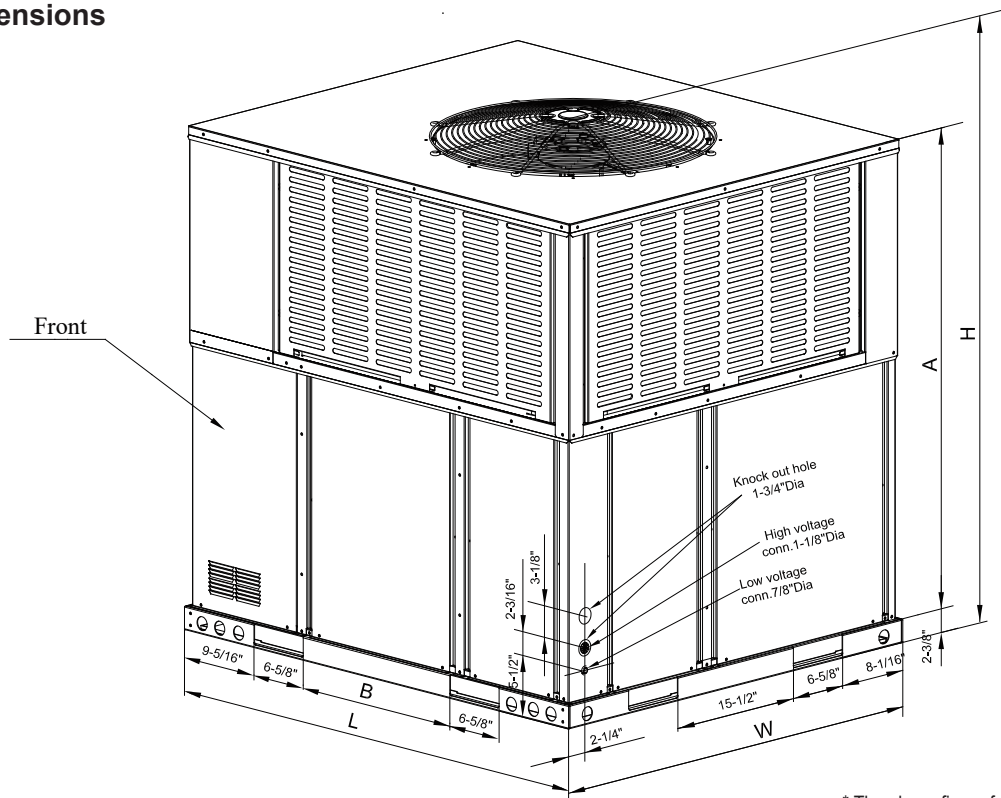
Component Location



\* 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      |                 |                 |                |                |
|-------------|-----------------|-----------------|-----------------|----------------|----------------|
|             | "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

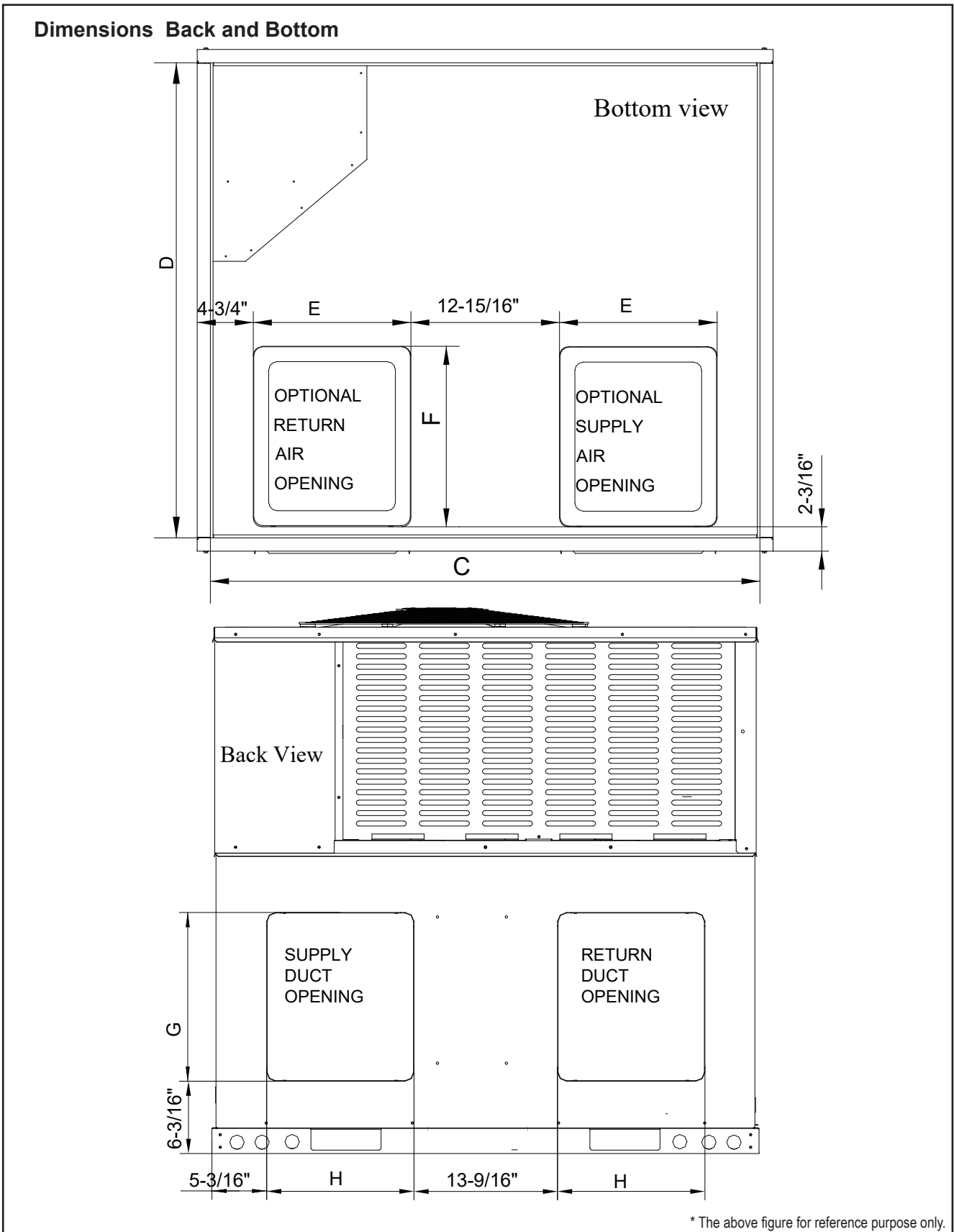


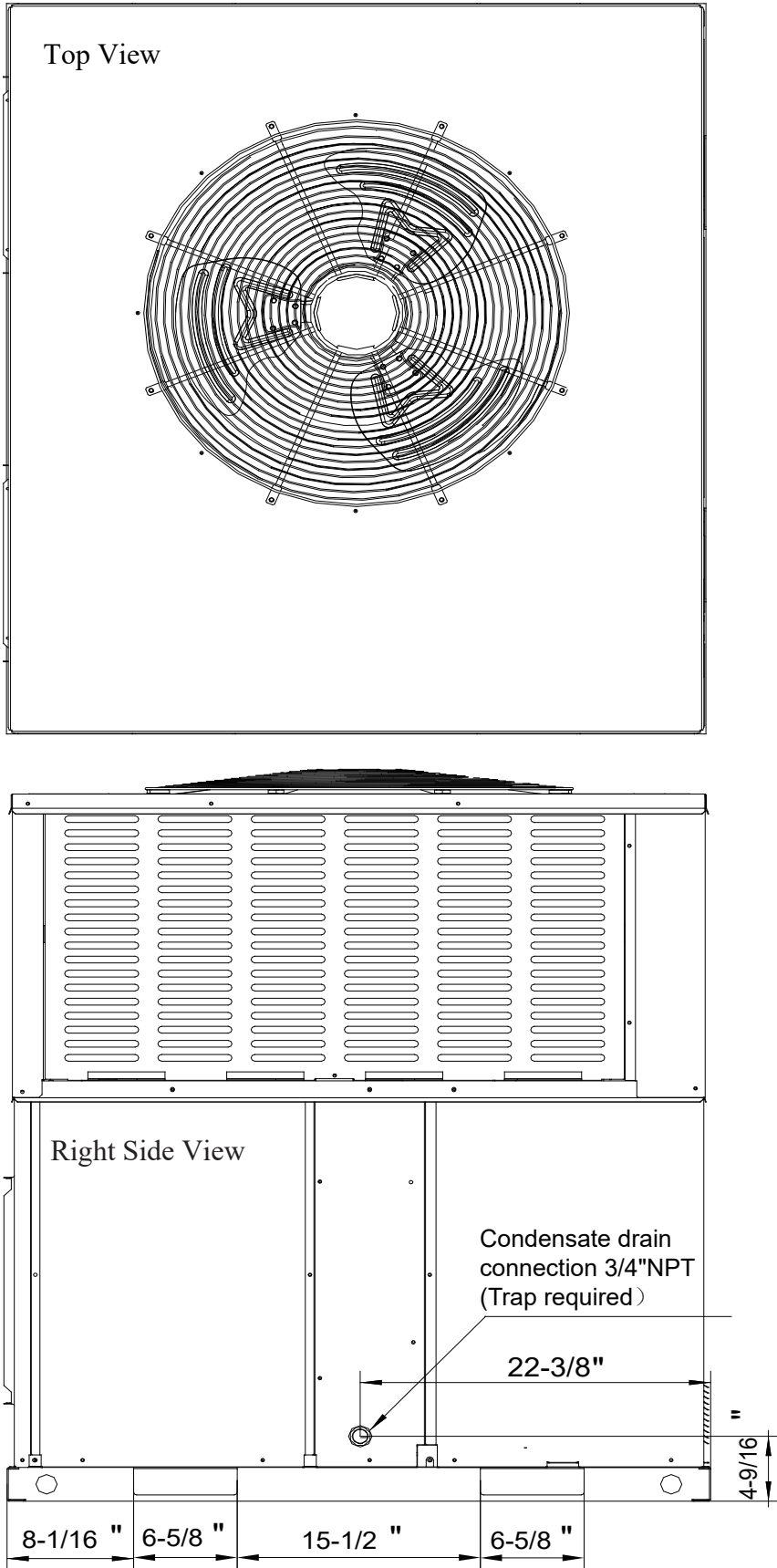
Figure 2-8 (b)

