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# installation, start-up and service instructions

## UNDER CEILING FAN COIL UNITS

**619C**  
**Sizes 024-048**  
**2 to 4 Tons**

Cancels: New

II 619C-24-1  
 7/1/92

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**NOTE:** Detailed controls, service, and troubleshooting information is in a separate manual, available from your distributor.

### SAFETY CONSIDERATIONS

Installing and servicing air conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install or service air conditioning equipment.

Untrained personnel can perform basic maintenance, such as cleaning and replacing filters. All other operations should be performed by trained service personnel. When working on air conditioning equipment, observe precautions in literature, tags, and labels attached to unit.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for brazing operations. Have fire extinguisher available. Read these instructions *thoroughly*. Consult local building codes and National Electrical Code (NEC) for special installation requirements.

**⚠ WARNING:** Before installing or servicing system, always turn off main power to system. There may be more than one disconnect switch. Turn off accessory heater power if applicable. Electrical shock can cause personal injury.

### INSTALLATION

The 619C under ceiling fan coil unit is installed with the 700C outdoor condensing unit, or the 705C heat pump (Fig. 1). Refer to Table 1 to make sure the correct indoor unit is installed with the correct outdoor unit.

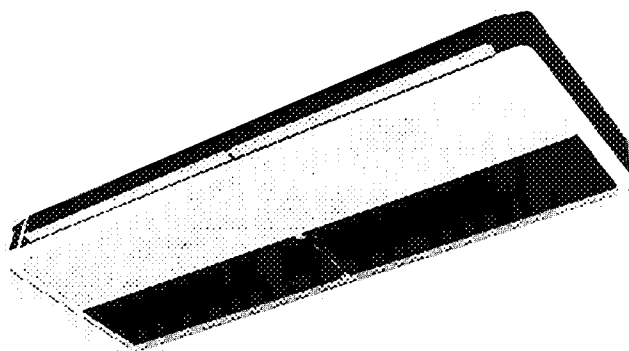


Fig. 1 — 619C Under Ceiling Fan Coil Unit

Table 1 — System Combinations for Indoor and Outdoor Units

SPLIT SYSTEM	INDOOR UNIT	OUTDOOR UNIT
<b>Under Ceiling Cooling Only System</b>		
535BNC024	619CNX0240E0	700CNX024
535BNC036	619CNX0360E0	700CNX036
535BNC048	619CNX0480E0	700CNX048
<b>Under Ceiling Heat Pump System</b>		
635ANC024	619CNX0240W0	705CNX024000
635ANC036	619CNX0360W0	705CNX036000
635ANC048	619CNX0480W0	705CNX048000

Installation instructions for 619C fan coils are contained in this manual. Refer to this manual for proper installation of the complete system. Note that the 700C and 705C outdoor units are shipped with installation and service instructions for basic installation of the outdoor section.

Be sure the unit will be operated within the application guidelines shown in Table 2. When installing the 700C or 705C unit, it is important to note that for cooling operation when the outside air temperature is below 55 F, it is necessary to equip the outdoor unit with the low-ambient control accessory.

To install this system you will need:

- 1 — 619C fan coil
- 1 — 700C or 705C outdoor unit
- 1 — Remote controller kit (included with 619C fan coil) — note that kit normally includes 15-ft long wire cable; however, cable length up to 200 ft can be ordered.
- 1 — Low Ambient Kit (if required for your application)
- 1 — Check-Flo-Rater™ Metering Device Kit (included with 619C fan coil)
- 1 — Fresh-Air Intake Kit (if required for your application)
- 1 — Condensate Pump Kit (if required for your application)

**NOTE:** Refrigerant pipe, drain pipe, wire, etc., are also required to install system.

Be sure you have the required parts before beginning installation. The 619C unit utilizes a microprocessor control system to deliver optimal levels of comfort and efficiency. Be sure to follow these instructions carefully to obtain proper functioning of the unit.

