

PTAC

AIR CONDITIONER / HEAT PUMP

SERVICE MANUAL

208/230 VAC Units	265/277 VAC Unit
PTAC49CH3ZX PTAC49HP3ZB PTAC412CH3ZB PTAC412HP3ZB PTAC415CH3ZX PTAC415HP3ZB	PTAC49CH3VX PTAC49HP3VB PTAC412CH3VX PTAC412HP3VB PTAC415CH3VX PTAC415HP3VX

REFRIGERANT	R410A
--------------------	--------------

Table of Contents

1. SAFETY PRECAUTIONS	2
2. SPECIFICATION	3
Specification of 208/230 VAC units.....	3
Specification of 265/277 VAC units.....	4
3. OUTLINE AND INSTALLATION DIMENSIONS	5
4. REFRIGERATION SYSTEM DIAGRAM	6
5. WIRING DIAGRAMS	7
6. PC Board	8
7. INSTALLATION INSTRUCTIONS.....	10
8. FUNCTION AND CONTROL	13
9. TROUBLESHOOTING.....	19
10. APPENDIX: RESSISTANCE TABLE OF SENSORS	22
11. DISASSEMBLY PROCEDURE	24

SAFETY PRECAUTIONS

IMPORTANT

Please Read Before Starting.

This air conditioning system meets strict safety and operating standards. As the installer or service person, it is an important part of your job to install or service the system so that it operates safely and efficiently.

To prevent injury to the user or other people and property damage, the following instructions must be followed.

- Follow each installation or repair step exactly as shown.
- Observe all local, state and national electrical codes.
- Pay close attention to all warning and caution notices given in this manual.

About the pictures:



Warning

Erroneous handling gives a high possibility to induce serious results such as death or heavy injury.



Caution

Erroneous handling may induce serious injury depending on the situation.



Warning

All electric work must be performed by licensed technician, according to local regulations and the instructions given in this manual.

- **Do not supply power to the unit until all wiring and tubing are completed or recommended and checked.**
- **Highly dangerous electrical voltages are used in this system. Carefully refer to the wiring diagram and these instructions when wiring. Improper connections and inadequate grounding can cause accidental injury or death.**
- **Ground the unit following local electrical codes.**
- **Connect all wiring tightly. Loose wiring may cause overheating at connection points and possible fire hazard.**

There is risk of fire, electric shock, explosion, or injury.

Ask your dealer or specialized subcontractor for installation or repair work.

- **Make sure the ceiling/wall is strong enough to hold the unit's weight. The outdoor unit should be installed in a location where air and noise emitted by the unit will not disturb the neighbors.**
- **Properly insulate any tubing run inside a room to prevent "sweating" that can cause dripping and water damage to walls and floors.**
- **The outdoor unit must be installed on stable, level surface, in a place where there is no accumulation of**

snow, leaves or rubbish.

- **The unit should be installed according to the instructions in order to minimize the risk of damage from earthquakes, typhoons or strong winds.**
- **When the refrigerant touches the fire etc, it was decomposed and a poisonous gas is generated.**
- **Use only the specified refrigerant to charge the refrigerant circuit.**
- **Do not mix it with any other refrigerant and do not allow air to remain in the circuit.**
- **Air enclosed in the circuit can cause high pressure resulting in a rupture and other hazards.**
- **After completing installation work, make sure that refrigerant gas has not leaked.**
- **The limit density is made not to be exceeded even if the refrigerant leaks by any chance.**
- **Turn the power off at the main power box (mains) before opening the unit to check or repair electrical parts and wiring.**
- **Keep your fingers and clothing away from any moving parts.**
- **Clean up the site after you finish, remembering to check that no metal scraps of bits of wiring have been left inside the unit being serviced.**
- **The unit must be properly earth connected.**



Caution

- **Never install on the place where a combustible gas might leak.** The gas may ignite or explode when the gas leaks and collects in surround of the unit.
- **When the unit is installed at telecommunication centers or hospitals, take a proper provision against noise.**
- **When installing at a watery place, provide an electric leak breaker.**
- **Do not wash the unit with water.**
- **Be very careful about unit transportation.** The unit should not be carried by only one person if it is more than 44 LBS. It occasionally causes the damage of the unit and health to be impaired.
- **Do not touch the heat exchanger fins with your hands.** Doing so may cut your hands.
- **Do not touch the compressor or refrigerant piping without wearing glove on your hands.** Touching directly such part can cause a burn or frostbite as it becomes high or low temperature according to the refrigerant state.
- **Do not operate the air conditioner without the air filter set placed.** Dust may accumulate, and cause a failure.
- **At emergency (if you smell something burning), stop operation and turn the power source switch off.**

TECHNICAL SPECIFICATIONS OF 208/230 UNITS

Model Number	PTAC49CH3ZX	PTAC49HP3ZB	PTAC412CH3ZB	PTAC412HP3ZB	PTAC415CH3ZX	PTAC415HP3ZB
Refrigerant type/charge	R410A / 2.09 lb	R410A / 1.54 lb	R410A / 1.74 lb	R410A / 1.74 lb	R410A / 2.38 lb	R410A / 2.38 lb
Voltage Input (V/PH/Hz)	208-230V/1/60	208-230V/1/60	208-230V/1/60	208-230V/1/60	208-230V/1/60	208-230V/1/60
Operating Temperature Range (Indoor room temp. setting range)	61°F to 86°F	61°F to 86°F	61°F to 86°F	61°F to 86°F	61°F to 86°F	61°F to 86°F
Operating Temperature Range *	55°F to 115°F	55°F to 115°F	55°F to 115°F	55°F to 115°F	55°F to 115°F	55°F to 115°F
Cooling Capacity (Btu/Hr)	9000	9000	12000	12000	15000	14500
Heating Capacity (Btu/Hr)	N/A	8100	N/A	10700	N/A	13300
Electric Heating (Watts)	3000	3000	3000	3000	3000	3000
Dehumidification (Pints/Hour)	1.71	2.11	2.75	2.75	4.65	3.17
EER (BTU/h.W) 208/230VAC	11.3	11.3	10.7	10.7	9.8	9.8
COP	N/A	3.3	N/A	3.1	N/A	3.0
Compressor Type	mitsubishi	RECHI	RECHI	RECHI	PANASONIC	PANASONIC
AIR FLOW (H/M/L) CFM	312 / 294 / 277	330 / 312 / 294	341 / 324 / 306	341 / 324 / 306	341 / 324 / 306	341 / 324 / 306
Rated Input Cool (Watts)	800	795	1120	1120	1530	1480
Rated Input Heat (Watts)	N/A	715	N/A	1010	N/A	1300
Rated Current Cool (compressor and fan in cool mode)	5A	3.7A	7.6A	7.9A	10.5A	6.7A
Rated Current Heat (compressor and fan in heat)	N/A	3.4A	N/A	5.7A	N/A	6.1A
Electric Heat Current (electric heat and fan) (This is also "Unit Full Load")	208VAC - 14.7A 230VAC - 13.7A	208VAC - 14.7A 230VAC - 13.7A	208VAC - 14.7A 230VAC - 13.7A	208VAC - 14.7A 230VAC - 13.7A	208VAC - 14.7A 230VAC - 13.7A	208VAC - 14.7A 230VAC - 13.7A
Breaker Min. Size	20A (3KW)	20A (3KW)	20A (3KW)	20A (3KW)	20A (3KW)	20A (3KW)
Sound Pressure Level Max (dBa)	51 (Indoor) 62 (Outdoor)	51 (Indoor) 61 (Outdoor)	54 (Indoor) 66 (Outdoor)	54 (Indoor) 66 (Outdoor)	53 (Indoor) 65 (Outdoor)	53 (Indoor) 65 (Outdoor)
Coil Type	Aluminum fin Copper Tube	Aluminum fin Copper Tube	Aluminum fin Copper Tube	Aluminum fin Copper Tube	Aluminum fin Copper Tube	Aluminum fin Copper Tube
Unit Dimensions (W X H X D)	42.1" x 16" x 21.5"	42.1" x 16" x 21.5"	42.1" x 16" x 21.5"	42.1" x 16" x 21.5"	42.1" x 16" x 21.5"	42.1" x 16" x 21.5"
Package Dimensions (L X W X H)	44.9" x 25.3" x 18.1"	44.9" x 25.3" x 18.1"	44.9" x 25.3" x 18.1"	44.9" x 25.3" x 18.1"	44.9" x 25.3" x 18.1"	44.9" x 25.3" x 18.1"
Net Wt. (lbs.)	111	108	113	113	119	119
Ship Wt. (lbs.)	131	128	133	133	139	143
Certifications	UL / CSA / AHRI	UL / CSA / AHRI	UL / CSA / AHRI	UL / CSA / AHRI	UL / CSA / AHRI	UL / CSA / AHRI
Max. High Side Pressure (PSIG)	580.2	580.2	623.7	623.7	580.2	623.7
Max. Low Side Pressure (PSIG)	304.2	304.2	362.6	362.6	304.2	362.6
Optional Power Cord Part Numbers	2KWPC, 3KWPC	2KWPC, 3KWPC	2KWPC, 3KWPC, 5KWPC	2KWPC, 3KWPC, 5KWPC	2KWPC, 3KWPC, 5KWPC	2KWPC, 3KWPC, 5KWPC
Electric Heat Current for 2KWPC	8.9 A	8.9 A	8.9 A	8.9 A	8.9 A	8.9 A
Breaker Min. Size for 2KWPC	15A	15A	15A	15A	15A	15A
Electric Heat Current for 5KWPC	N/A	N/A	22A	22A	22A	22A
Breaker Min. Size for 5KWPC	N/A	N/A	30A	30A	30A	30A

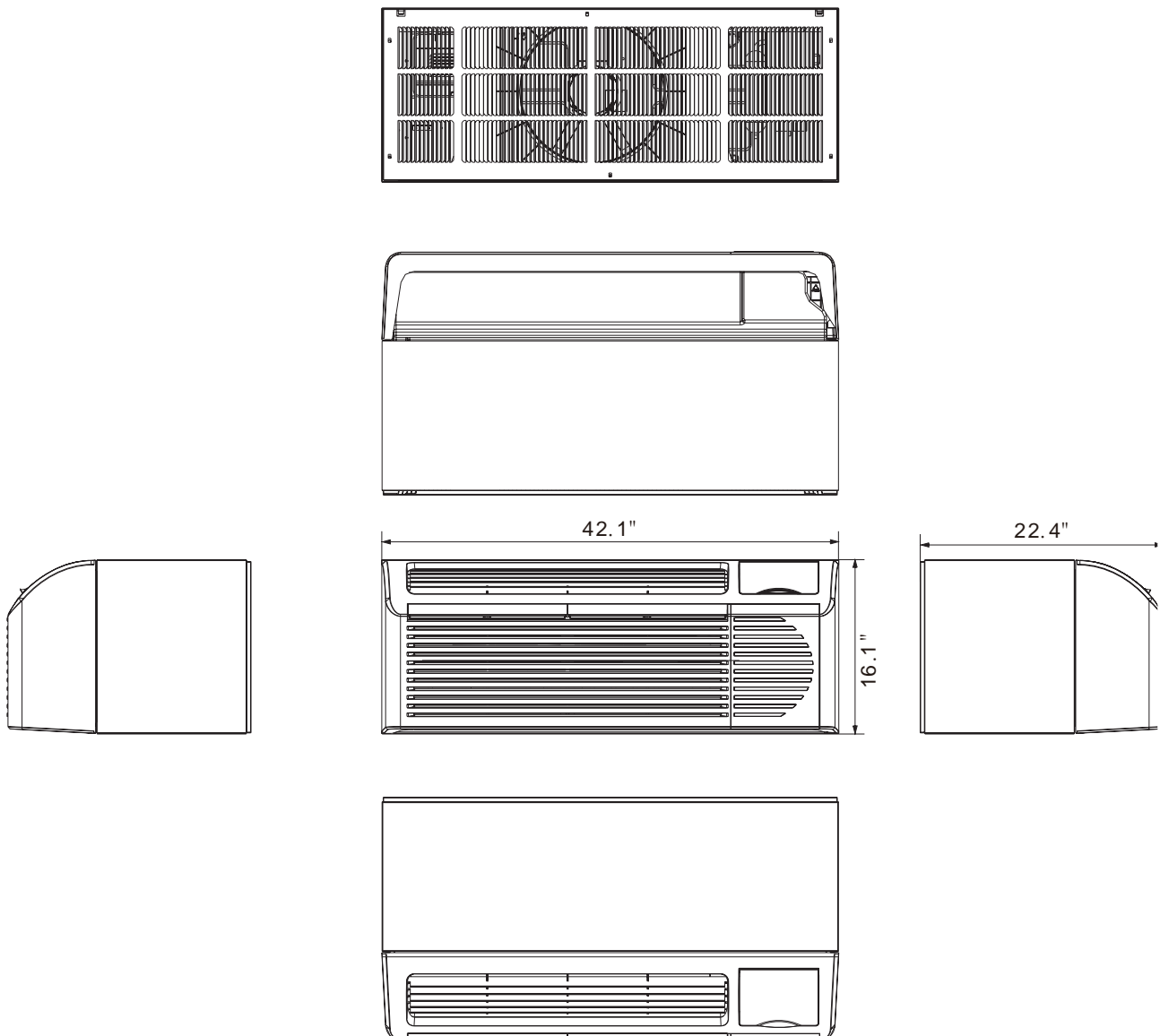
Note: * Operating Temperature Range (outdoor), the outdoor temperature at which the unit operates normally. If the outdoor temperature is out of this range the unit can still operate but error codes or protections may occur. All specifications given at 230 VAC.