| Model size  | Dimensions      |               |               |              |              |              |
|-------------|-----------------|---------------|---------------|--------------|--------------|--------------|
|             | "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

For 60k model

### Dimensions Right and Top



\* The above figure for reference purpose only.

Figure 2-9 (b)



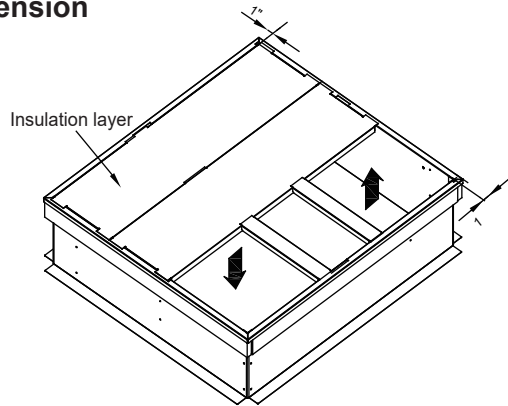
## 2.6 Roof Curb

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

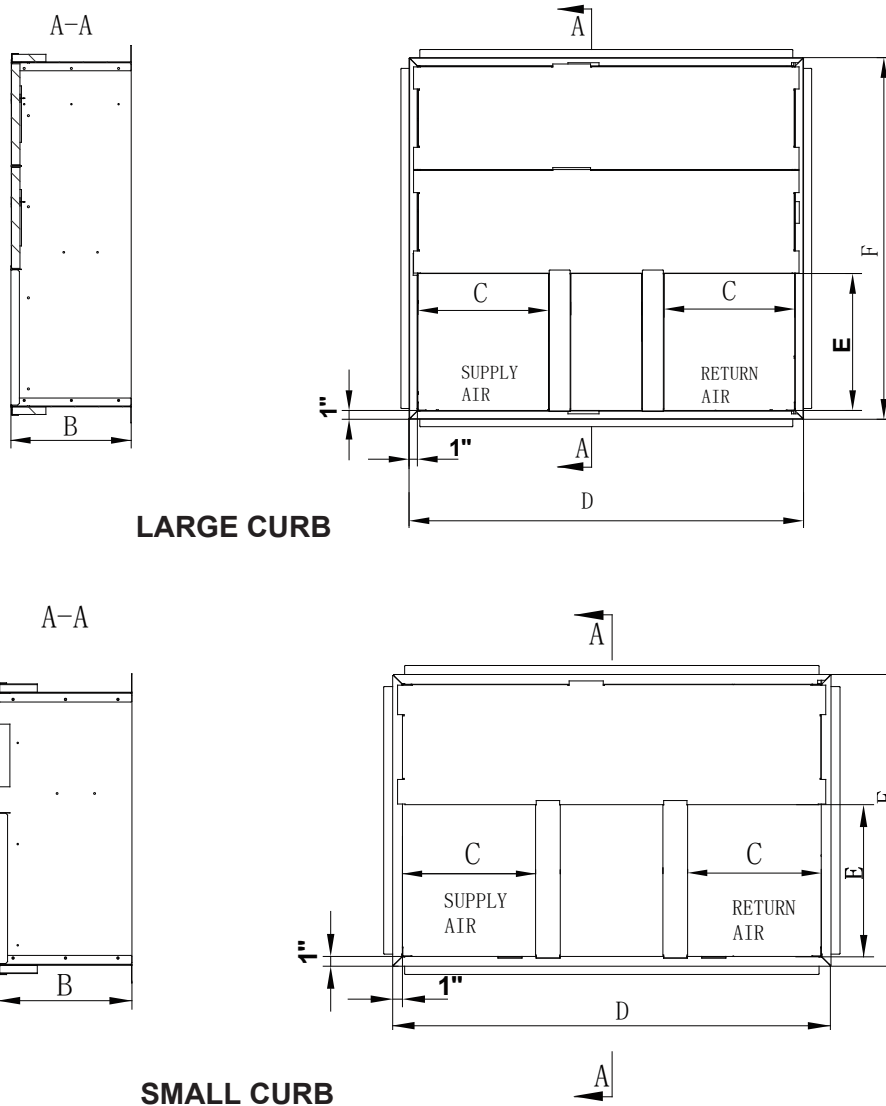


Figure 2-11


\* 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.

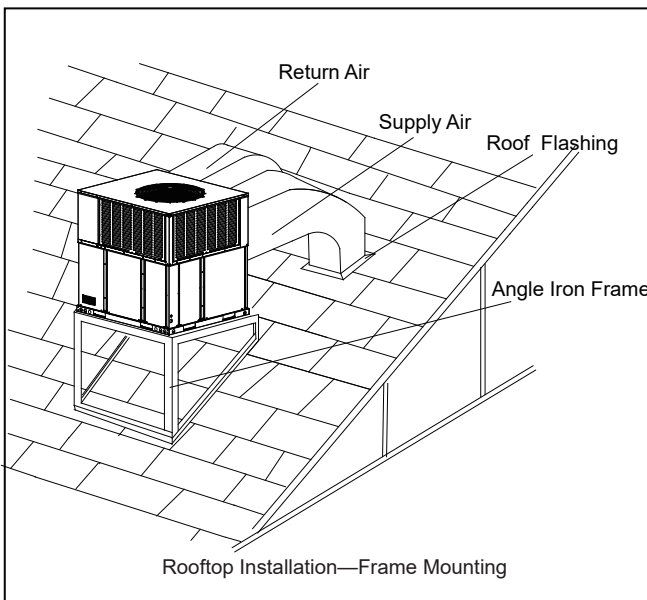


Figure 3-1

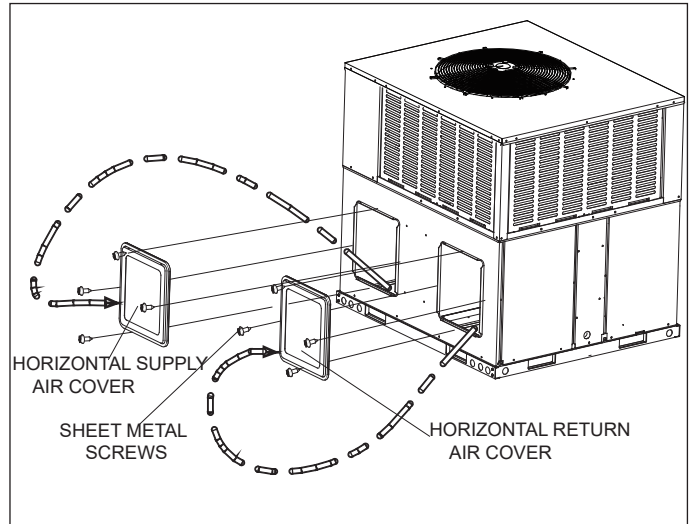


Figure 3-2

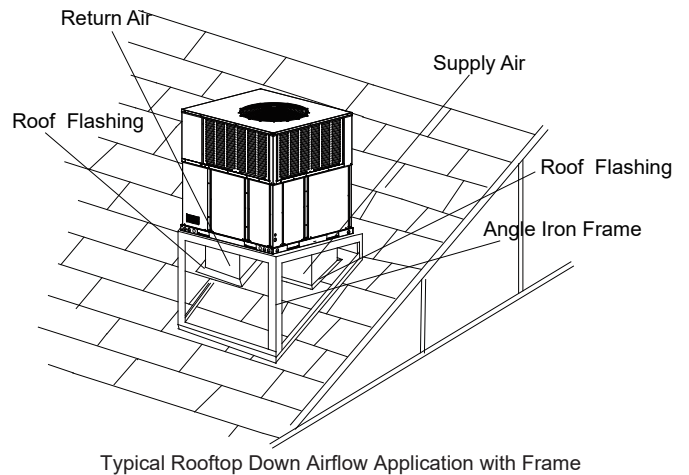



Figure 3-3

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).