**Table 2 — Application Range**

COOLING			
Maximum		Minimum	
Indoor	Outdoor	Indoor	Outdoor
95 F DB 71 F WB	125 F DB	67 F DB 57 F WB	55 F DB*
HEATING			
Maximum		Minimum	
Indoor	Outdoor	Indoor	Outdoor
80 F DB 71 F WB	75 F DB 65 F WB	55 F DB	-20 F DB

**LEGEND**

DB — Dry Bulb  
WB — Wet Bulb

\*Unit may be equipped with a low-ambient control that will allow operation down to -20 F

**I. COMPLETE PRE-INSTALLATION CHECKS**

**A. Unpack Unit**

Store unit in the original packaging until it is moved to the final site for installation. When removing unit from carton, lift unit by its 4 corners; DO NOT lift unit by its plastic parts.

**B. Inspect Shipment**

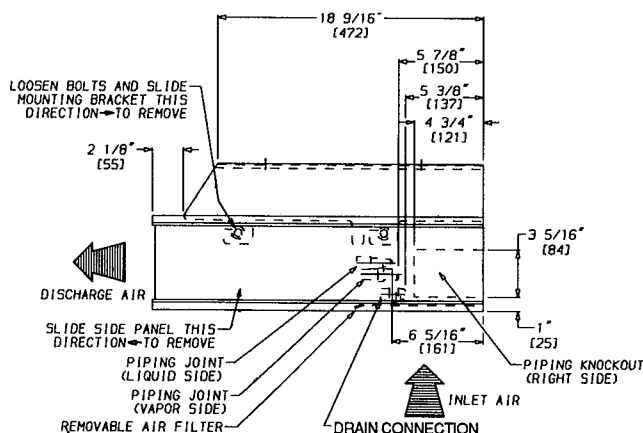
Upon receipt of shipment check unit for damage. Forward claim papers directly to the transportation company. Manufacturer is not responsible for damage incurred in transit.

Check all items; if any item is missing notify your distributor. To prevent loss or damage, leave all parts in original packages until installation.

**C. Before Installation**

Perform the following steps before installing indoor unit (Fig. 2). Place the unit upside down on the floor, then:

1. Remove side panels by sliding forward, then away from sides of unit.
2. Remove air filters from inlet grilles; then remove and retain screws securing inlet grilles to indoor unit.
3. Remove inlet grilles from indoor unit by sliding forward.



**NOTE:** Dimensions shown in brackets [ ] are in mm

**Fig. 2 — Removal of Mounting Brackets from Indoor Unit**

**Table 3 — Physical Data**

UNIT 619C	NX0240E0	NX0360E0	NX0480E0	NX0240W0	NX0360W0	NX0480W0
<b>OPERATING WT (lb)</b>	108	117	140	110	119	142
<b>REFRIGERANT</b>	R-22, Check-Flo-Rater Control					
<b>FAN</b>						
Rpm						
High	1035	1310	1345	1035	1310	1345
Med	990	1160	1307	990	1160	1307
Low	940	1010	1270	940	1010	1270
Nominal Cfm (High Speed)	635	935	1300	635	935	1300
<b>COIL</b>						
Rows	4	4	4	4	4	4
Face Area (sq ft)	2.189	2.625	3.069	2.189	2.625	3.069
Fins/in.	14.9	14.9	14.9	14.9	14.9	14.9
Number of Circuits	4	4	8	4	4	8
<b>CONNECTIONS</b>						
Suction (in.) Flare	5/8	3/4	3/4	5/8	3/4	3/4
Liquid (in.) Flare	3/8	3/8	3/8	3/8	3/8	3/8
Condensate Drain (in.)	3/4	3/4	3/4	3/4	3/4	3/4
<b>LINE SIZES</b>						
Suction (in.)	5/8	3/4	7/8	5/8	3/4	7/8
Liquid (in.)	3/8	3/8	3/8	3/8	3/8	3/8
Condensate Drain	3/4	3/4	3/4	3/4	3/4	3/4

## II. SELECT LOCATION

Consult local building codes and NEC for special installation requirements.

There are several ways the unit may be installed to different types of ceiling construction. These instructions do not cover all installation methods. As a typical installation, these instructions focus primarily on mounting the unit to metal in new construction. Plan your installation carefully before you begin. Listed below are some guidelines that should be followed when determining location for the unit.