TECHNICAL SPECIFICATIONS OF 265/277 UNITS

Model Number	PTAC49CH3VX	PTAC49HP3VB	PTAC412CH3VX	PTAC412HP3VB	PTAC415CH3VX	PTAC415HP3VX
Refrigerant type/charge	R410A / 33.27 oz.	R410A / 24.34 oz.	R410A / 35.98 oz.	R410A / 26.8 oz.	R410A / 40.21 oz.	R410A / 36.33 oz.
Voltage Input (V/PH/Hz)	265-277V / 1/60	265-277V / 1/60	265-277V / 1/60	265-277V / 1/60	265-277V / 1/60	265-277V / 1/60
Operating Temperature Range (Indoor room temp. setting range)	61°F to 86°F	61°F to 86°F	61°F to 86°F	61°F to 86°F	61°F to 86°F	61°F to 86°F
Operating Temperature Range *	55°F to 115°F	55°F to 115°F	55°F to 115°F	55°F to 115°F	55°F to 115°F	55°F to 115°F
Cooling Capacity (Btu/Hr)	9000	9300	12000	12000	15000	14500
Heating Capacity (Btu/Hr)	N/A	8100	N/A	10700	N/A	13300
Electric Heating (Watts)	3000	3000	3000	3000	3000	3000
Dehumidification (Pints/Hour)	1.71	2.11	3.49	2.75	4.65	2.75
EER (BTU/h.W) 208/230VAC	11.3	11.3	10.7	10.7	9.8	9.8
COP	N/A	3.3	N/A	3.1	N/A	3.0
Compressor Type	MITSUBISHI	RECHI	SAMSUNG	RECHI	PANASONIC	PANASONIC
AIR FLOW (H/M/L) CFM	312 / 294 / 277	312 / 294 / 277	341 / 324 / 306	341 / 324 / 306	341 / 324 / 306	341 / 324 / 306
Rated Input Cool (Watts)	800	820	1120	1120	1530	1480
Rated Input Heat (Watts)	N/A	715	N/A	1010	N/A	1300
Rated Current Cool (compressor and fan in cool mode)	3.7A	3.4A	4.8A	4.8A	5.9A	5.8A
Rated Current Heat (compressor and fan in heat)	N/A	2.9A	N/A	4.5A	N/A	5.3A
Electric Heat Current (3kW electric heat and fan) (This is also "Unit Full Load")	13.2A	11.6A	13.5A	11.6A	13.5A	13.5A
Breaker Min. Size	20A (3KW)	20A (3KW)	20A (3KW)	20A (3KW)	20A (3KW)	20A (3KW)
Sound Pressure Level H/M/L (dBa)	50/48/46 (Indoor) 61/59/57 (Outdoor)	52/51/50 (Indoor) 66/65/64 (Outdoor)	52/50/48 (Indoor) 63/61/59 (Outdoor)	54/53/52 (Indoor) 66/65/64 (Outdoor)	52/48/46 (Indoor) 65/61/59 (Outdoor)	56/55/54 (Indoor) 66/65/64 (Outdoor)
Coil Type	Aluminum fin Copper Tube	Aluminum fin Copper Tube	Aluminum fin Copper Tube	Aluminum fin Copper Tube	Aluminum fin Copper Tube	Aluminum fin Copper Tube
Unit Dimensions (W X H X D)	42.1" x 16" x 21.5"	42.1" x 16" x 21.5"	42.1" x 16" x 21.5"	42.1" x 16" x 21.5"	42.1" x 16" x 21.5"	42.1" x 16" x 21.5"
Package Dimensions (W X D X H)	44.9" x 25.3" x 18.1"	45" x 25.4" x 18.5"	44.9" x 25.3" x 18.1"	45" x 25.4" x 18.5"	44.9" x 25.3" x 18.1"	44.9" x 25.3" x 18.1"
Net Wt. (lbs.)	111	108	119	112	119	117
Ship Wt. (lbs.)	131	128	139	132	139	139
Certifications	UL / CSA / AHRI	UL / CSA / AHRI	UL / CSA / AHRI	UL / CSA / AHRI	UL / CSA / AHRI	UL / CSA / AHRI
Design Pressure High Side (PSIG)	500	500	500	500	500	500
Design Pressure Low Side (PSIG)	300	300	300	300	300	300
Optional Power Cord Part Numbers	2KWPC265, 3KWPC265	2KWPC265, 3KWPC265	2KWPC265, 3KWPC265, 5KWPC265	2KWPC265, 3KWPC265, 5KWPC265	2KWPC265, 3KWPC265, 5KWPC265	2KWPC265, 3KWPC265, 5KWPC265
Electric Heat Current for 2KWPC	8.9 A	8.9 A	8.9 A	8.9 A	8.9 A	8.9 A
Breaker Min. Size for 2KWPC	20A	20A	20A	20A	20A	20A
Electric Heat Current for 5KWPC	N/A	N/A	21.5A	21.5A	21.5A	21.5A
Breaker Min. Size for 5KWPC	N/A	N/A	30A	30A	30A	30A

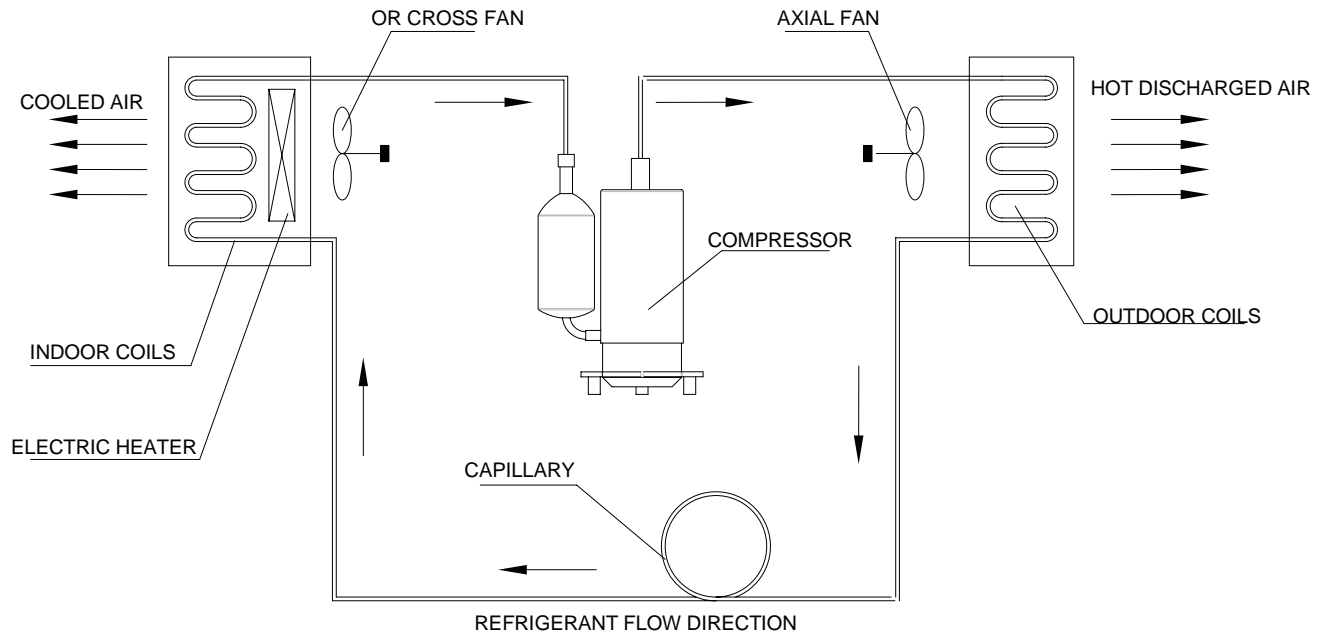
Note: * Operating Temperature Range (outdoor), the outdoor temperature at which the unit operates normally. If the outdoor temperature is out of this range the unit can still operate but error codes or protections may occur.