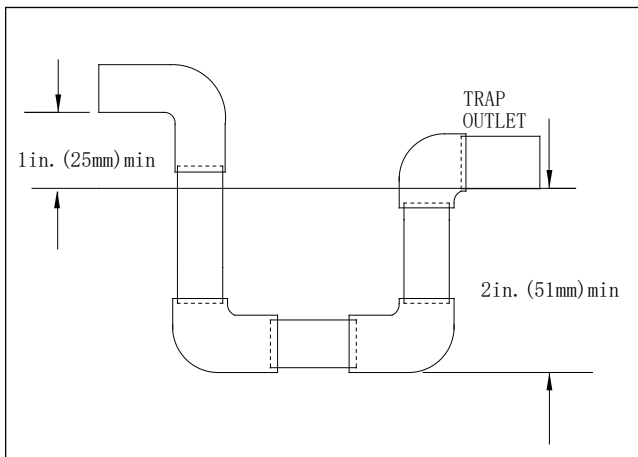


Figure 4-1

## 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.

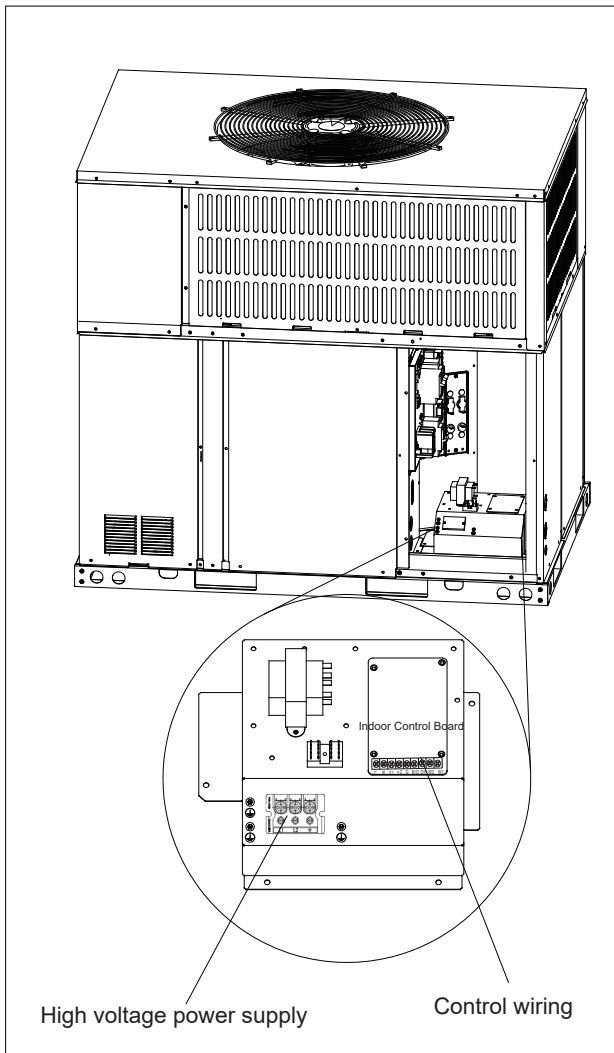


Figure 6-1 \* The above figure for reference purpose only.

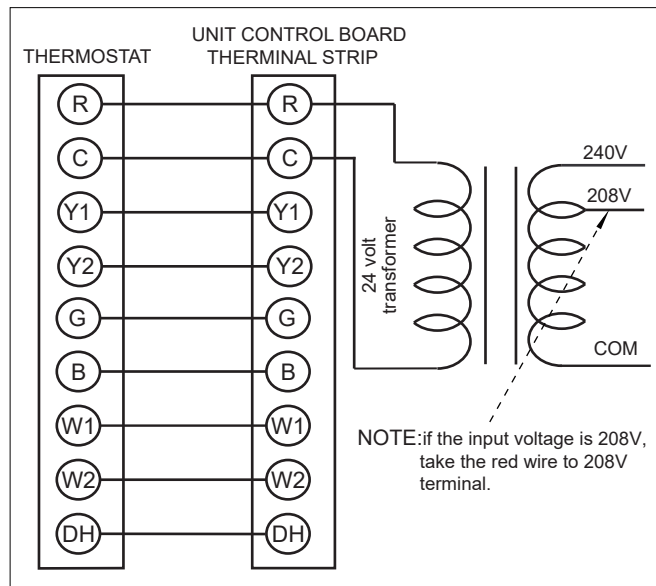


Figure 6-2 Typical Field Control Wiring Diagram

- \*\*\* 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.

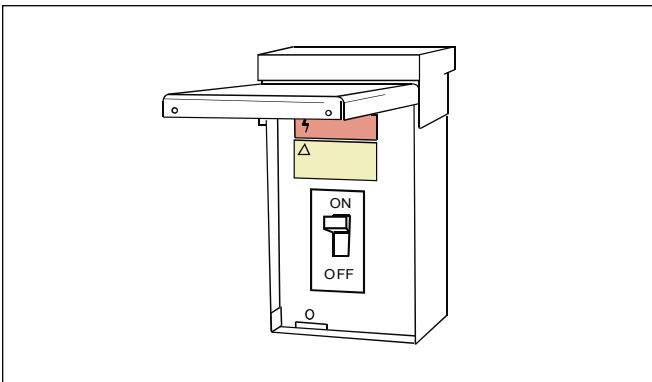


Figure 7-2

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

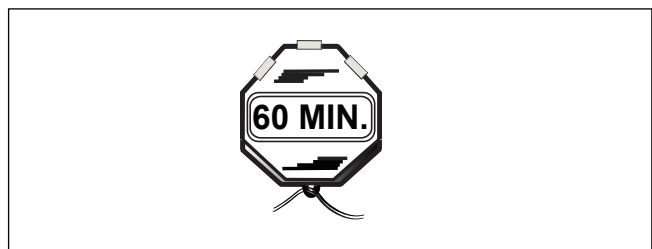


Figure 7-3

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.

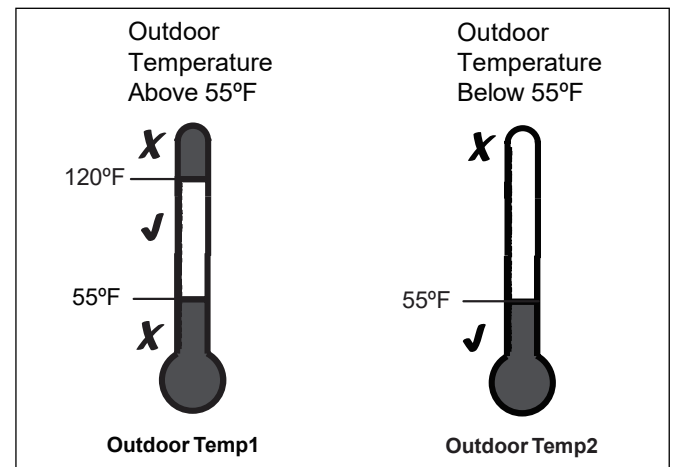
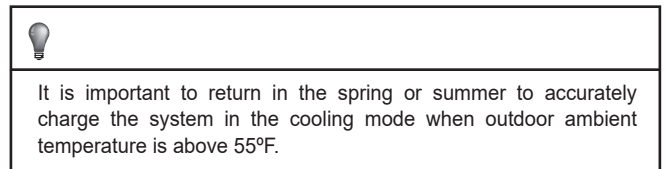


Figure 8-1

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

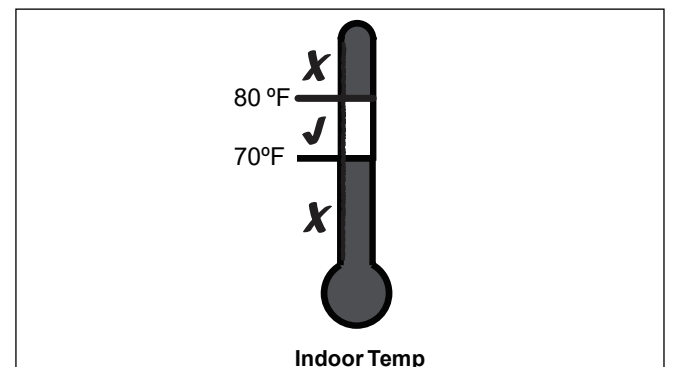



Figure 8-2

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.

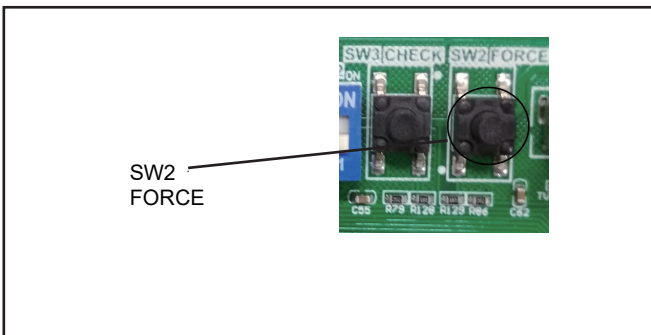


Figure 8-3


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).