1. Place unit adjacent to an outside wall if fresh air is required, ensuring that location allows for complete air distribution.
2. Determine a convenient and accessible location to mount the wired remote controller. Note that because the controller is not used to sense room conditions, it is not necessary to consider this factor when determining the controller location.  
The controller cable can be routed through walls and does not need to be surface mounted. For additional information on remote controller, see separate controller kit installation instructions.
3. Allow sufficient space for airflow clearance, wiring, refrigerant piping, and servicing unit (Fig. 3).
4. Make sure the unit is easily accessible to electrical power.
5. Run refrigerant piping as directly as possible, avoiding any unnecessary turns or bends.
6. Condensate piping can be directed through the inside wall to an approved drain, or directed straight outside.

**NOTE:** The piping hole for condensate line must slope at a minimum pitch of 1 in. per 10 ft to ensure proper drainage. If proper pitch cannot be achieved, install accessory condensate pump at this time.

**NOTE:** The accessory condensate pump should be installed before hanging the unit.

## III. MOUNT UNIT

Refer to Fig. 6 for clearances and dimensions. Use mounting template included inside box to locate mounting bolt holes, piping holes, electrical connections, and accessory outdoor-air intake, if used.

Select proper type of hardware from the guidelines below. See Fig. 4.

**⚠ CAUTION:** Solid structure in ceiling must be used due to the weight of the unit.

### Wooden Structure

Install hanging bolts on a square wooden piece placed over beams.

### Newly Built Concrete Slab

Install hanging bolts with inserts, embedded bolts, etc.

### Metal Structure

Install hanging bolts utilizing an existing angle or by installing a new support angle.

### Previously Built Concrete Slab

Install hanging bolts with expansion anchor.

### A. To Mount Unit:

1. Remove mounting bracket and reinstall the 2 hex-head bolts (factory supplied) into each side of indoor unit as shown in Fig. 5. Allow approximately 3/8-in. space between bolt head and unit.

2. Determine installation position, paying particular attention to piping lengths and wiring connections, clearances, etc. See Fig. 3 for connection locations, Fig. 6 for clearances, and Fig. 7 and 8 for bolt locations.
3. Open knockout if right-side piping connections are required (Fig. 9).
4. Cut the slit portion in rear of the side panel with a saw or cutter knife. (Fig. 9).

If indoor unit accessory louver guard is to be installed, install at this time and refer to installation instructions packaged with this accessory.

5. Mount hanging brackets on ceiling (Fig. 10) for either concealed or exposed bolt hanging position.
6. Lift the unit into place, and fit the hex-head bolts on sides of indoor unit into slit grooves of mounting brackets (Fig. 11). Ensure unit is mounted level to assure proper drainage.
7. Tighten bolts securely.