OUTLINE AND INSTALLATION DIMENSION

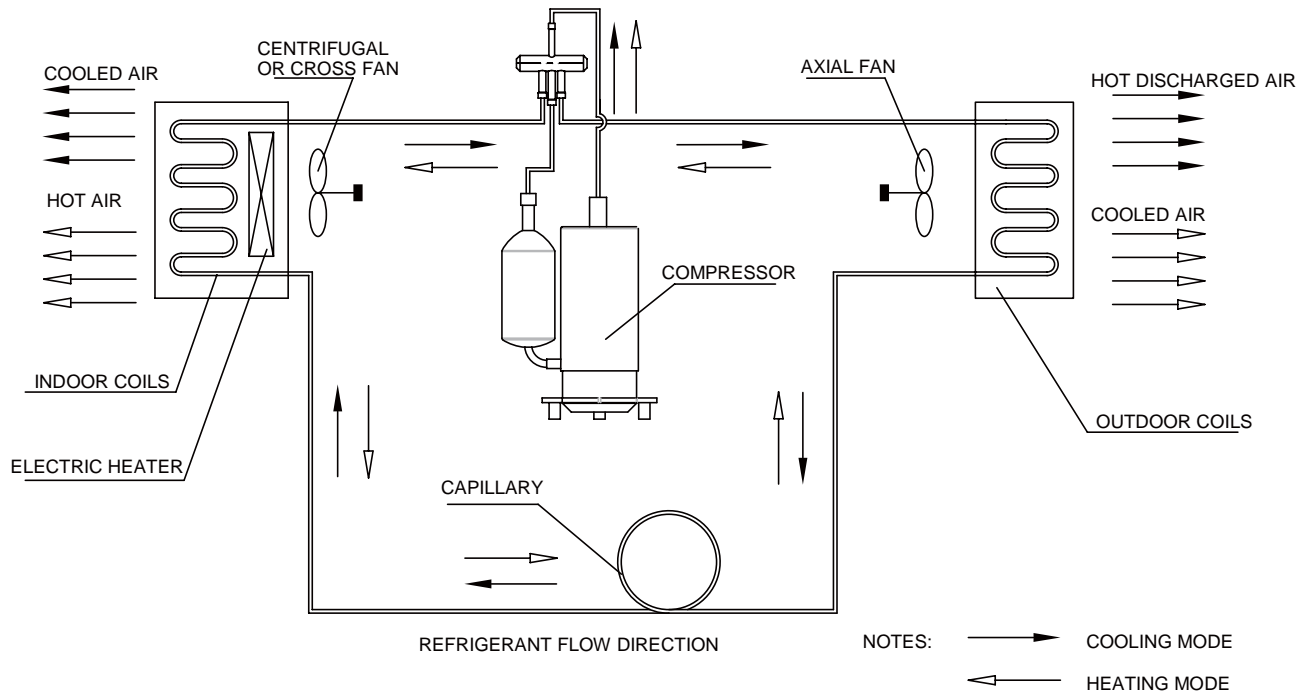


REFRIGERATION SYSTEM DIAGRAM

Model: PTAC49CH3ZX, PTAC49CH3VX, PTAC412CH3ZX, PTAC412CH3VX, PTAC415CH3ZX, PTAC415CH3VX

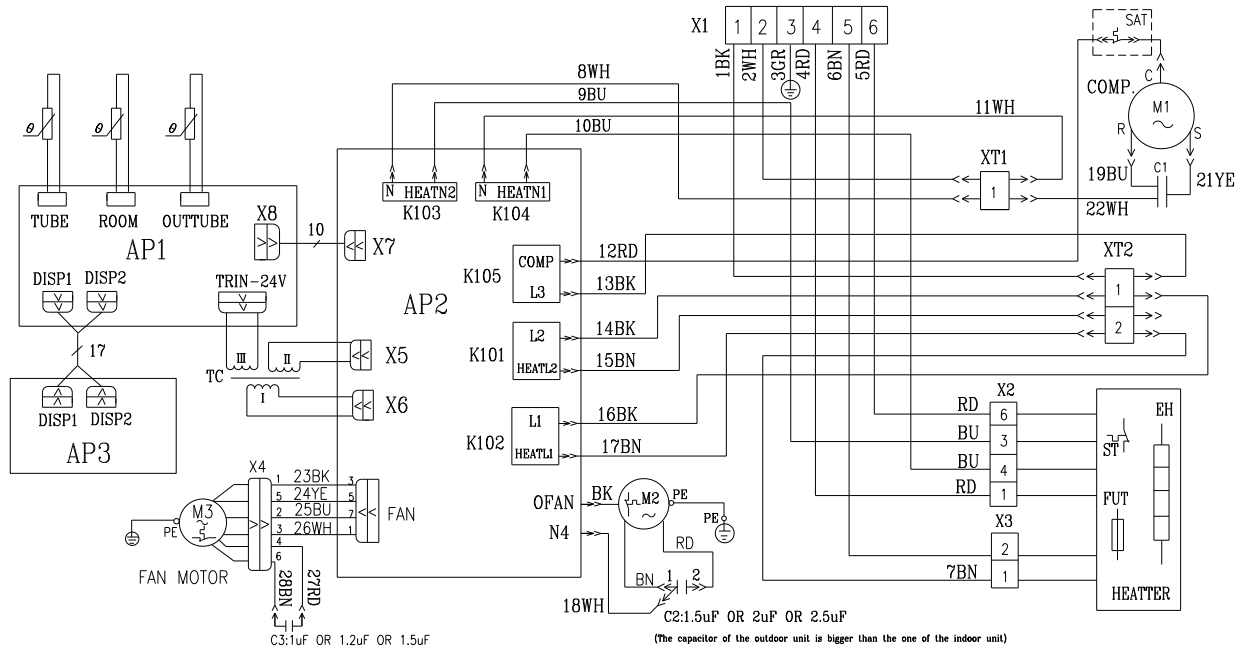


Model: PTAC49HP3ZB, PTAC49HP3VB, PTAC412HP3ZX, PTAC412HP3VB, PTAC415HP3ZB, PTAC415HP3VX

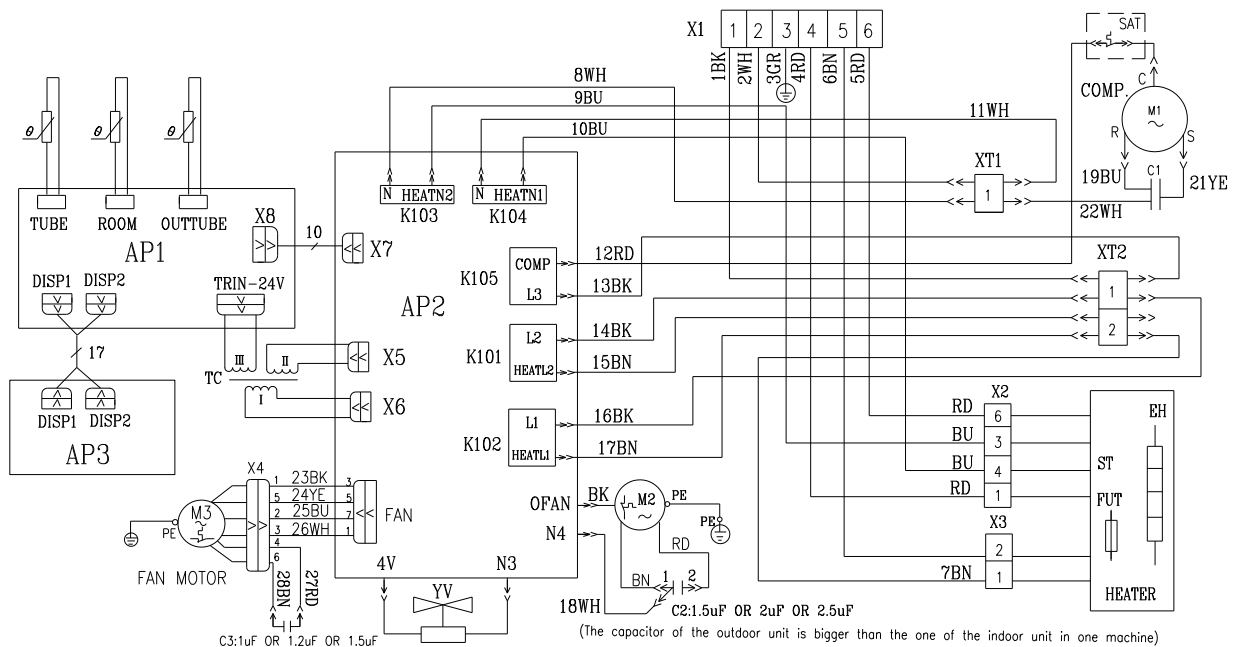


WIRING DIAGRAM

Model: PTAC49CH3ZX, PTAC49CH3VX, PTAC412CH3ZB, PTAC412CH3VX, PTAC415CH3ZX, PTAC415CH3VX



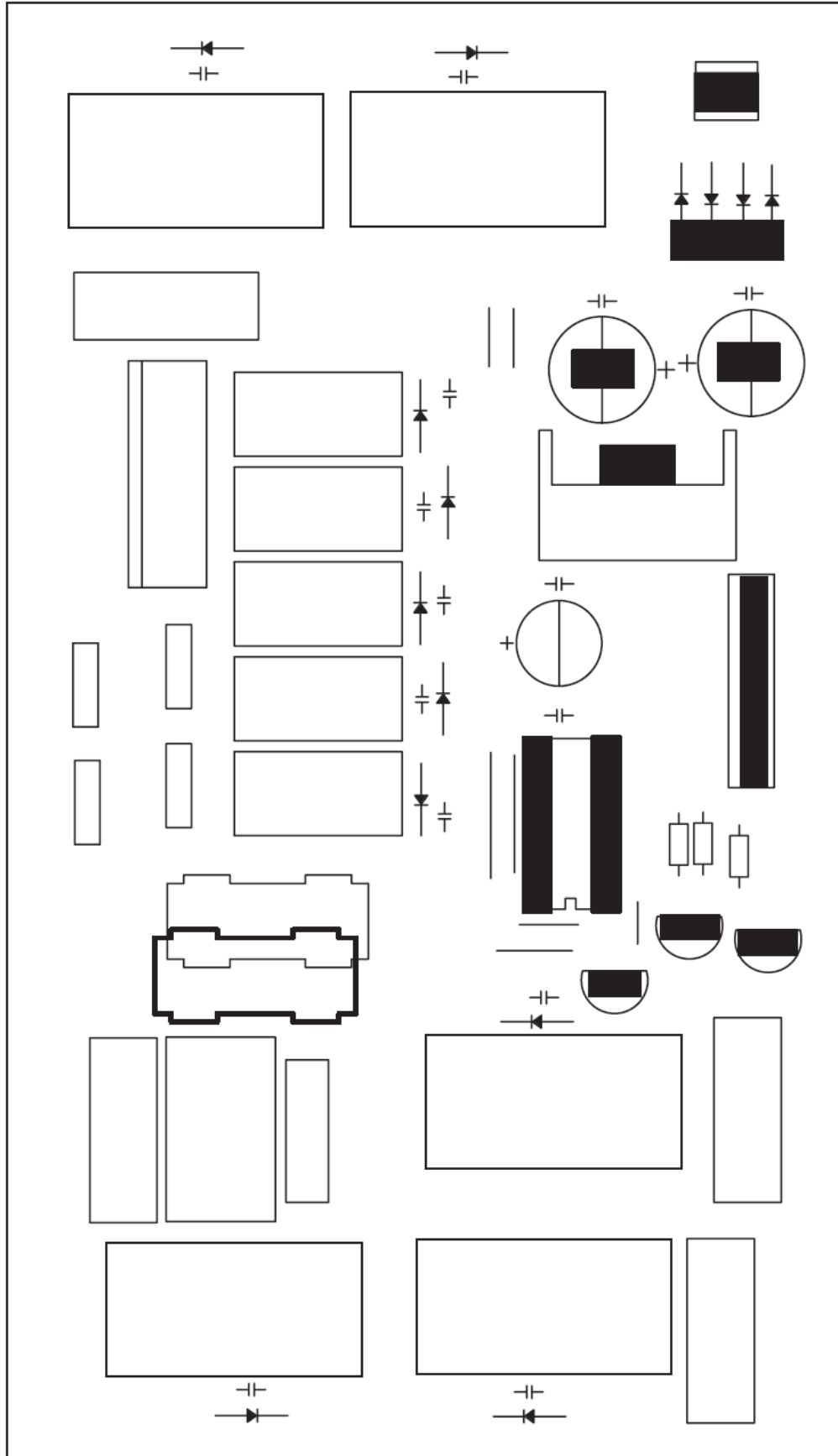
Model: PTAC49HP3ZB, PTAC49HP3VB, PTAC412HP3ZB, PTAC412HP3VB, PTAC415HP3ZB, PTAC415HP3VX



Top View



Bottom View



INSTALLATION INSTRUCTIONS


Proper installation is the responsibility of the installer. Product failure due to improper installation is not covered under the Warranty.

CHASSIS INSTALLATION

Units are shipped without a sleeve. In applications where unit is a replacement, it is recommended that a Sea Breeze sleeve be used.

These units can retrofit General Electric, Amana, Trane, and Friedrich sleeves / grilles (be sure outdoor grille is installed on the sleeve). See Table 1 for details.

For any sleeve retrofit applications, be sure that the foam seals (factory-installed on the tube sheets) provide a good seal between the grille and outdoor coil tube sheet. These foam seals provide a barrier to separate outdoor coil leaving air from mixing with the outdoor incoming air (known as sir recirculation).

CAUTION

UNIT DAMAGE AND/OR OPERATION HAZARD

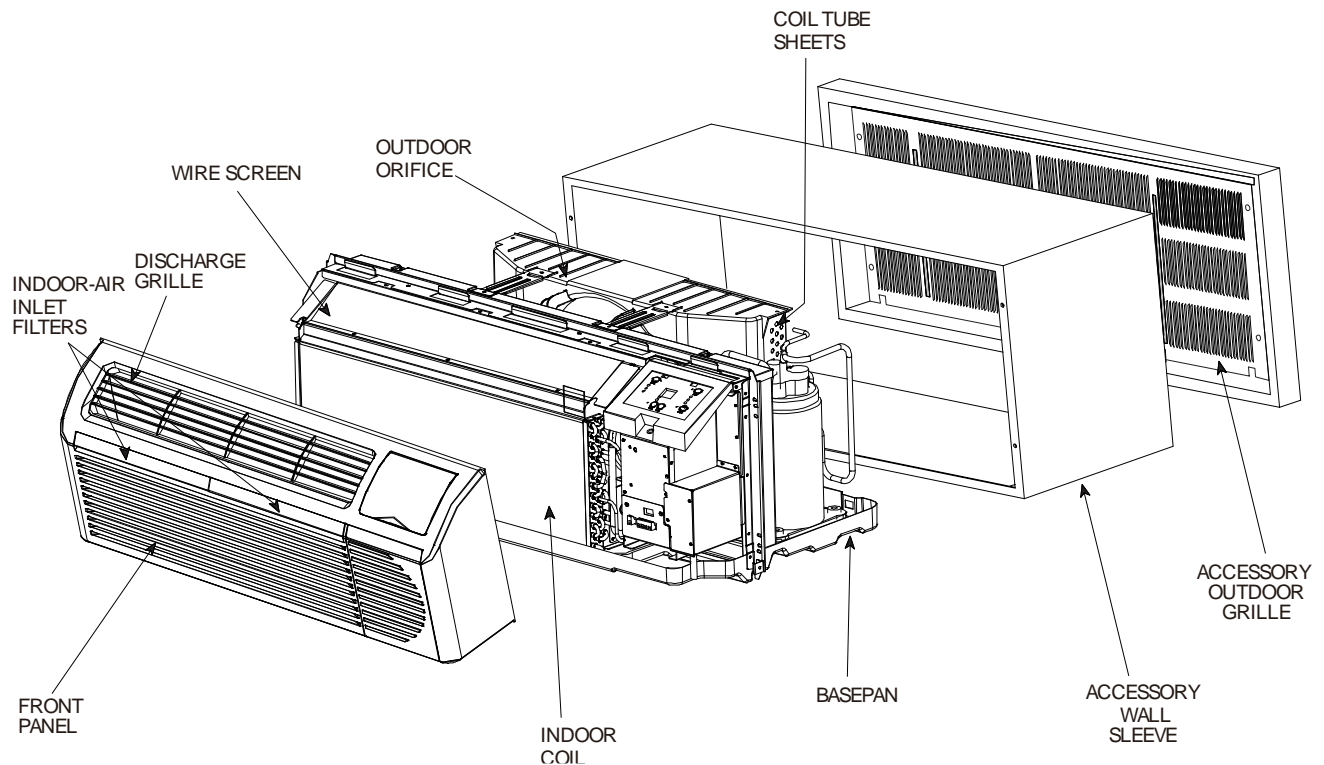
Failure to follow this caution may result in equipment damage or improper operation.