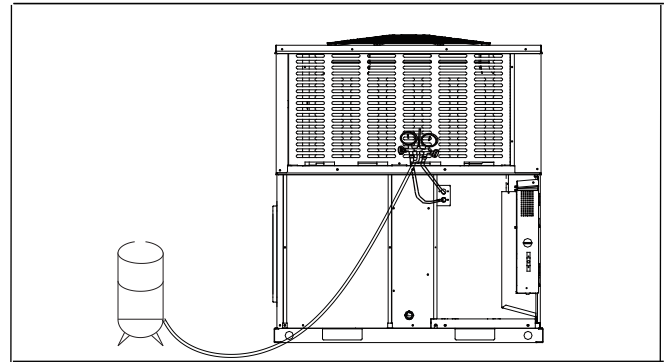



Figure 8-4

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.

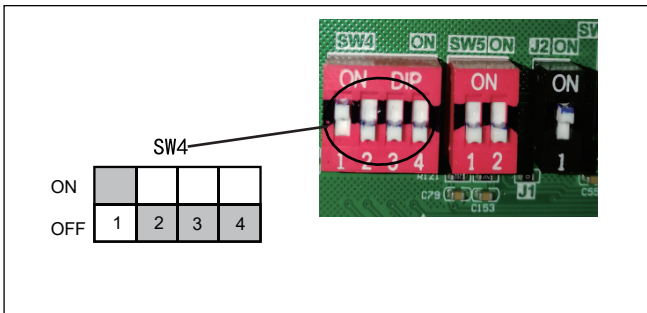


Figure 9-1

|                        |     |                                    |
|------------------------|-----|------------------------------------|
| 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<br>Enter defrost | ON  | Operating time is reduced by 10%   |
|                        | OFF | Normal *                           |
| SW5-2<br>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 ≥ 39°F, Delta T = 18°F
    - T4 ≥ 30°F, Delta T = 16°F
    - T4 ≥ 19°F, Delta T = 14°F
    - When T4 < 19°F, T3 < 9°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°F
    - MRT is 2 hours when: 23°F ≤ T4 < 42°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

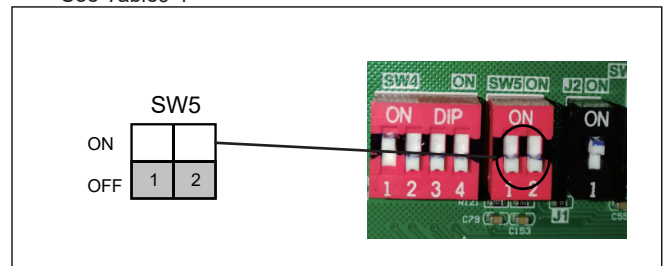


Fig. 9-2

- ▶ 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.



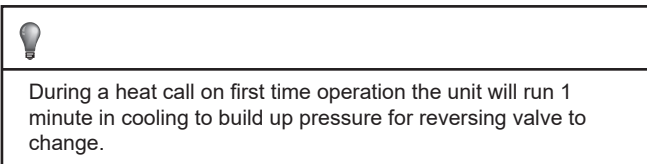
## 9.4 Compressor crankcase heater description

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

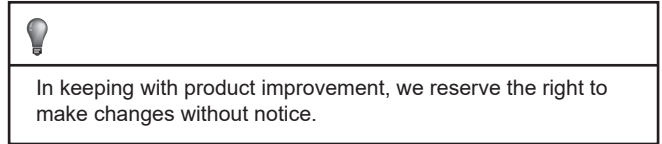
- ▶ Reversing valve energizes during heat mode and de-energizes in cool mode.



## 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.



## 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.

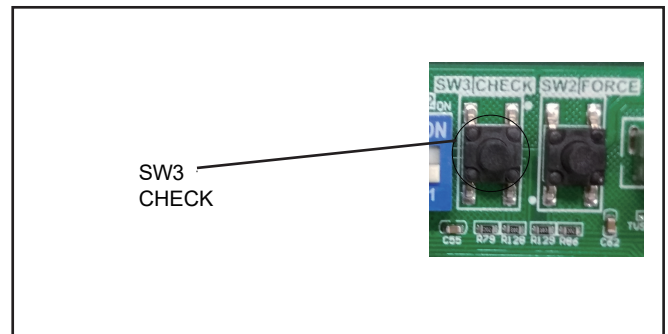


Figure 9-3

- ▶ 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”.

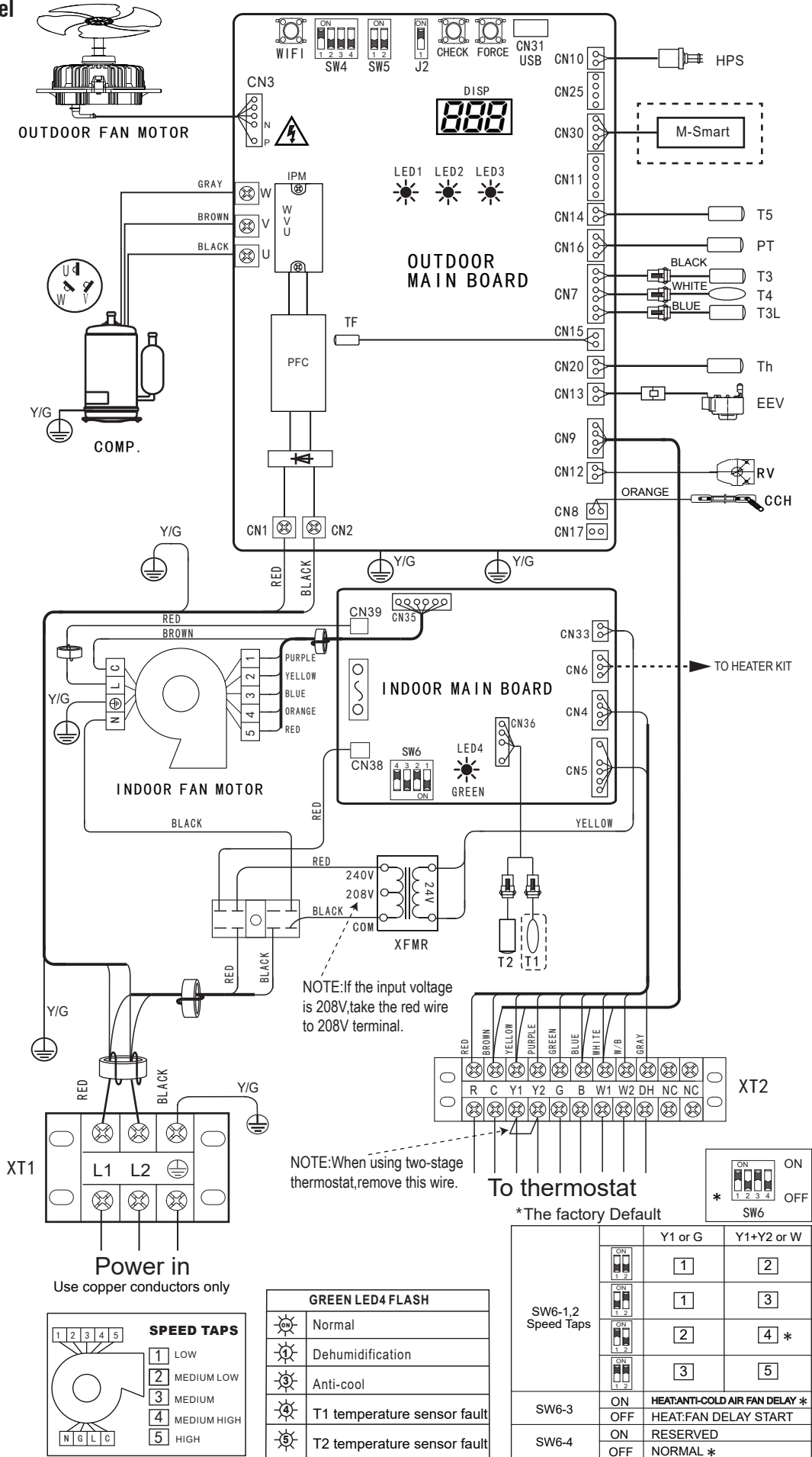


| No. | Point check content   | Example | Remark                                |
|-----|---|---------|---------------------------------------|
| 0   | Outdoor unit capacity   | RH5     | RH5=Heat pump 5 ton                   |
| 1   | Outdoor unit mode   | 2       | 0 standby,<br>2 cooling,<br>3 heating |
| 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



|   |  |
|---|--|
|   | <b>WARNING</b><br><b>ELECTRIC HAZARD 380V VOLTS DC</b> |
| WAIT 3 MINUTES AFTER DISCONNECTING POWER, THEN VERIFY DC VOLTAGE LESS THAN 42 VDC AT INVERTER <b>TEST POINTS P-N</b> . 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<br>Enter defrost | ON  | Operating time is reduced by 10%   |
|                        | OFF | Normal *                           |
| SW5-2<br>Quit defrost  | ON  | Defrosting extended for 60 seconds |
|                        | OFF | Normal *                           |

|    |  |                 |
|----|--|-----------------|
| J2 |  | For 60K model * |
|    |  | 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                     |