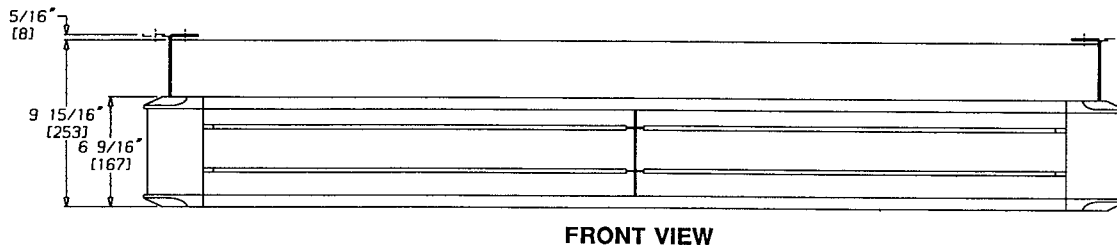
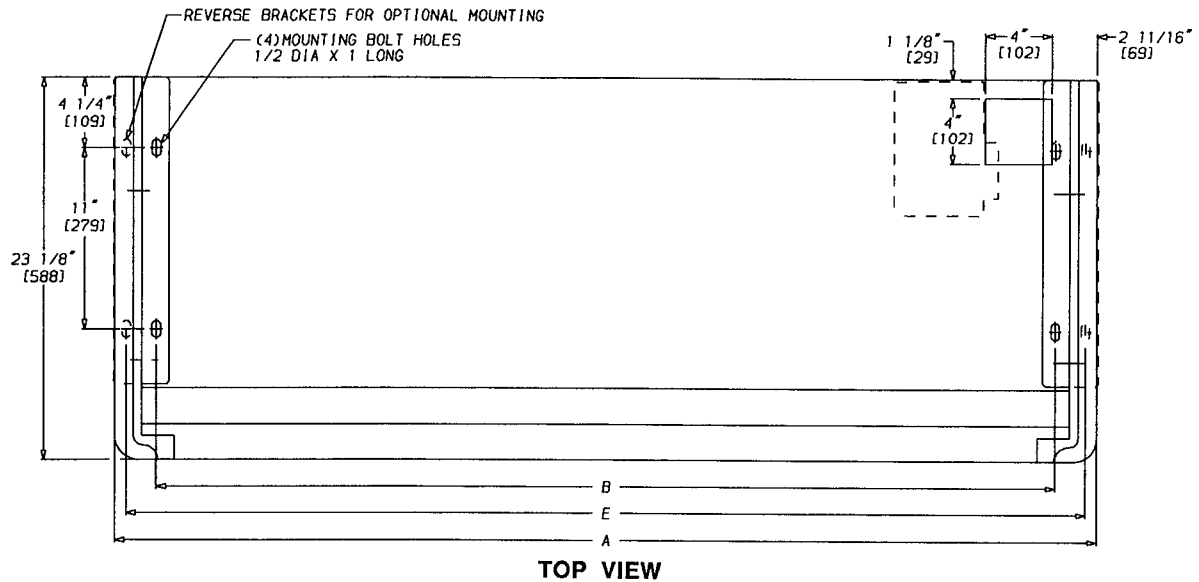
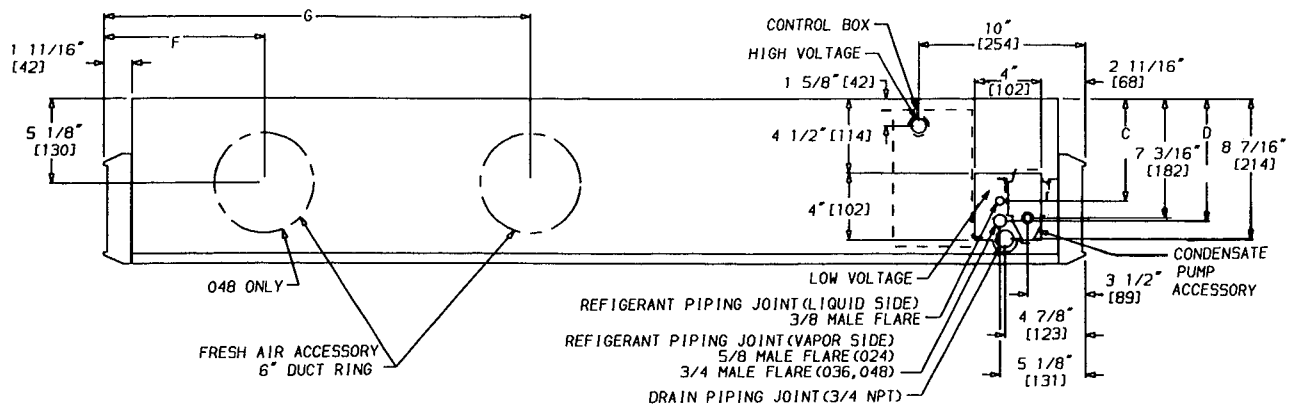
## IV. CONNECT REFRIGERANT PIPING

Fan coil units may be connected to condensing units using field-supplied refrigerant grade piping. Refer to Table 3 for the correct size piping. The length of refrigerant pipe depends on the unit placement and building structure; keep in mind to run pipes as directly as possible. For piping requirements over 50 ft of total run, or more than 25 ft of lift, consult the long line application guidelines available from your distributor.

**⚠ CAUTION:** DO NOT BURY MORE THAN 36 IN. OF REFRIGERANT PIPE IN THE GROUND. If any section of pipe is buried, there must be a 6-in. vertical rise to the valve connections on the outdoor unit. If more than the recommended length is buried, refrigerant may migrate to the cooler, buried section during extended periods of unit shutdown, causing refrigerant slugging and possible compressor damage at start-up.

Use the following instructions to connect piping.