For retrofit applications, foam seals on outdoor coil tube sheets must make a seal between the coil and grille or loss of performance and premature damage to the major components can result.

Table 1 – Retrofit Wall Sleeves


Manufacturer	Wall Sleeve Part Number
General Electric	Metal Sleeve RAB72
	Plastic Sleeve RAB77
Amana	Metal Sleeve WS900B
Trane	Metal Sleeve SLV149
Friedrich	T-Series Metal 11 ^{1/2} - in. Deep Wall Sleeve*
	Standard Depth Wall Sleeve 16 x 42 x 13 ^{3/4} - in. PXWS

* FR - SLEEVE-EXT accessory is required for retrofit into Friedrich (T-Series) wall sleeves.



RETROFIT SLEEVE PREPARATION

IMPORTANT: Inspect wall sleeve thoroughly prior to installation. Manufacturer does not assume responsibility for costs or damages due to defects in sleeve or for improper installation.

	WARNING
ELECTRICAL SHOCK HAZARD	
Failure to follow this warning could result in personal injury or death.	
Disconnect all power to unit to avoid possible electrical shock during installation.	

Remove any existing foam baffles that are installed on competitive outdoor grille, if present. See Fig.1

GE Sleeves Only

GE Metal Wall Sleeve - Remove metal clip on mounting rail located on left, inside bottom, of metal sleeve and discard. See Fig. 2.

GE Plastic Sleeve - Remove bottom seal from plastic sleeve. See Fig. 3.

INSTALLATION OF A CARRIER WALL SLEEVE USING A NON CARRIER GRILLE

This application has become more common due to pre-manufactured windows with built-in grilles or renovations where a Carrier sleeve is used with an existing non-Carrier grille.

Use of a Carrier wall sleeve with a non-Carrier grille requires installation of an Accessory Baffle Kit (see Fig. 4), which ensures a good seal between the unit and exterior grille to prevent air recirculation. Air recirculation is a large contributor to performance loss and premature damage to major components.

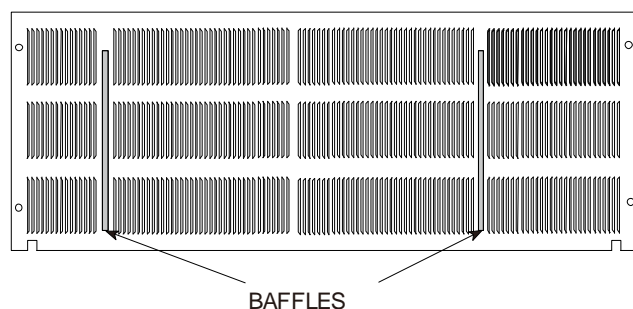


Fig. 1 - Remove Existing Outdoor Grille Baffles on Competitive Grille

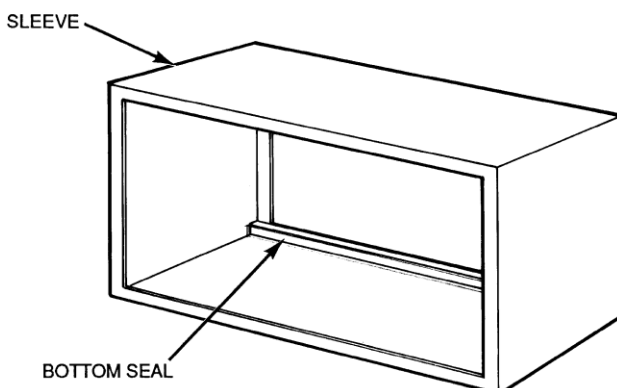
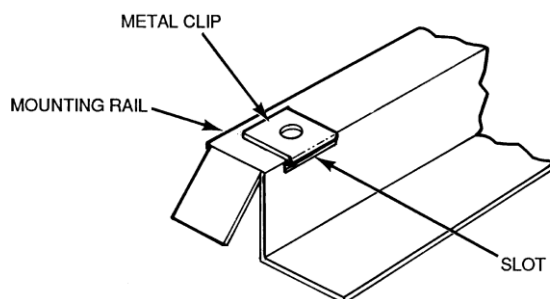


Fig. 3 - Remove Bottom Seal From GE Plastic Sleeve

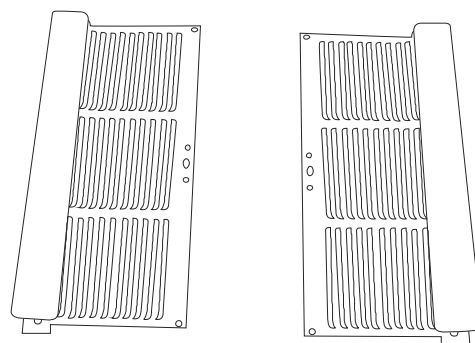



Fig. 4 - Accessory Baffle Kit

Note: Contact with your unit supplier to get the kit and it may be different from the shape shown above.

INSTALL UNIT INTO WALL SLEEVE

1. Carefully remove shipping tape from the front panel and vet door. See Fig.5.
2. Remove shipping screw from the vent door, if present. See Fig.6.
3. Remove front panel. See Fig.7.
4. Lift unit level and slide unit into wall sleeve until foam seal rests firmly against front of wall sleeve.
5. Secure with four screws (supplied) through the unit flange holes. See Fig.8.
6. Reinstall front panel. See Fig.9.



CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage or improper operation.

Failure to remove shipping tape and screw will prevent fresh air vent door from opening and may result in damage to vent door cable.

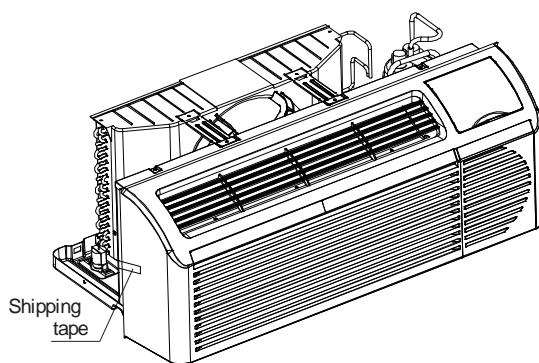


Fig.5. – Shipping Tape Location

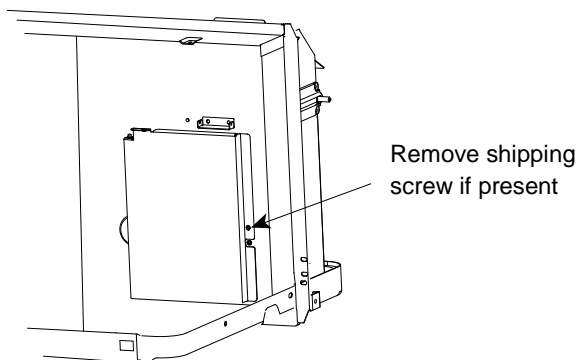
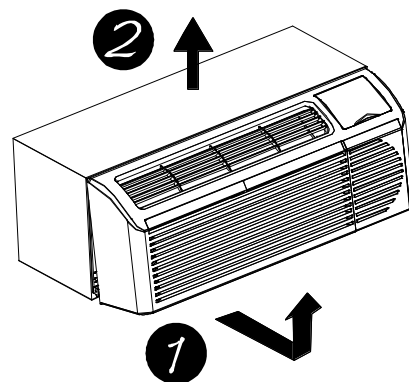


Fig.6. – Shipping Screw Location



Pull out at the bottom to release it from the tabs (1). Then lift up (2).

Fig.7. – Removing Front Panel

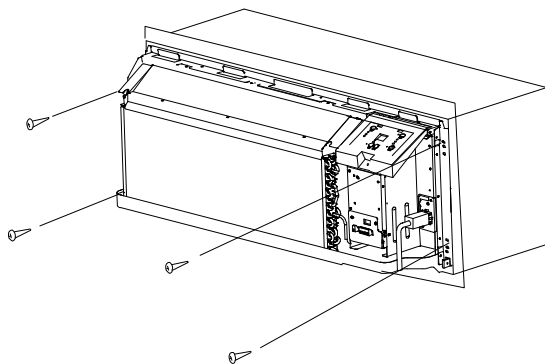
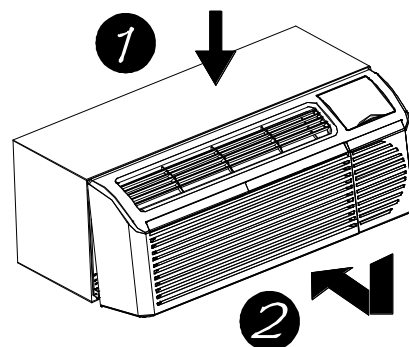


Fig.8. – Securing Unit



Place tabs over top rail (1). Push inward at bottom until panel snaps into place (2).

Fig.9. – Replacing Front Panel

FUNCTION AND CONTROL

1. Temperature Parameter

- Indoor setting temperature (T_{preset})
- Room temperature (T_{amb})

2. System Basic Function

In any circumstances, the compressor will delay 3 minutes for protection once it's started up. Once the compressor is started up, the compressor won't stop with the change of the indoor temperature. While once the compressor is stopped, it can be started up only after 3 minutes delayed. (The compressor can be stopped immediately at the time of mode switchover, turning off the unit, adjusting setting temperature and turning to protection functions.)

1) Cooling Mode

Working conditions and process for cooling:

When $T_{amb} \geq T_{preset} + 2^{\circ}\text{F}(1^{\circ}\text{C})$, the unit is running in cooling mode. Meanwhile, the compressor is running and the fan is running at the setting fan speed.

When $T_{amb} \leq T_{preset} - 2^{\circ}\text{F}(1^{\circ}\text{C})$, the unit turns off. Meanwhile, the compressor will stop, and the fan will run at the setting fan speed.

When $T_{preset} - 2^{\circ}\text{F}(1^{\circ}\text{C}) < T_{amb} < T_{preset} + 2^{\circ}\text{F}(1^{\circ}\text{C})$, the unit keeps previous running status.

* In this mode, the unit displays the setting temperature and the cooling LED is illuminated. The setting temperature range is 60 ~ 90 °F (16 ~ 32 °C)

2) Fan Mode

In this mode, the compressor won't run and the temperature can't be adjusted (UP and DOWN are invalid). The fan can be selected at high, medium and low fan speed. The unit displays ambient temperature (32 ~ 99 °F, when ambient temperature is higher than 99 °F, it will display H1. When ambient temperature is lower than 32 °F, it will display L0), and the fan LED is illuminated.

3) Heating Mode

For cooling only with electric heater units, working conditions and process for heating:

When $T_{amb} \leq T_{preset} - 2^{\circ}\text{F}(1^{\circ}\text{C})$, the unit is running in heating mode. Meanwhile, the electric heater will be started up 3 seconds later than the fan.

When $T_{amb} \geq T_{preset} + 2^{\circ}\text{F}(1^{\circ}\text{C})$, the electric heating will be turned off, and the fan will continue to run until $T_{air\ discharge} \leq 90^{\circ}\text{F}$ and the unit is stopped (the fan will keep run 15 seconds at least). Then the fan will turn to the status that it stops for 10 minutes and runs for 1 minute at low speed periodically. If $T_{amb} \leq T_{preset} - 2^{\circ}\text{F}(1^{\circ}\text{C})$, the unit will quit the circulation.

When $T_{preset} - 2^{\circ}\text{F}(1^{\circ}\text{C}) < T_{amb} < T_{preset} + 2^{\circ}\text{F}(1^{\circ}\text{C})$, the unit keeps previous running status.

* In this mode, the unit displays the setting temperature and heating LED is illuminated. The setting temperature range is 55 ~ 80 °F (13 ~ 27 °C).

For heat pump with electric heater units, working conditions and process for heating:

If the room temperature (T_{amb}) is less than 5°F from set point the compressor will be turned on in the heating function and run until the room temperature is satisfied.