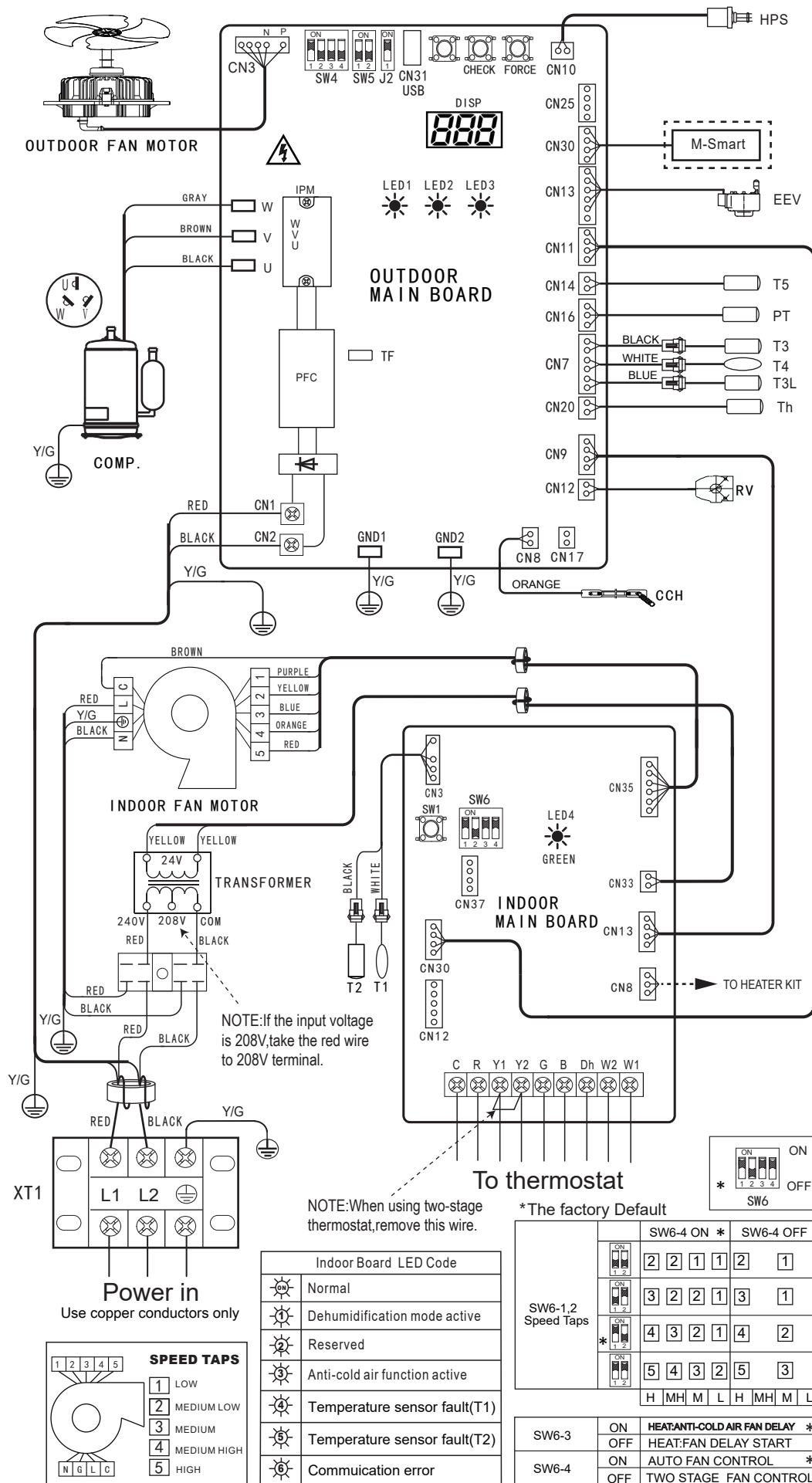
|       |                               |
|-------|-------------------------------|
| HPS   | High pressure switch          |
| T5    | Comp. discharge temp. sensor  |
| PT    | Pressure transducer           |
| T3    | Condensor temp. sensor        |
| T4    | Ambient temp. sensor          |
| T3L   | 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<br>GREEN | ON    | Comp. running                                |
|               | FLASH | LED2 ON IPM Module fault<br>LED2 OFF Standby |
| LED2<br>RED   | ON    | Fault  |
|               | OFF   | No fault                                     |
| LED3<br>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  |
|------|--|
|      | 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"--"   |




| Indoor Board LED Code |                               |
|-----------------------|-------------------------------|
|                       | Normal                        |
|                       | Dehumidification mode active  |
|                       | Reserved                      |
|                       | Anti-cold air function active |
|                       | Temperature sensor fault(T1)  |
|                       | Temperature sensor fault(T2)  |
|                       | Communication error           |

| SW6-1,2 Speed Taps | SW6-4 ON * |    | SW6-4 OFF |   |
|--------------------|------------|----|-----------|---|
|                    |            | 2  | 2         | 1 |
|                    | 3          | 2  | 2         | 1 |
|                    | 4          | 3  | 2         | 1 |
|                    | 5          | 4  | 3         | 2 |
|                    | H          | MH | M         | L |

|       |     |                                |
|-------|-----|--------------------------------|
| SW6-3 | ON  | HEAT-ANTI-COLD AIR FAN DELAY * |
|       | OFF | HEAT-FAN DELAY START           |
| SW6-4 | ON  | AUTO FAN CONTROL *             |
|       | OFF | TWO STAGE FAN CONTROL          |



## For 36k model

|  |  |
|--|--|
|   | <b>WARNING</b><br><b>ELECTRIC HAZARD 380V VOLTS DC</b> |
| <p>WAIT 3 MINUTES AFTER DISCONNECTING POWER, THEN VERIFY DC VOLTAGE LESS THAN 42 VDC AT INVERTER</p> <p><b>TEST POINTS P-N.</b> COMPONENTS MAY STORE A DANGEROUS ELECTRICAL POTENTIAL OF 380 VOLTS DC.</p> |  |
| <p>FAILURE TO FOLLOW THIS WARNING COULD RESULT IN PERSONAL INJURY OR DEATH.</p>  |  |




\*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         | ON  | Operating time is reduced by 10%   |
| Enter defrost | OFF | Normal *                           |
|               | ON  | Defrosting extended for 60 seconds |
| 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                      |

|   |       |               |                  |
|---|-------|---------------|------------------|
|  | ON    | Comp. running |                  |
|   | FLASH | LED2 ON       | IPM Module fault |
|   |       | LED2 OFF      | Standby          |
|  | ON    | Fault         |                  |
|   | OFF   | No fault      |                  |
|  | 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