When $T_{amb} \leq T_{preset} - 2^{\circ}\text{F}(1^{\circ}\text{C})$, the unit is running in heating mode. Meanwhile, the compressor will be started up.

When $T_{amb} \geq T_{preset} + 2^{\circ}\text{F}(1^{\circ}\text{C})$, the compressor and the fan will be turned off.

When $T_{preset} - 2^{\circ}\text{F}(1^{\circ}\text{C}) < T_{amb} < T_{preset} + 2^{\circ}\text{F}(1^{\circ}\text{C})$, the unit keeps previous running status.

If the room temperature (T_{amb}) falls to 5 °F below the set point temperature (T_{preset}) the reverse cycle heat will be shut off and the electric strip heat is turned on for one cycle until heating set point is satisfied.

* In this mode, the electric strip heaters and the compressor will not operate simultaneously.

The unit displays the setting temperature and heating LED is illuminated. The setting temperature range is

55 ~ 80 °F (13 ~ 27 °C).

4) OFF Mode

If the OFF mode is selected, all the display will be closed except the power indicator and all the output are invalid. (Except the low temperature resistant protection)

If the UP or Down button is pressed, the unit display will extinguish after it displays the ambient temperature for 15 seconds and the indoor indicator will also go out after illuminated 15 seconds. By repressing the UP and DOWN button in the process of displaying the ambient temperature, 15 second will be calculated again.

5) Low Temperature Resistant Protection

This is valid in OFF, cooling and fan mode.

Entry condition: if the dip switch 1 is on "UP" position, and the room temperature is lower than 40 °F for 5 seconds continuously, the low temperature resistant protection will be activated.

Quit condition: When the room temperature raises more than 50 °F, the low temperature resistant protection will be deactivated.

During the low temperature resistant protection, the unit displays "FP" and the running LED is in green color (including the OFF status). During this period, the unit won't be controlled by the wall thermostat and it will ignore the signal from the wall thermostat.

6) Open circuit and short circuit of temperature sensor

If the temperature sensor is open circuit or short circuit, the error code displays when the unit is turning on. If the failure of the temperature sensor is detected, only the indoor fan will keep running in Cooling and Fan mode.

If the failure of the temperature sensor is detected in Heating mode, the indoor fan will blow the residual heat for 6 seconds and then turns off. Once the fan is stopped, it cannot be started up again. If the failure of the temperature sensor is detected during the residual heat blowing, the fan will be stopped after blowing 1 minute later.

3. Buttons and Display

1) Buttons

There are ON/OFF, UP, DOWN, MODE and FAN SPEED five buttons in all.

- a) In the OFF status, press the ON/OFF button to turn on the unit. In OFF mode, if press the UP or DOWN button, the display will be extinguished after the room temperature shows 15 seconds.
Pressing the MODE button in the OFF status, the previous mode will be activated and the running LED will be illuminated in green.
- b) In the ON status, all buttons are in valid.
 - i) ON/OFF: Pressing this button, the unit can be switched between ON and OFF mode.
 - ii) MODE: Pressing this button, the unit can be switched among cooling, fan and heating made circularly.
 - iii) FAN SPEED: In the ON status, the fan speed can be selected to high, medium and low by pressing this button.
 - iv) UP and DOWN: To adjust the setting temperature by pressing these two buttons.

2) Digital display and LED display

There are 11 LEDs which are HI, MED, LO, COOL, FAN, HEAT, ON/OFF, SETPOINT (setting temperature), INDOOR (room temperature), ON/OFF and STATUS (This LED is on the PC board).

- a) Mode LED: when the unit is running in a certain kind of mode, the corresponding LED is illuminated.
- b) ON/OFF LED: The LED is green when the unit is running. The LED is red when the unit is turning off.
- c) Fan speed LED: When the unit is running at high, medium or low fan speed, the corresponding LED is illuminated.
- d) The digital display
 - i) In cooling and heating mode, it displays the setting temperature. In fan mode, it displays the room temperature.

- ii) Error Codes: When the unit is energized, the STATUS LED illuminates. If there is any malfunction or protection, the STATUS LED will blink with the Error code.
- When the unit is in the OFF status, there is not an error code showing (except the low temperature resistant protection), and the protections - 6, 7, 8 in the following table will be illuminated. If there are multiple protections or failure, it activates with the priority which is decreasing from 1 to 8.

1	Room temp. sensor open/short	Digital display 'F1', with STATUS light flash
2	Indoor coil sensor open or short	Digital display 'F2', with STATUS light flash
3	Outdoor coil sensor open/short	Digital display 'F4', with STATUS light flash
4	Freeze Guard protection	Digital display 'FP', with STATUS light flash
5	Indoor coil high temp. protection	STATU LED flash 8 times and off 3 sec circularly
6	Outdoor coil high temp. protection	STATU LED flash 6 times and off 3 sec circularly
7	Indoor coil freeze protection	STATU LED flash 5 times and off 3 sec circularly
8	Defrost (heat pump type)	STATU LED flash 7 times and off 3 sec circularly
9	Thermostat wiring error	STATU LED flash 9 times and off 3 sec circularly

4. Especial Functions

1) Energy Management Input (Front Desk Control)

“EM”: It is used for energy management input. When the terminal 24 VAC is connected, the unit will be turned off and the unit is in OFF mode.

The control panel or thermostat is invalid at this time. If there is no signal (0 VAC), the unit can be operated by the control panel or thermostat. The wall thermostat is ignored when the unit is turned off by EM, and it needs 3 seconds to detect the signal from the wall thermostat after the unit is turned on by EM. (24 VAC signal range is 18~28 VAC, 0 VAC signal range is 0~5 VAC).

2) Configuration – Easy for hotel personnel to repair (7 dip switches, the configuration is valid only after the unit is power off).

a) EL- HEAT ONLY (only electric heating; valid in wall thermostat mode)

ON – only electric heating. OFF – normal heating mode. The default setting is OFF.

This function is only applicable to HEAT PUMP.

b) REMOTE (wall thermostat)

ON – wall thermostat is valid. OFF – control panel is valid. The default setting is OFF.

c) FAN CYCLE FOR HEAT (invalid in remote control mode)

ON – fan runs continuously. OFF – fan will be stopped when room temperature is satisfied. The default setting is OFF.

(It follows the operation on the wall thermostat when the wall thermostat is connected).

d) FAN CYCLE FOR COOL (invalid in remote control mode)

ON – fan will be stopped when room temperature is satisfied. OFF – fan runs continuously. The default setting is OFF.

(It follows the operation on the wall thermostat when the wall thermostat is connected).

e) SETPOINT (SETPOINT1, SETPOINT 2) (invalid in wall thermostat mode)

OFF OFF – (61~86 °F); ON OFF - (63~80 °F); OFF ON - (65~78 °F); ON ON - (68~75 °F); The default setting is OFF OFF (61~86 °F).

If the setting temperature exceeds the setpoint range, the unit always displays 61~86 °F. The actual working temperature range follows the configuration above.

- f) LOW TEMPERATURE RESISTANT PROTECTION (valid in wall thermostat mode)
ON – invalid. OFF – valid. The default setting is OFF.
- 3) Configuration – Do not need hotel maintenance personnel to control (configuration is valid after B dial-up is energized, and the configuration is invalid after A dial-up is energized).
- a) Heat pump and Heat Cool units for selection. (Heat Pump is electric heating + heat pump; Heat Cool is electric heating + cooling only) Heat pump - ON; Heat cool – OFF.
Heat pump units should be equipped with Heat pump type wall thermostat. Heat Cool units should be equipped with Heat Cool type wall thermostat.
- b) Neglect for time delay (TIMER RESET)
When the dial-up is activated for once (from OFF to ON, or from ON to OFF), it will cancel all the current delay timer (once) (for example, the compressors minimum stop time, compressors minimum running time, electric heating minimum stop time). After validation, if the dial-up has no action, all the delay will resume normal. The exact delay time is as below:
Electric heating minimum OFF time-----1s
Compressor minimum stop time-----9s
Compressor minimum running time-----9s
Four-way valve delays for 2 minutes-----6s (available when the compressor is required)
- 4) Configuration mode
After the unit is turned on for 30 seconds, press the fan speed button and the COOLER button for 5 seconds, the configuration mode will be started up. After turning to the configuration mode, if adjusting the temperature offset by buttons to turn to switching condition, the load will be activated 3 seconds later. If turning to switching condition due to the change of the ambient temperature, it can be activated only after quitting the configuration mode.
In the configuration mode, the five configuration modes as below can be selected by FAN SPEED button.
Mode one: Fahrenheit /Centigrade display mode
Fahrenheit and Centigrade display mode can be switched by pressing UP or Down button.
F indicates Fahrenheit display mode; C indicates Centigrade display mode
Mode two: Adjusting mode for cooling temperature offset.
UP button can increase offset temperature 1 °F(or °C). DOWN button can decrease offset temperature 1 °F(or °C).
The room temperature offset adjusting range is -6 to +6°F (-3 to +3 °C) (cooling LED is illuminated).
Mode three: Adjusting mode for heating temperature offset
UP button can increase offset temperature 1°F(or °C). DOWN button can decrease offset temperature 1 °F(or °C).
The room temperature offset adjusting range is -6 to +6°F (-3 to +3 °C) (heating LED is illuminated).
The temperature offset is default 0 in cooling and heating mode. They can allocate different offset in cooling and heating mode respectively. The offset cannot be adjusted in fan mode.
Mode four: Display switchover between setting temperature and ambient temperature in heating and cooling mode;
Press the UP button or DOWN button to switch the setting temperature and room temperature displaying;
Setting temperature displaying: the digital indicator displays SP. After quitting configuration mode, the heating mode and the cooling mode display the set temperature constantly;
Room temperature displaying: the digital indicator displays AA. After quitting the configuration mode, the heating mode and the cooling mode display the ambient room temperature. For below circumstances, it displays set temperature for 10 seconds and then turns to display room temperature.

(Note: if room temperature displaying is set, the unit is in cooling mode or heating mode, timer will be displayed for 5 seconds, then turn to display set temperature for 5s and then turn to display ambient temperature.)

- a) Press mode button
- b) Re-energized after power failure
- c) Restart the unit
- d) Turn on the unit after EM turn off unite. Adjust the set temperature by UP or Down button

Method for quitting configuration mode: Pressing the mode button or wait for 30 seconds without any operation.

5) Timer (same as "Neglect for time delay" on page 16)

Hold the UP and DOWN buttons for 3 seconds simultaneously, it will weaken all recent running delay timer (once). (It's valid only during the compressor delay or electric heating mini stop time or compressor minimum running time)

6) Memory Function

The unit will restart in previous mode and setting when the unit re-energized from a power failure.

Power-off memory: running mode before power failure, setting fan speed, setting temperature, compressor's minimum stop time (T), Fahrenheit and Centigrade display mode, cooling temperature offset, heating temperature offset, room or setting temperature display mode in configuration mode. When there's no memory, it runs at the default mode. The default mode is setting fan and the fans speed to medium and T=0. Fahrenheit displaying and the cooling temperature offset and the heating temperature offset are 0. The default setting temperature is 71 °F and the setting temperature is display in cooling and heating mode.

7) Restore factory settings

In standby and OFF status, after pressing "fan speed"+"UP" for 3s and the digital indicator displays "00" for 3 seconds, it shows that the factory settings has been restored. Meanwhile, the configuration information is default to display Fahrenheit. Heating offset and cooling offset is 0 and the setting temperature is displayed. T value is 0, the fan speed is medium and the setting temperature is 71 °F.

5. Protection Functions

1) Frost Protection Mode (heat pump only)

Entry condition: When the compressor is controlled by wall thermostat in heating mode, and the outdoor tube temperature $\leq 28^{\circ}\text{F}(-2^{\circ}\text{C})$ is over 1 minute continuously, the compressor and outdoor fan will stop running. Then indoor fan is running normally according to the wall thermostat signal. If the heating is required at the moment, then the compressor operation will be replaced by the electric heating.

Quit condition: In the frost protection mode, when the outdoor tube temperature $\geq 40^{\circ}\text{F}(5^{\circ}\text{C})$ is over 10 minutes, it will quit the frost protection mode.

2) High temperature protection for evaporator

Entry condition: When the compressor is controlled by wall thermostat in heating mode, and the indoor tube temperature $\leq 136^{\circ}\text{F}(58^{\circ}\text{C})$ is over 1 minute continuously, the compressor and outdoor fan will stop running and the indoor fan is running normally according to the wall thermostat signal. If the heating is required at the moment, then the compressor operation will be replaced by the electric heating after 15 seconds.

3) Anti-freezing protection for the evaporator

Entry condition: When the compressor is controlled by wall thermostat in heating mode, and the indoor tube temperature $\leq 28^{\circ}\text{F}(-2^{\circ}\text{C})$ is over 1 minute continuously, the compressor and outdoor fan will stop running and the indoor fan is running normally according to the wall thermostat signal. (If the indoor fan stops before the protection, it will be activated and run at medium fan speed.)

Quit condition: In the anti-freezing protection, when the indoor tube temperature $\leq 40^{\circ}\text{F}(5^{\circ}\text{C})$ is over 2 minutes, the system will quit anti-freezing protection.

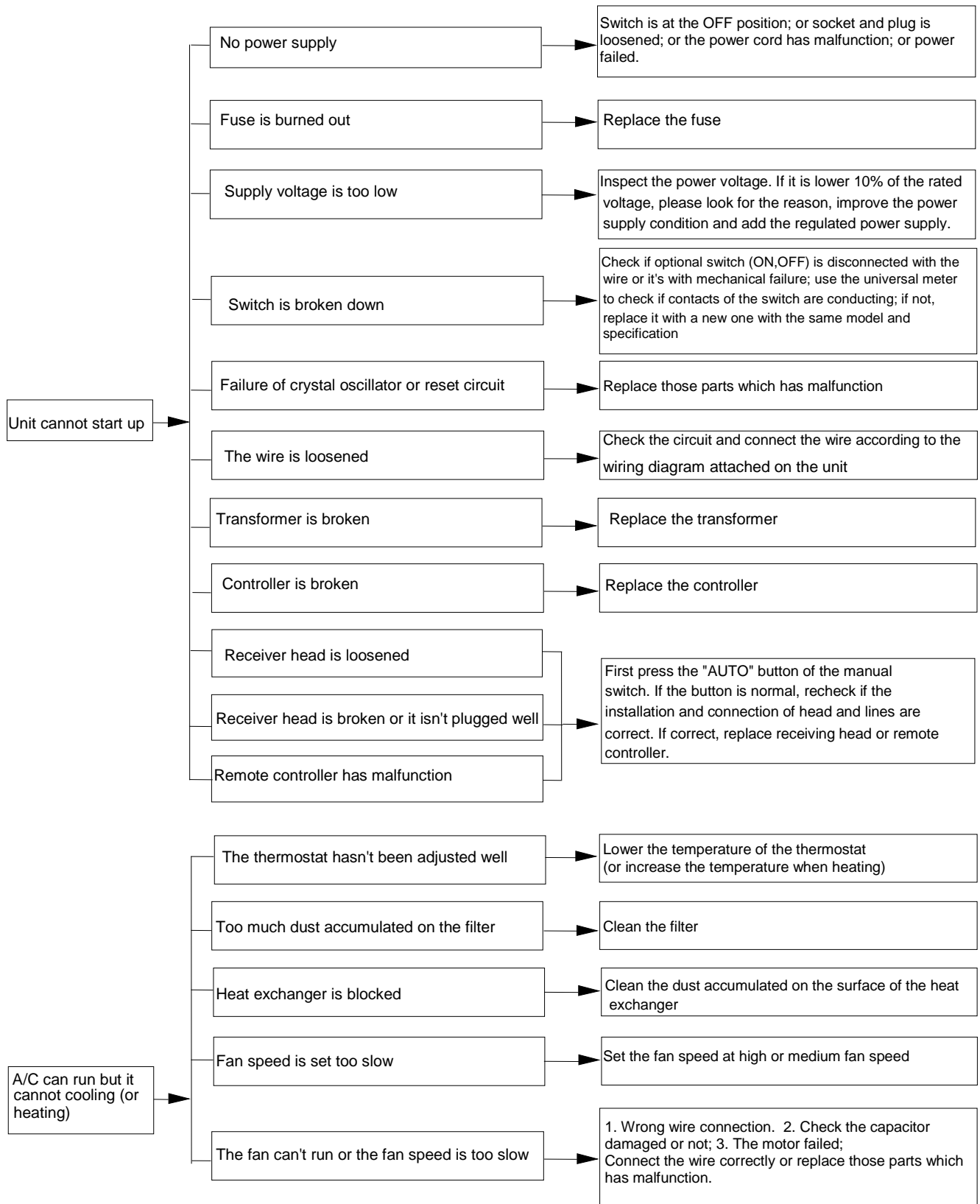
4) High temperature protection for the outdoor condenser

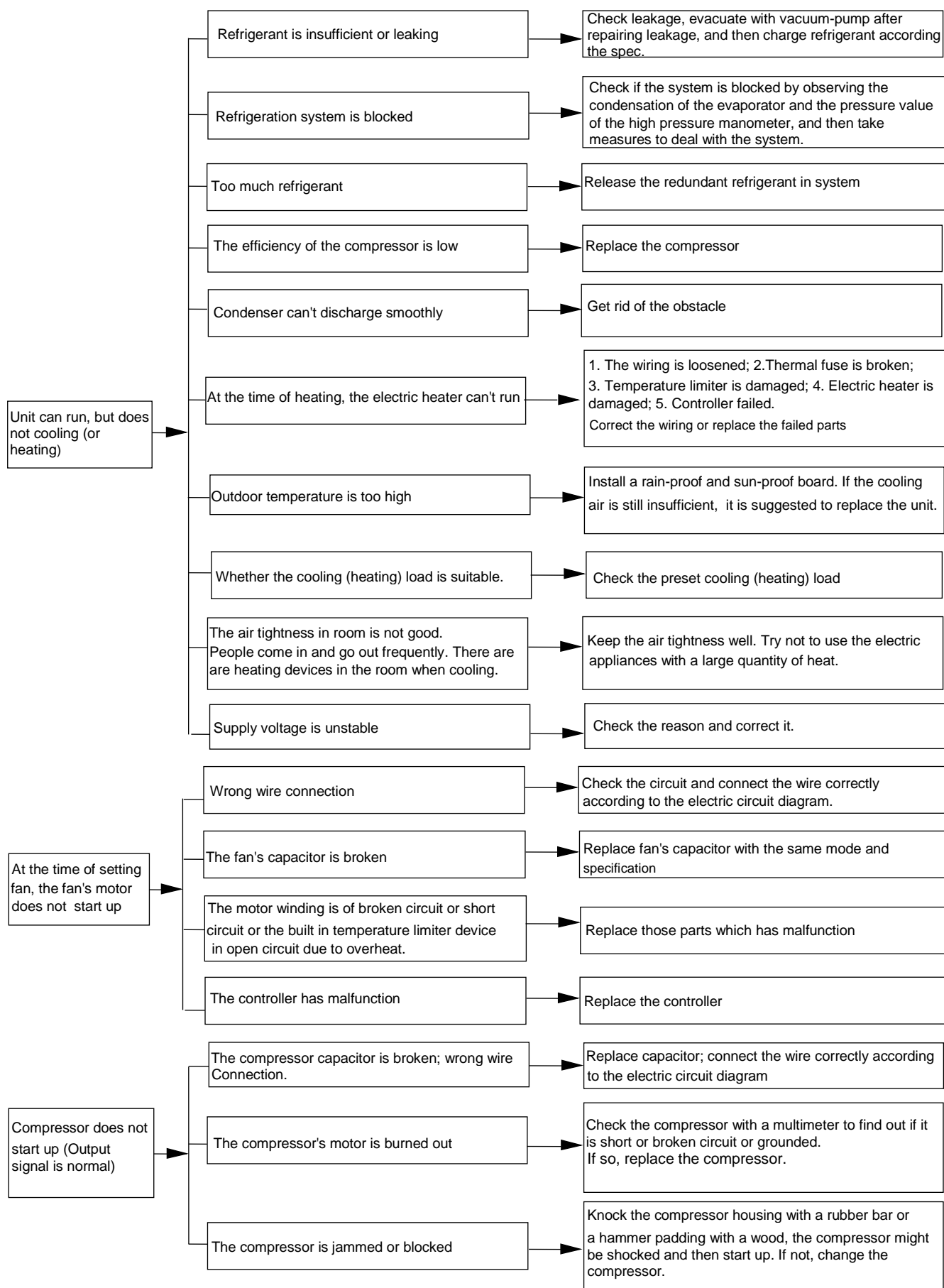
Entry condition: When the compressor is controlled by wall thermostat, and the outdoor tube temperature $\leq 149^{\circ}\text{F}(65^{\circ}\text{C})$ is over 1 minute continuously, then the high temperature protection will be activated. The

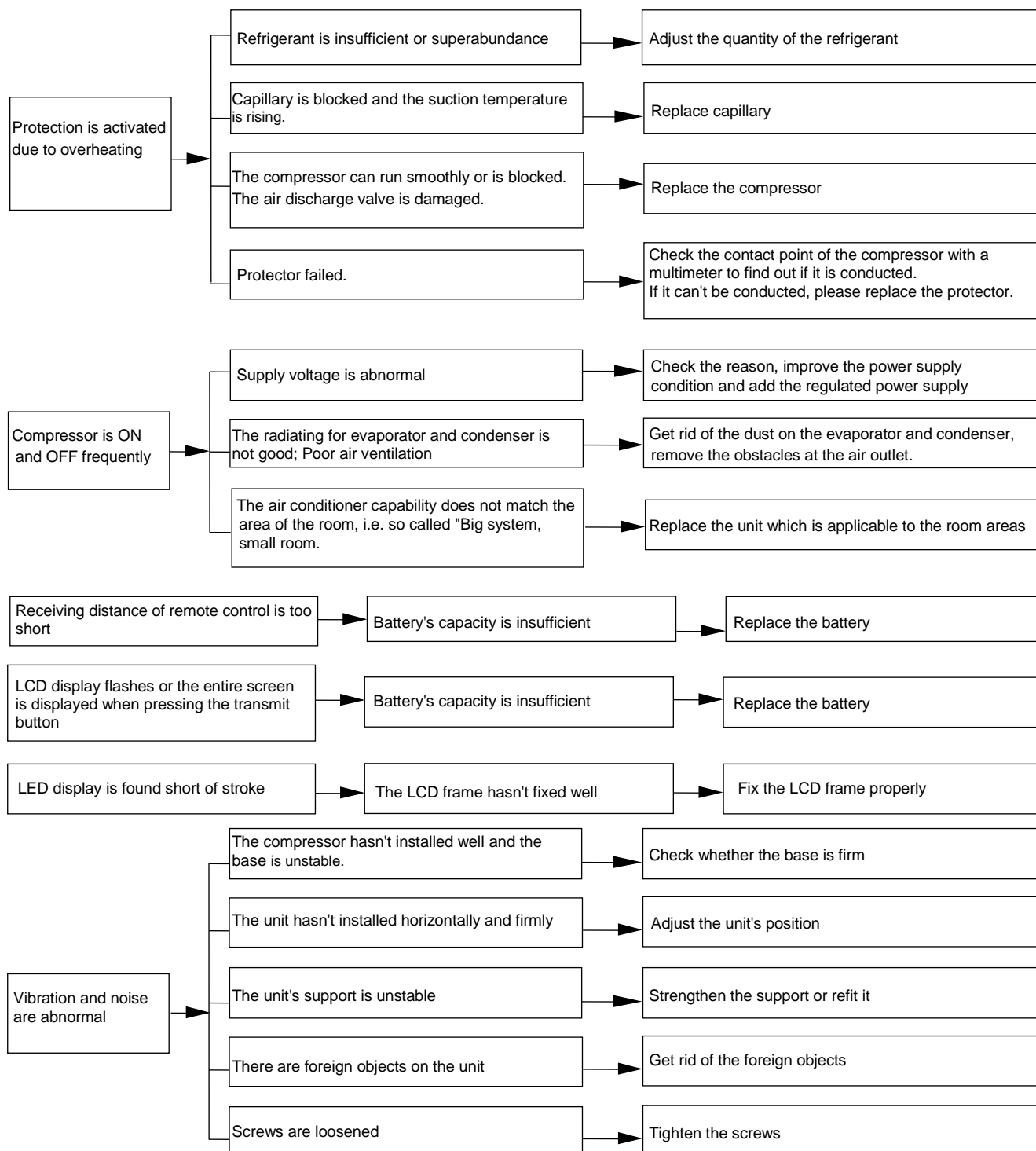
compressor will stop running, outdoor fan will keep running continuously, and the indoor fan is running normally according to the wall thermostat signal.

Quit condition: If the outdoor tube temperature $\leq 131^{\circ}\text{F}(55^{\circ}\text{C})$ is over 2 minutes, this protection will be ended.