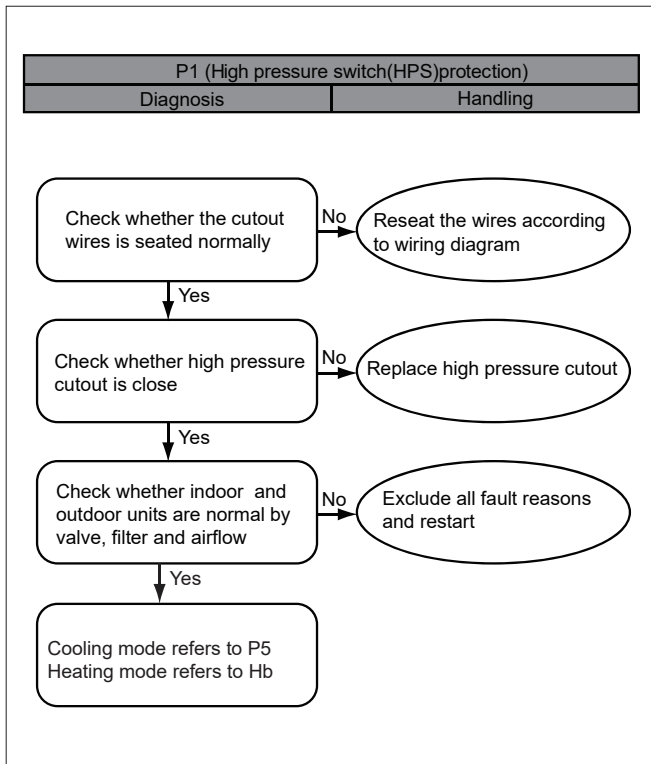


Figure 9-4

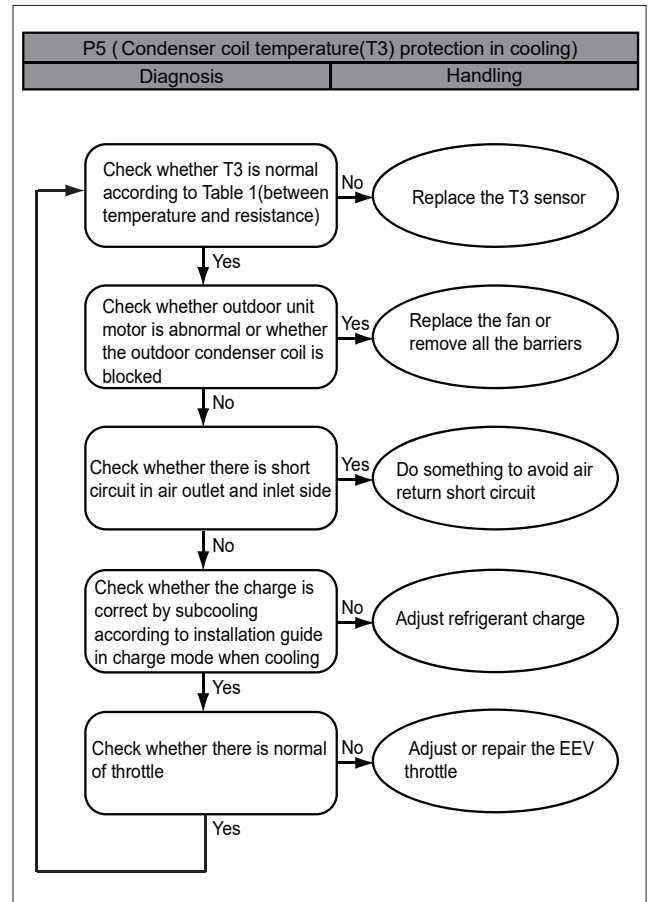


Figure 9-5

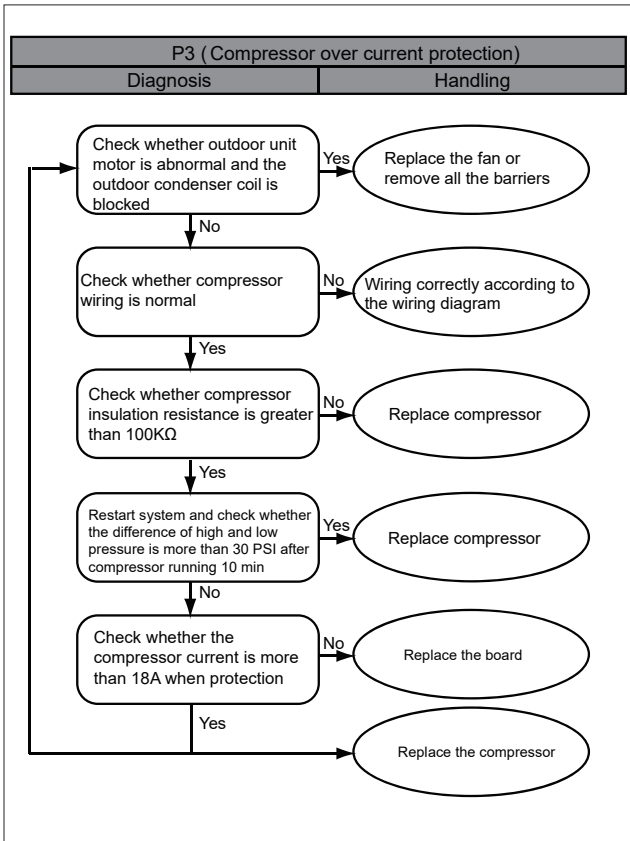


Figure 9-6

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

Table 9-4

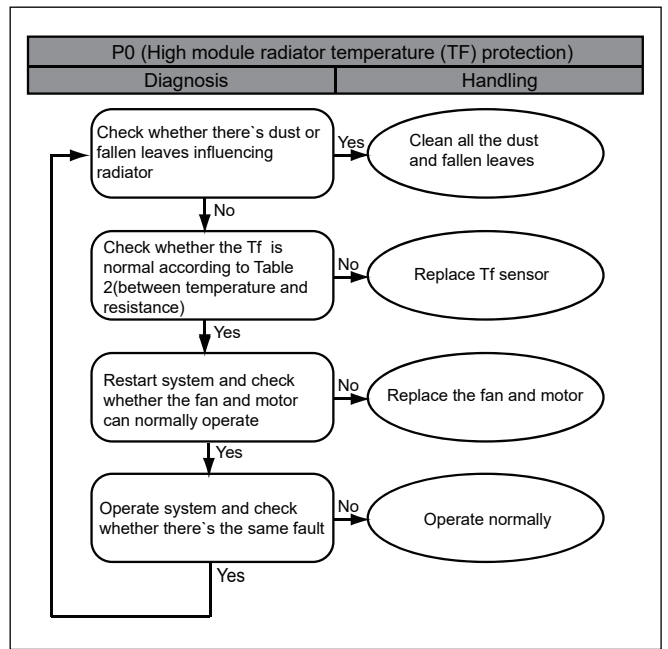


Figure 9-7

| 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

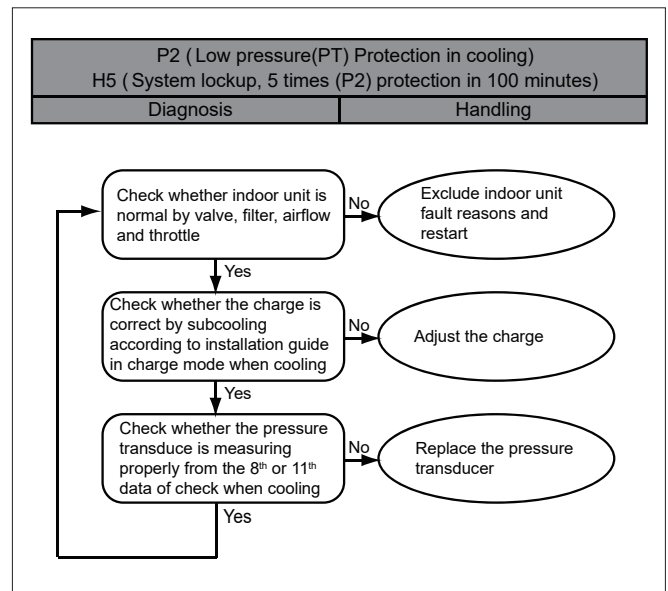


Figure 9-8

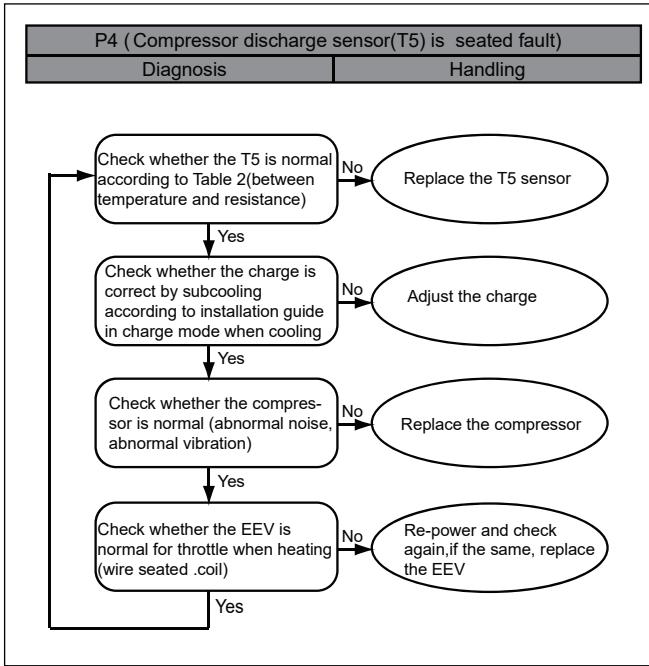


Figure 9-9

| 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