TROUBLESHOOTING







Appendix

Appendix 1: Resistance Table of Ambient Temperature Sensor for Indoor and Outdoor Units (15K)							
Temp. (°F)	Resistance (kΩ)	Temp. (°F)	Resistance (kΩ)	Temp. (°F)	Resistance (kΩ)	Temp. (°F)	Resistance (kΩ)
-2.2	138.1	68	18.75	138.2	3.848	208.4	1.071
-0.4	128.6	69.8	17.93	140	3.711	210.2	1.039
1.4	121.6	71.6	17.14	141.8	3.579	212	1.009
3.2	115	73.4	16.39	143.6	3.454	213.8	0.98
5	108.7	75.2	15.68	145.4	3.333	215.6	0.952
6.8	102.9	77	15	147.2	3.217	217.4	0.925
8.6	97.4	78.8	14.36	149	3.105	219.2	0.898
10.4	92.22	80.6	13.74	150.8	2.998	221	0.873
12.2	87.35	82.4	13.16	152.6	2.896	222.8	0.848
14	82.75	84.2	12.6	154.4	2.797	224.6	0.825
15.8	78.43	86	12.07	156.2	2.702	226.4	0.802
17.6	74.35	87.8	11.57	158	2.611	228.2	0.779
19.4	70.5	89.6	11.09	159.8	2.523	230	0.758
21.2	66.88	91.4	10.63	161.6	2.439	231.8	0.737
23	63.46	93.2	10.2	163.4	2.358	233.6	0.717
24.8	60.23	95	9.779	165.2	2.28	235.4	0.697
26.6	57.18	96.8	9.382	167	2.206	237.2	0.678
28.4	54.31	98.6	9.003	168.8	2.133	239	0.66
30.2	51.59	100.4	8.642	170.6	2.064	240.8	0.642
32	49.02	102.2	8.297	172.4	1.997	242.6	0.625
33.8	46.6	104	7.967	174.2	1.933	244.4	0.608
35.6	44.31	105.8	7.653	176	1.871	246.2	0.592
37.4	42.14	107.6	7.352	177.8	1.811	248	0.577
39.2	40.09	109.4	7.065	179.6	1.754	249.8	0.561
41	38.15	111.2	6.791	181.4	1.699	251.6	0.547
42.8	36.32	113	6.529	183.2	1.645	253.4	0.532
44.6	34.58	114.8	6.278	185	1.594	255.2	0.519
46.4	32.94	116.6	6.038	186.8	1.544	257	0.505
48.2	31.38	118.4	5.809	188.6	1.497	258.8	0.492
50	29.9	120.2	5.589	190.4	1.451	260.6	0.48
51.8	28.51	122	5.379	192.2	1.408	262.4	0.467
53.6	27.18	123.8	5.197	194	1.363	264.2	0.456
55.4	25.92	125.6	4.986	195.8	1.322	266	0.444
57.2	24.73	127.4	4.802	197.6	1.282	267.8	0.433
59	23.6	129.2	4.625	199.4	1.244	269.6	0.422
60.8	22.53	131	4.456	201.2	1.207	271.4	0.412
62.6	21.51	132.8	4.294	203	1.171	273.2	0.401
64.4	20.54	134.6	4.139	204.8	1.136	275	0.391
66.2	19.63	136.4	3.99	206.6	1.103	276.8	0.382

Appendix 2: Resistance Table of Outdoor and Indoor Tube Temperature Sensors (20K)							
Temp. (°F)	Resistance (kΩ)		Temp. (°F)	Resistance (kΩ)		Temp. (°F)	Resistance (kΩ)
-2.2	181.4		68	25.01		138.2	5.13
-0.4	171.4		69.8	23.9		140	4.948
1.4	162.1		71.6	22.85		141.8	4.773
3.2	153.3		73.4	21.85		143.6	4.605
5	145		75.2	20.9		145.4	4.443
6.8	137.2		77	20		147.2	4.289
8.6	129.9		78.8	19.14		149	4.14
10.4	123		80.6	18.13		150.8	3.998
12.2	116.5		82.4	17.55		152.6	3.861
14	110.3		84.2	16.8		154.4	3.729
15.8	104.6		86	16.1		156.2	3.603
17.6	99.13		87.8	15.43		158	3.481
19.4	94		89.6	14.79		159.8	3.364
21.2	89.17		91.4	14.18		161.6	3.252
23	84.61		93.2	13.59		163.4	3.144
24.8	80.31		95	13.04		165.2	3.04
26.6	76.24		96.8	12.51		167	2.94
28.4	72.41		98.6	12		168.8	2.844
30.2	68.79		100.4	11.52		170.6	2.752
32	65.37		102.2	11.06		172.4	2.663
33.8	62.13		104	10.62		174.2	2.577
35.6	59.08		105.8	10.2		176	2.495
37.4	56.19		107.6	9.803		177.8	2.415
39.2	53.46		109.4	9.42		179.6	2.339
41	50.87		111.2	9.054		181.4	2.265
42.8	48.42		113	8.705		183.2	2.194
44.6	46.11		114.8	8.37		185	2.125
46.4	43.92		116.6	8.051		186.8	2.059
48.2	41.84		118.4	7.745		188.6	1.996
50	39.87		120.2	7.453		190.4	1.934
51.8	38.01		122	7.173		192.2	1.875
53.6	36.24		123.8	6.905		194	1.818
55.4	34.57		125.6	6.648		195.8	1.736
57.2	32.98		127.4	6.403		197.6	1.71
59	31.47		129.2	6.167		199.4	1.658
60.8	30.04		131	5.942		201.2	1.609
62.6	28.68		132.8	5.726		203	1.561
64.4	27.39		134.6	5.519		204.8	1.515
66.2	26.17		136.4	5.32		206.6	1.47
						208.4	1.427
						210.2	1.386
						212	1.346
						213.8	1.307
						215.6	1.269
						217.4	1.233
						219.2	1.198
						221	1.164
						222.8	1.131
						224.6	1.099
						226.4	1.069
						228.2	1.039
						230	1.01
						231.8	0.983
						233.6	0.956
						235.4	0.93
						237.2	0.904
						239	0.88
						240.8	0.856
						242.6	0.833
						244.4	0.811
						246.2	0.77
						248	0.769
						249.8	0.746
						251.6	0.729
						253.4	0.71
						255.2	0.692
						257	0.674
						258.8	0.658
						260.6	0.64
						262.4	0.623
						264.2	0.607
						266	0.592
						267.8	0.577
						269.6	0.563
						271.4	0.549
						273.2	0.535
						275	0.521
						276.8	0.509

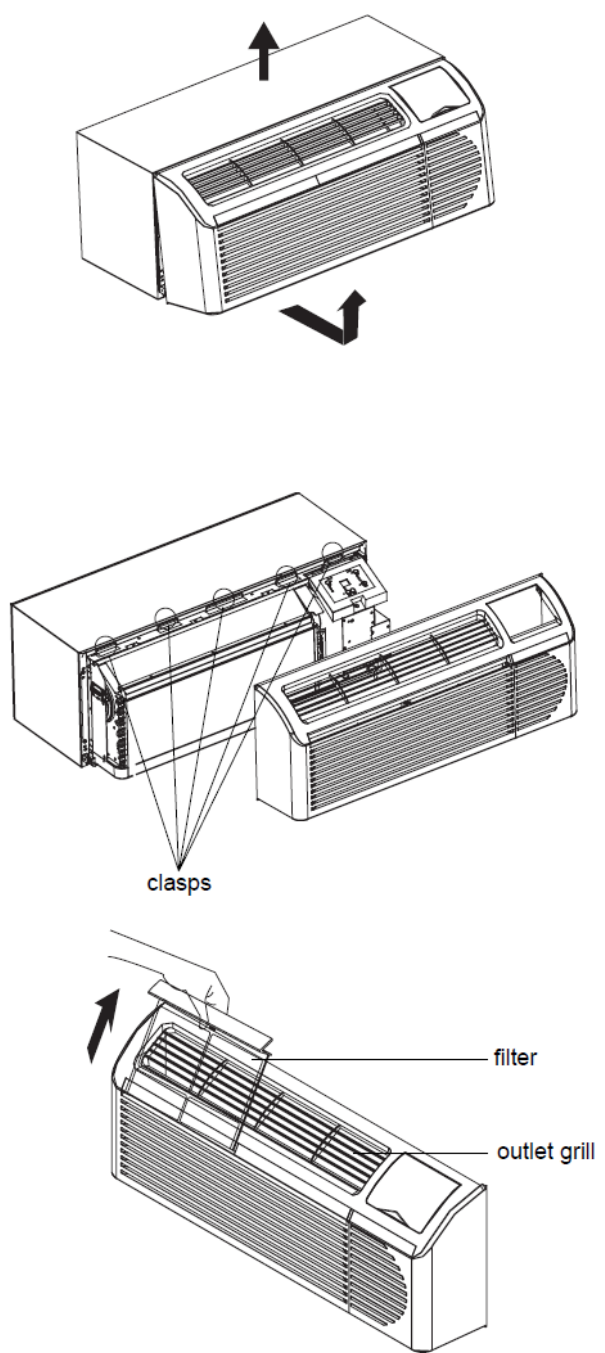
Note: The information above is for reference only.

DISASSEMBLY PROCEDURE

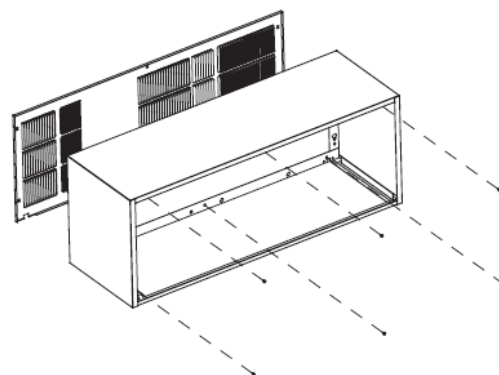
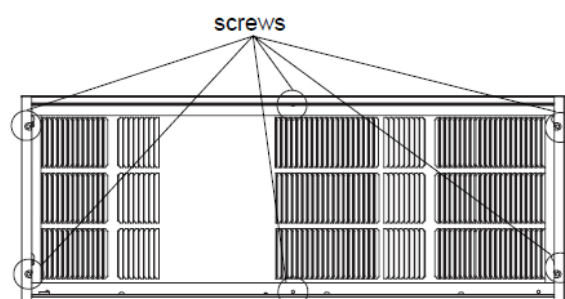
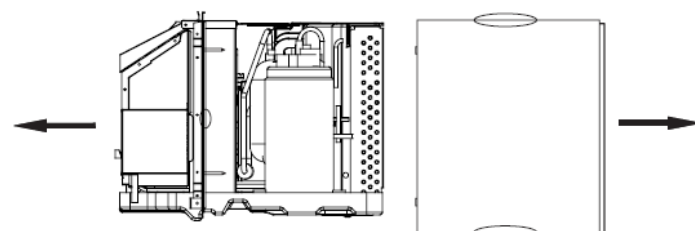
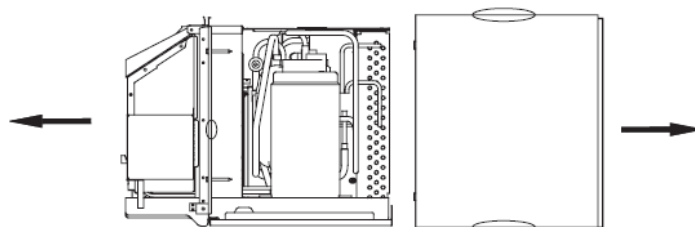
Warning

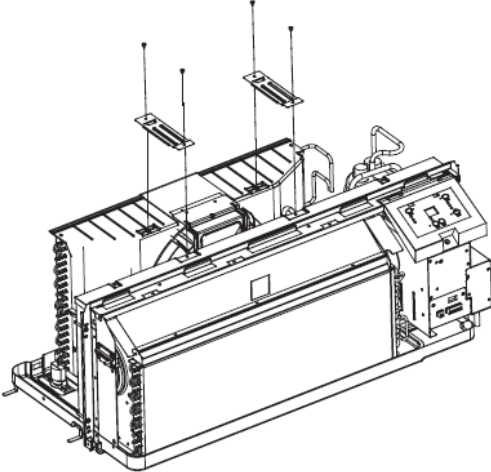

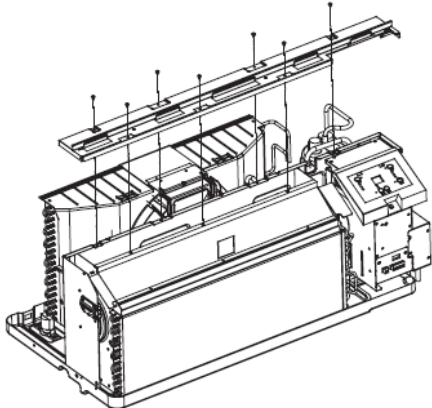
Be sure to wait 10 minutes or more after turning off all power supplies before disassembling work.