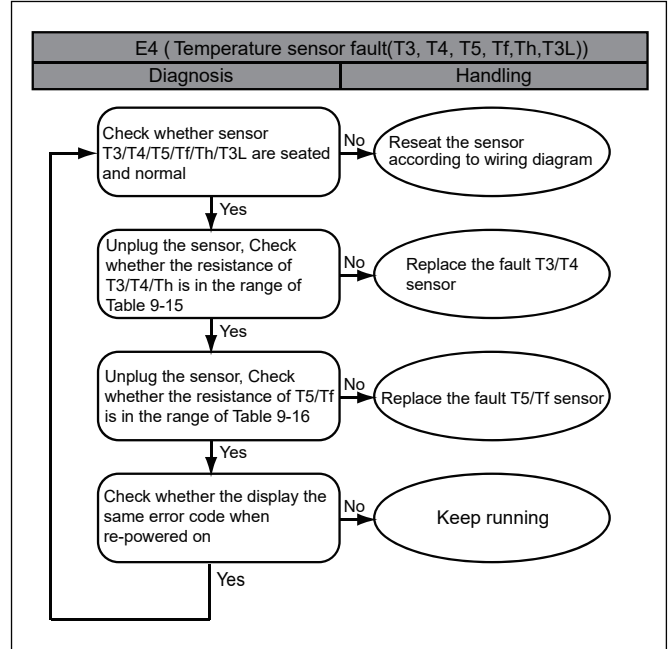


Figure 9-11

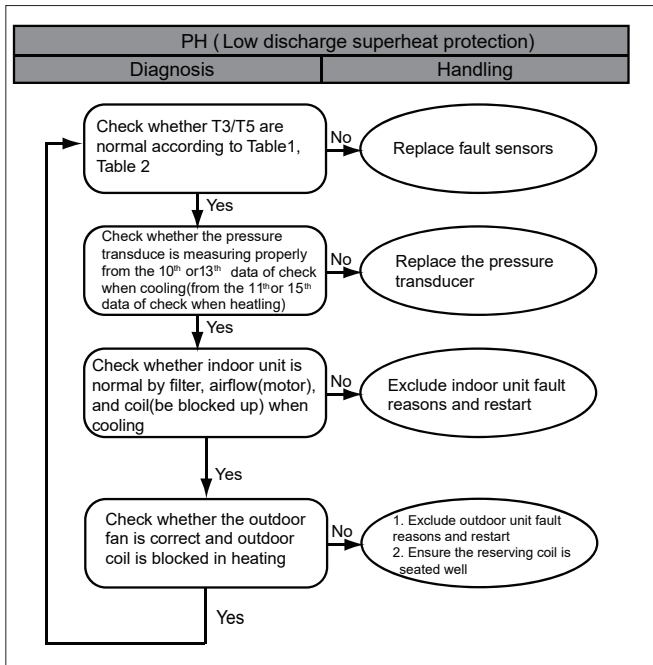


Figure 9-10



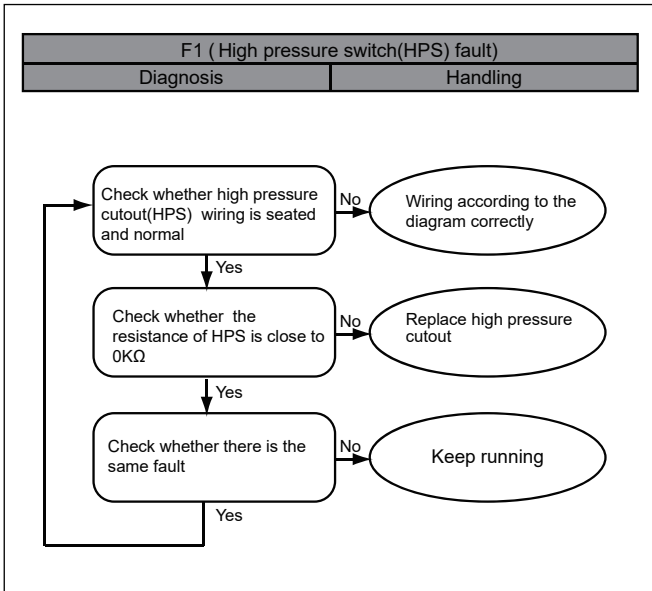


Figure 9-12

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

Table 9-8

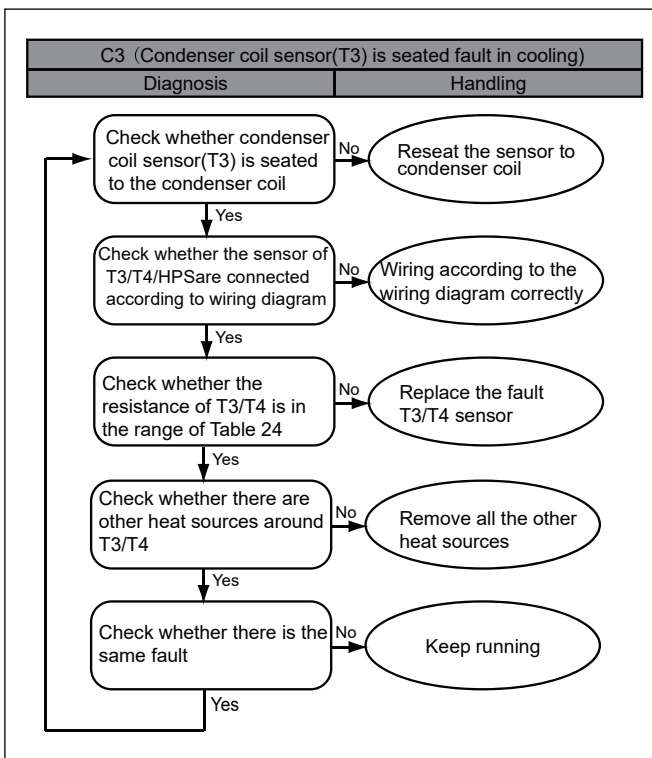


Figure 9-13

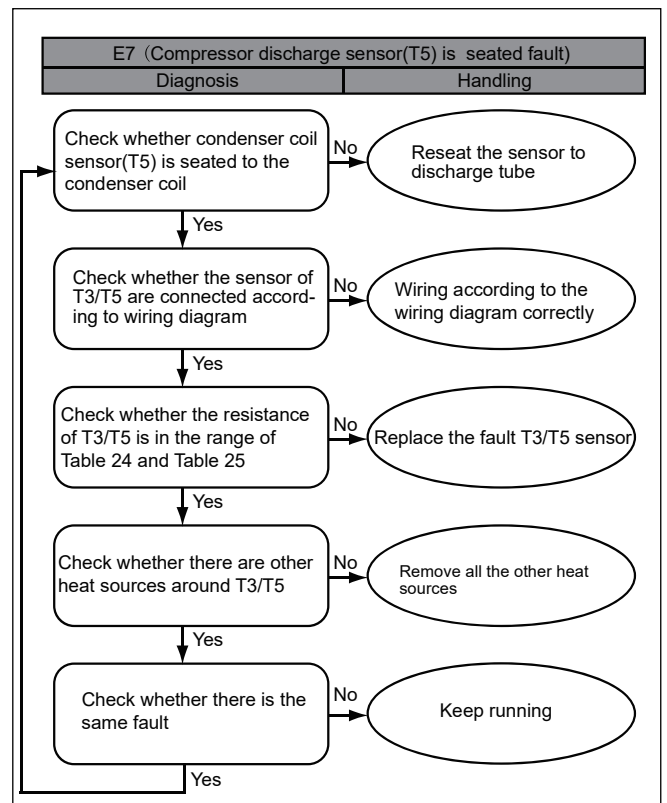


Figure 9-14

| 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.

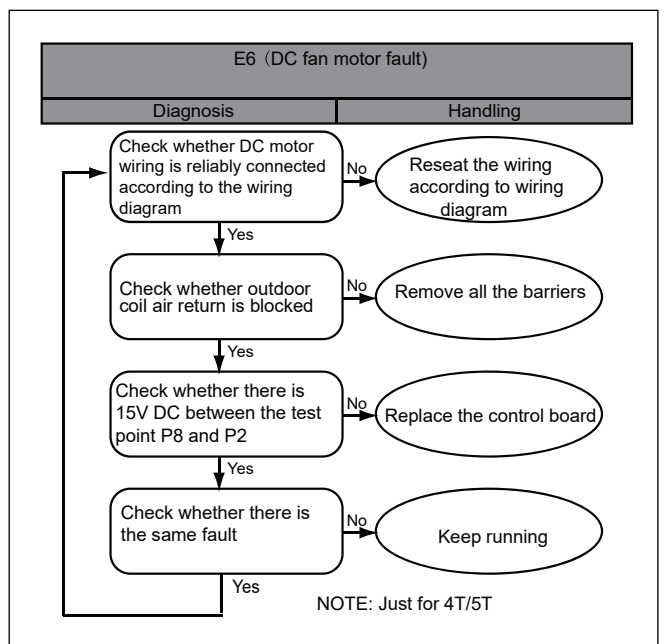


Figure 9-15

| 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.

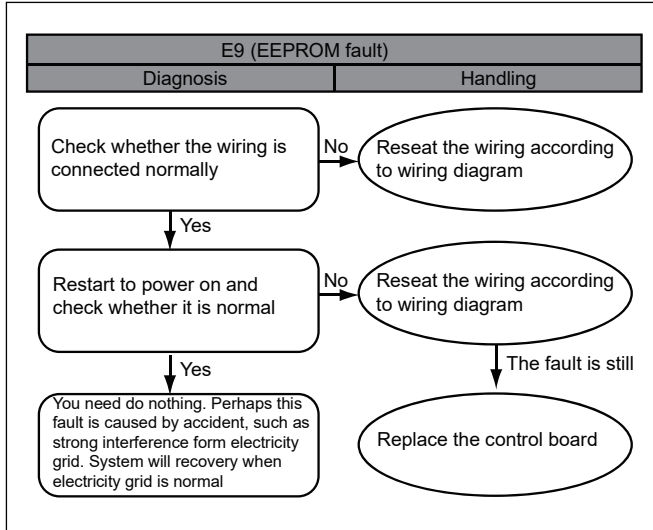


Figure 9-15

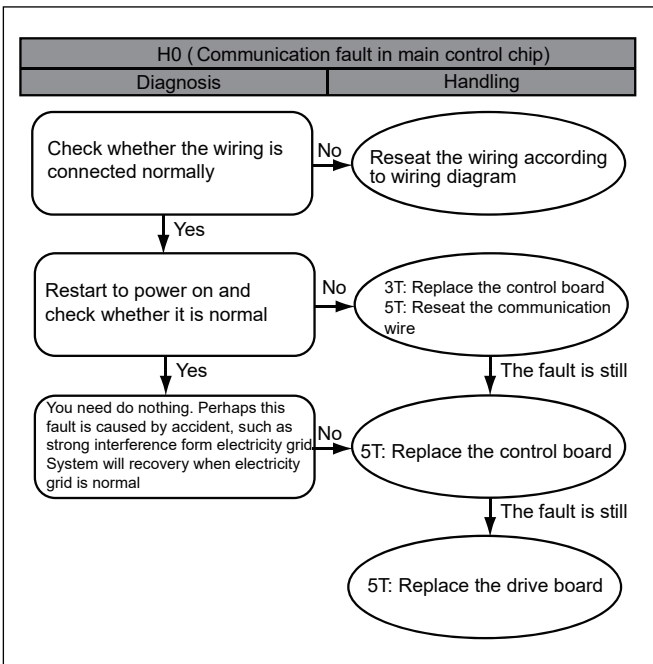


Figure 9-16

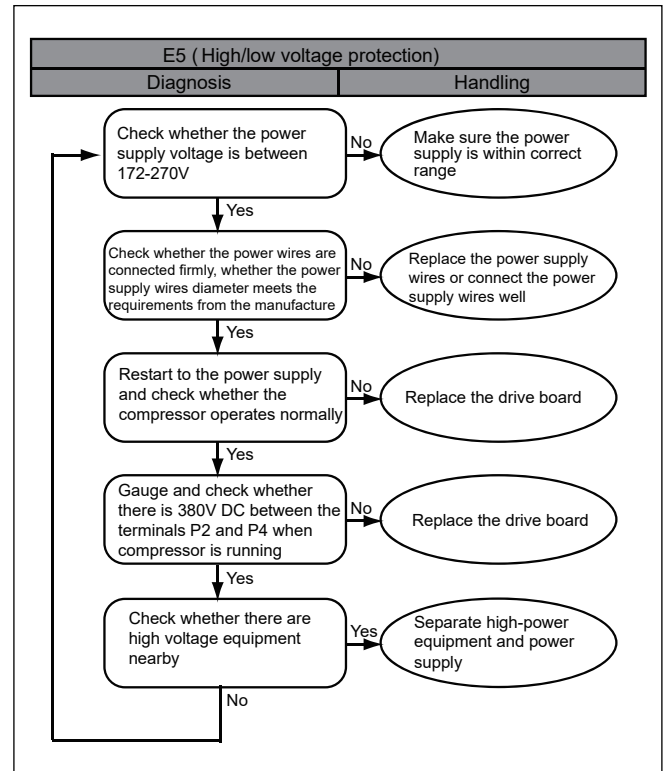


Figure 9-17

| 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.

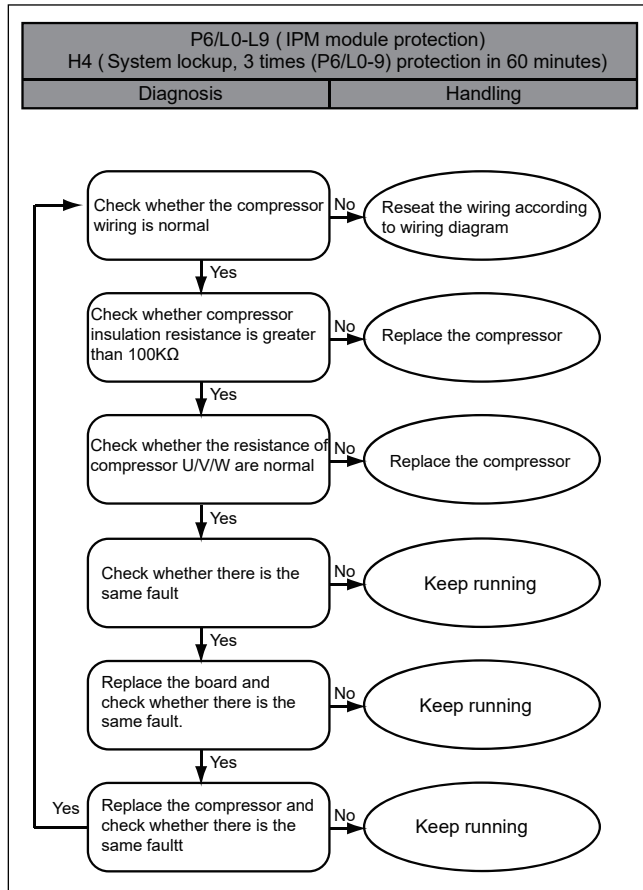



Figure 9-18

| Error Code | Description                 |
|------------|-----------------------------|
| AtL        | Ambient Temperature Limited |

Table 9-12



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

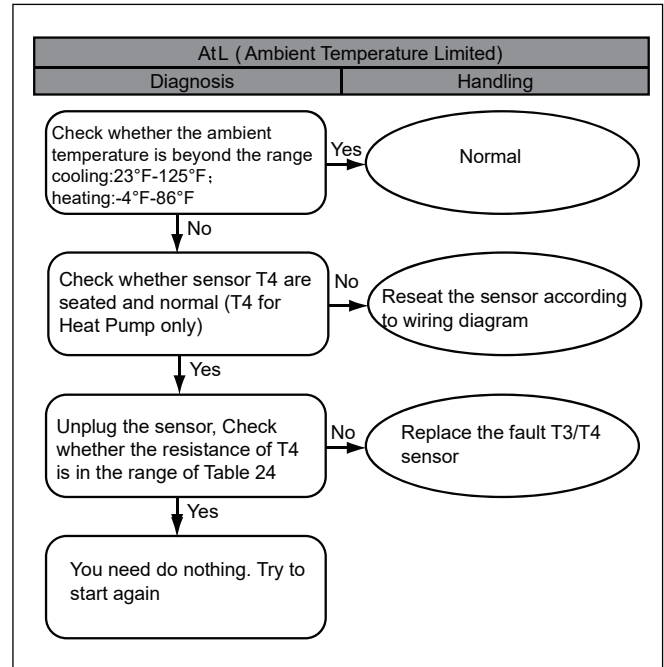


Figure 9-19

| 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                         |                           | <div style="display: flex; justify-content: space-between; text-align: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">POWER SUPPLY OR HIGH VOLTAGE WIRING<br/>WHAT TO CHECK MODE</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">LOW VOLTAGE WIRING OR THERMOSTAT</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">CONTROL BOARD OR WIRING</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">INEFFICIENT COMP.</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">I.D.FUSE</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">RES. ID AIRFLOW</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">RES. O.D AIRFLOW</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">INEFFICIENT O.D FAN</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">REF. OVERCHARGE</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">REF. UNDERCHARGE</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">REF. OIL RESTRICTIONS</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">EEV OR COIL DEF.</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">REV. OR COIL DEF.</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">SERVICE VALVE LEAKING</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">PT SENSOR DEF.</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">T3 SENSOR DEF.</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">T4 SENSOR DEF.</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">T5 SENSOR DEF.</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">T7 SENSOR DEF.</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">HPS SENSOR DEF.</div> </div> |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---------------------------------------|---------------------------|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|                                       |                           | C  | P |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 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 |   |
| Display is not normal when running    | C                         |  |   |   |   | P |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|                                       | H                         |  |   |   |   | P |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Cool when heating requirement         | H                         |  | P |   |   |   |   |   |   |   |   |   |   |   | S |   |   |   |   |   |
|                                       | 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 |   |   | S | P |   |   |   |   |   |   |   |
|                                       |                           | H  |   |   |   |   |   | P |   |   |   | S | P |   |   |   |   |   |   |   |
|                                       | P5                        | C  |   |   |   |   |   | P | P |   |   | S | S |   |   |   |   | S |   |   |
|                                       |                           | H  |   |   |   |   |   |   |   |   |   | S | S |   |   |   |   |   |   |   |
|                                       | P0                        | C  |   |   |   |   |   | P | P | S |   |   |   |   |   |   |   |   |   |   |
|                                       |                           | H  |   |   |   |   |   | P | P | S |   |   |   |   |   |   |   |   |   |   |
|                                       | P4                        | C  |   |   |   |   |   |   |   |   | P |   |   |   |   |   |   |   | S |   |
|                                       |                           | H  |   |   |   |   |   |   |   |   | P |   |   | S |   |   |   |   | S |   |
| PH                                    | C                         |  |   |   |   |   |   |   |   |   | P |   |   |   |   |   | S | S |   |   |
|                                       | H                         |  |   |   |   |   |   |   |   |   | P |   | P |   |   |   |   | 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 |   |   |   |   |   |   |   |   |   |   |
| 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            |
| <b>ARI COOLING PERFORMANCE</b>           |              |              |
| ARI net capacity (Btu) <sup>1</sup>      | 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          |
| <b>ARI HEATING PERFORMANCE</b>           |              |              |
| 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      |
| <b>DIMENSIONS (Inches)</b>               |              |              |
| Length                                   | 51-9/16      | 50-11/16     |
| Width                                    | 44-13/16     | 35-1/16      |
| Height                                   | 51-7/16      | 46-13/16     |
| <b>OPERATING WT. (lbs)</b>               |              |              |
| <b>COMPRESSORS</b>                       |              |              |
| Type                                     | Rotary       | Rotary       |
| Quantity                                 | 1            | 1            |
| <b>CONDENSER COIL DATA</b>               |              |              |
| 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   |
| <b>EVAPORATOR COIL DATA</b>              |              |              |
| 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          |
| <b>CONDENSER FAN DATA</b>                |              |              |
| 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         |
| <b>DIRECT DRIVE EVAP FAN DATA</b>        |              |              |
| 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         |
| <b>Electrical Data</b>                   |              |              |
| Voltage-Phase-Hz                         | 208/230-1-60 | 208/230-1-60 |
| Minimum Circuit Ampacity <sup>2</sup>    | 41.9         | 28.7         |
| Max. Overcurrent Protection <sup>3</sup> | 60           | 45           |
| Min / Max Volts                          | 173 / 269    | 173 / 269    |
| <b>Operating Range</b>                   |              |              |
| 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)