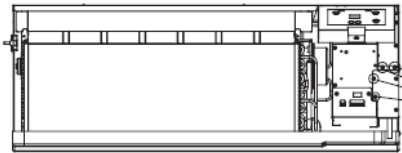

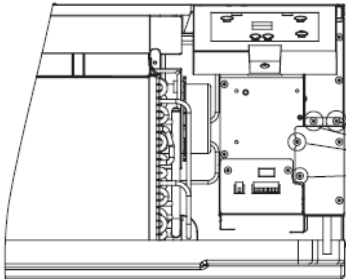
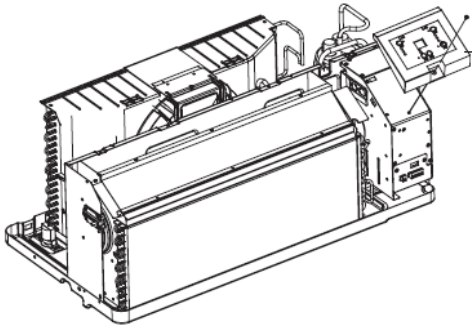
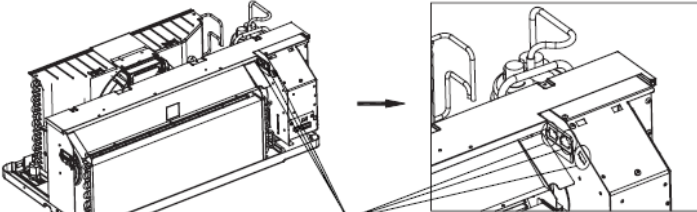
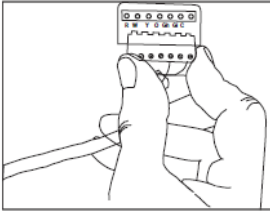
Note: The procedure below is for heat pump unit with electric heating. There is some difference between it and cooling only unit with electric heating. The difference is pointed out in the diagram; please refer to the related diagram direction.

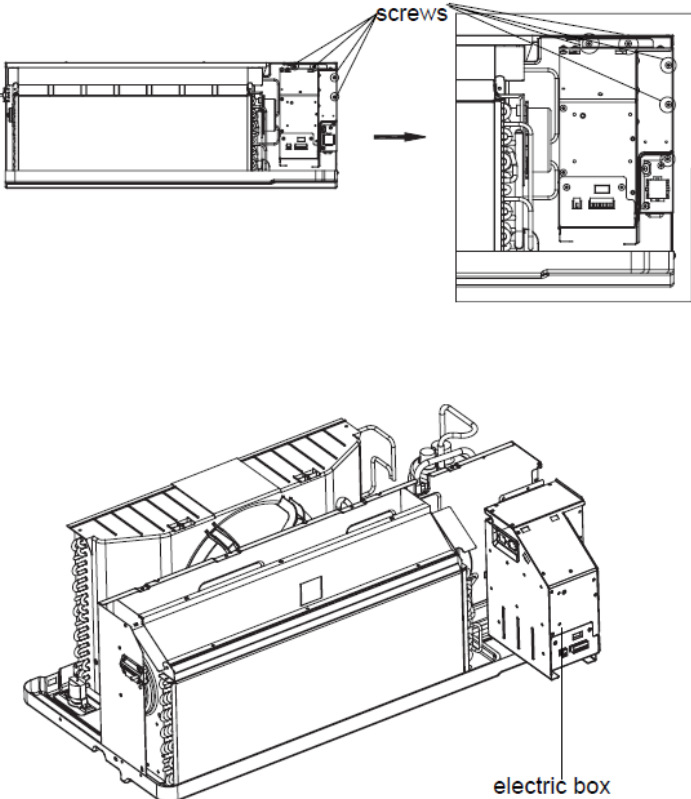
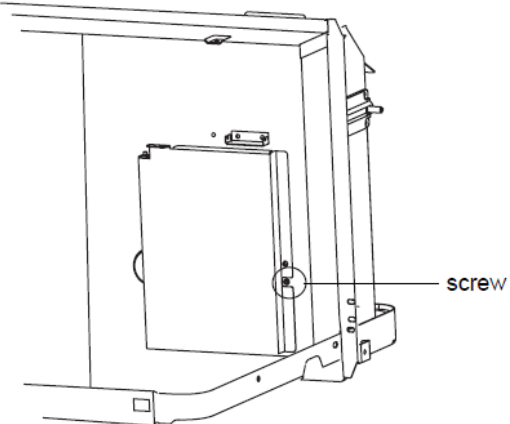
Steps	Procedure	
1	<p>Disassemble front panel assembly</p> <p>Pull the bottom of front panel and pat left &right side of front panel to make clasps loosen to remove front panel. If necessary, filter press board and outlet grill can be removed.</p>	

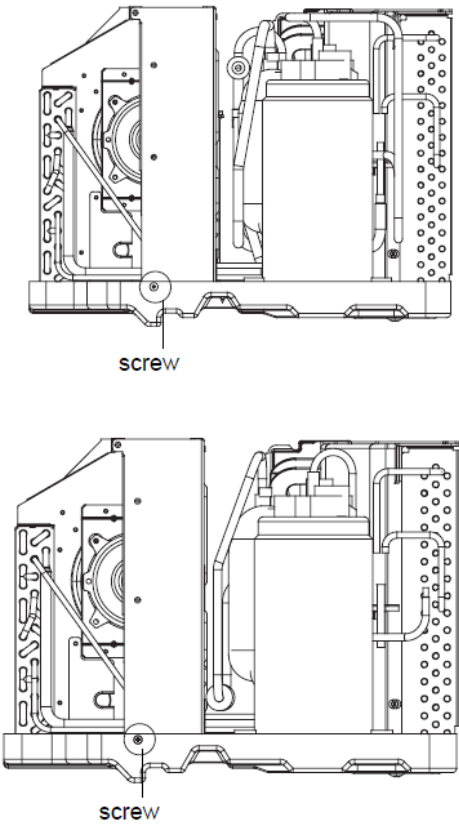
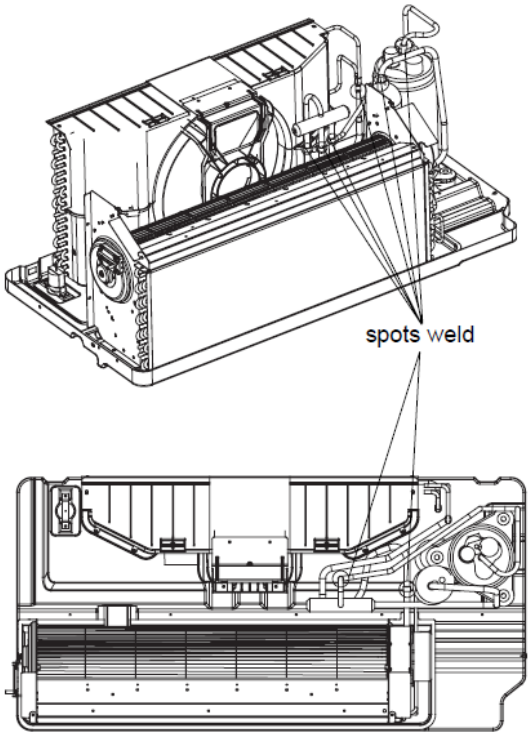
Steps	Procedure
<p>2</p>	<p>Disassemble outer case One person pull the unit to front, and one person pull outer case to the back, and along guide strip to remove.</p> <p>This diagram is applicable for cooling only + electric heating model.</p> <p>Unscrew 6 screws inside of outer case.</p> <p>Remove grill and take out clasps.</p>

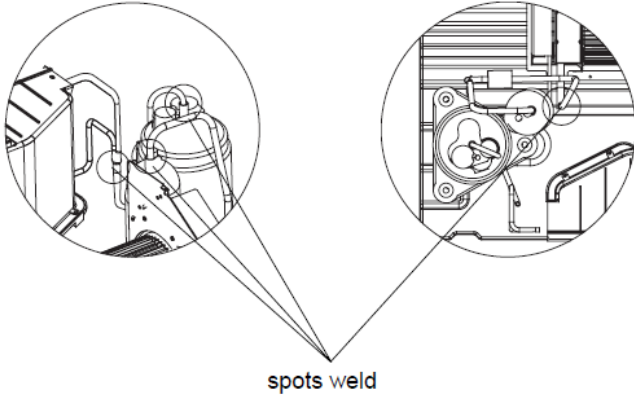
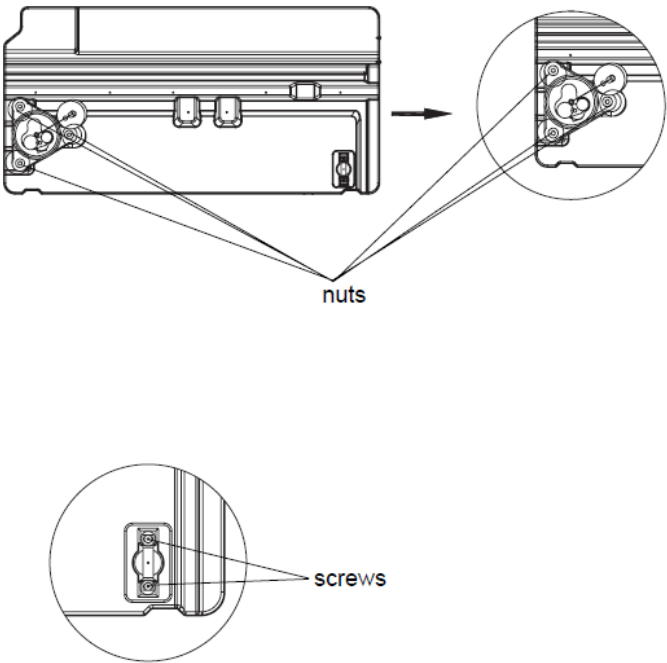


Steps	Procedure	
3	Disassemble middle connection board Unscrew screws and remove middle connection board.	
4	Disassemble support sub-assy Unscrew screws and remove left&right support.	
5	Disassemble top cover plate Unscrew screws and remove top cover plate	

Steps	Procedure
<p data-bbox="256 268 272 294">6</p> <p data-bbox="345 264 743 369">Disassemble electric box Unscrew the front 4 screw and remove leading-out box.</p> <p data-bbox="345 982 721 1050">Unscrew screws and remove control cover plate.</p> <p data-bbox="331 1436 743 1541">Press two sides' wiring terminal and pull out connection wire of electric box and motor.</p>	<div data-bbox="927 264 1479 415">  <p data-bbox="1406 359 1479 384">screws</p> </div> <div data-bbox="1101 447 1117 510">  </div> <div data-bbox="933 554 1479 831">  <p data-bbox="1406 711 1479 737">screws</p> </div> <div data-bbox="889 940 1500 1262">  <p data-bbox="1382 968 1500 1024">control cover plate</p> </div> <div data-bbox="786 1367 1479 1619">  <p data-bbox="1065 1591 1219 1617">wiring terminal</p> </div> <div data-bbox="1211 1650 1479 1860">  </div>

Steps	Procedure
	<p data-bbox="337 390 716 457">Unscrew 4 screws to remove electric box.</p> 
7	<p data-bbox="337 1394 727 1419">Disassemble middle isolation sheet</p> <p data-bbox="337 1432 756 1579">Unscrew screws of choker sub-assy, and turn to ight about 45 angle, then unscrew bottom 5 screws and left&right 3 screw to remove middle isolation sheet.</p> 

Steps	Procedure	
	<p>This diagram is applicable for cooling only + electric heating model.</p>	 <p>screw</p> <p>screw</p>
8	<p>Disassemble 4-way valve assembly Unsolder spots weld of 4-way valve and condenser, evaporator, compressor to remove them. (Note: Refrigerant must be discharged before unsoldering). This step is applicable for heat pump + electric heating model.</p>	 <p>spots weld</p> <p>spots weld</p>

Steps	Procedure	
		 <p data-bbox="1094 680 1203 709">spots weld</p>
10	<p data-bbox="337 961 768 1024">Disassemble compressor and drainage valve</p> <p data-bbox="337 1045 703 1108">Unscrew 3 foot nuts with washer by wrench to remove compressor.</p> <p data-bbox="337 1409 735 1472">Unscrew 2 screws to remove drainage valve.</p>	 <p data-bbox="1130 1241 1179 1270">nuts</p> <p data-bbox="1122 1524 1198 1554">screws</p>