1. Install insulation. Insulate all refrigerant lines on heat pumps to prevent condensation. It is extremely important that all refrigerant lines and the Check-Flo-Rater™ metering device be insulated on heat pumps. On cooling only units, the liquid line may be left uninsulated. Use any acceptable heat resistant closed-cell foam insulation (minimum 3/8-in. wall thickness). When insulating piping, cap ends and slide insulation over the piping. Insulation can also be cut and placed over piping.
2. Run liquid and gas refrigerant piping.
  - a. Run pipes as directly as possible, avoiding any unnecessary turns and bends.
  - b. Suspend refrigerant pipes so that the insulation is not damaged and vibrations are not transmitted to the structure.
  - c. Leave slack in the refrigerant pipe between the structure and the unit to absorb vibrations.
  - d. Install flare connection on tubing to liquid line at fan coil (Fig. 12). The correct piston size is shipped in the Check-Flo-Rater body with 619C units. If you have any questions, use Table 4 to determine required piston size for the system being installed. The arrow on the metering device body must face away from the indoor coil.

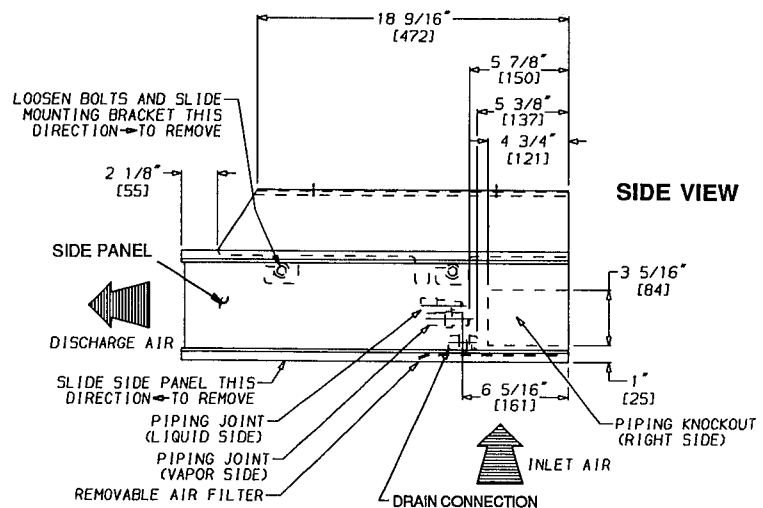


- NOTES:
1. DIMENSIONS IN [ ] ARE MILLIMETERS.
  2. DIRECTION OF AIR FLOW.

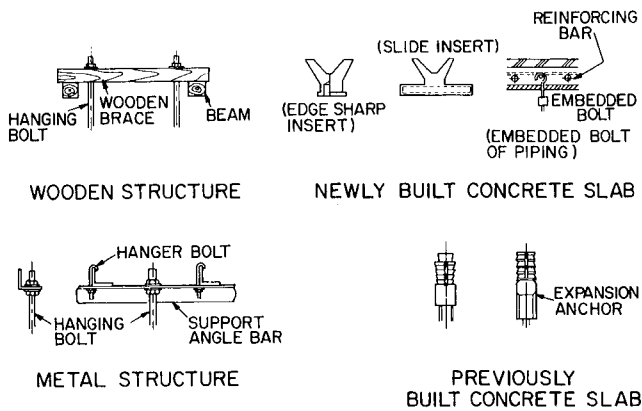
**DIMENSIONS (in.)**

UNIT 619C	A	B	C	D
024	50 15/16	46	6 1/8	7 3/8
036	58 13/16	53 3/8	6 1/8	7 3/8
048	71 9/16	66 3/8	7 3/8	6 3/8

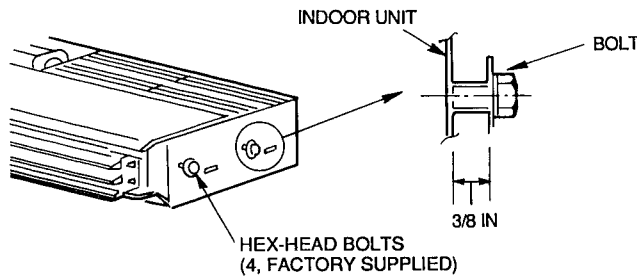
UNIT 619C	E	F	G
024	49 3/8	—	20 1/16
036	57 1/2	—	23 15/16
048	70 1/4	20 1/4	37 1/2



**Fig. 3 — 619C Dimensional Drawing**



**Fig. 4 - 619C Unit-Mounting Methods  
(Hardware is Field Supplied)**



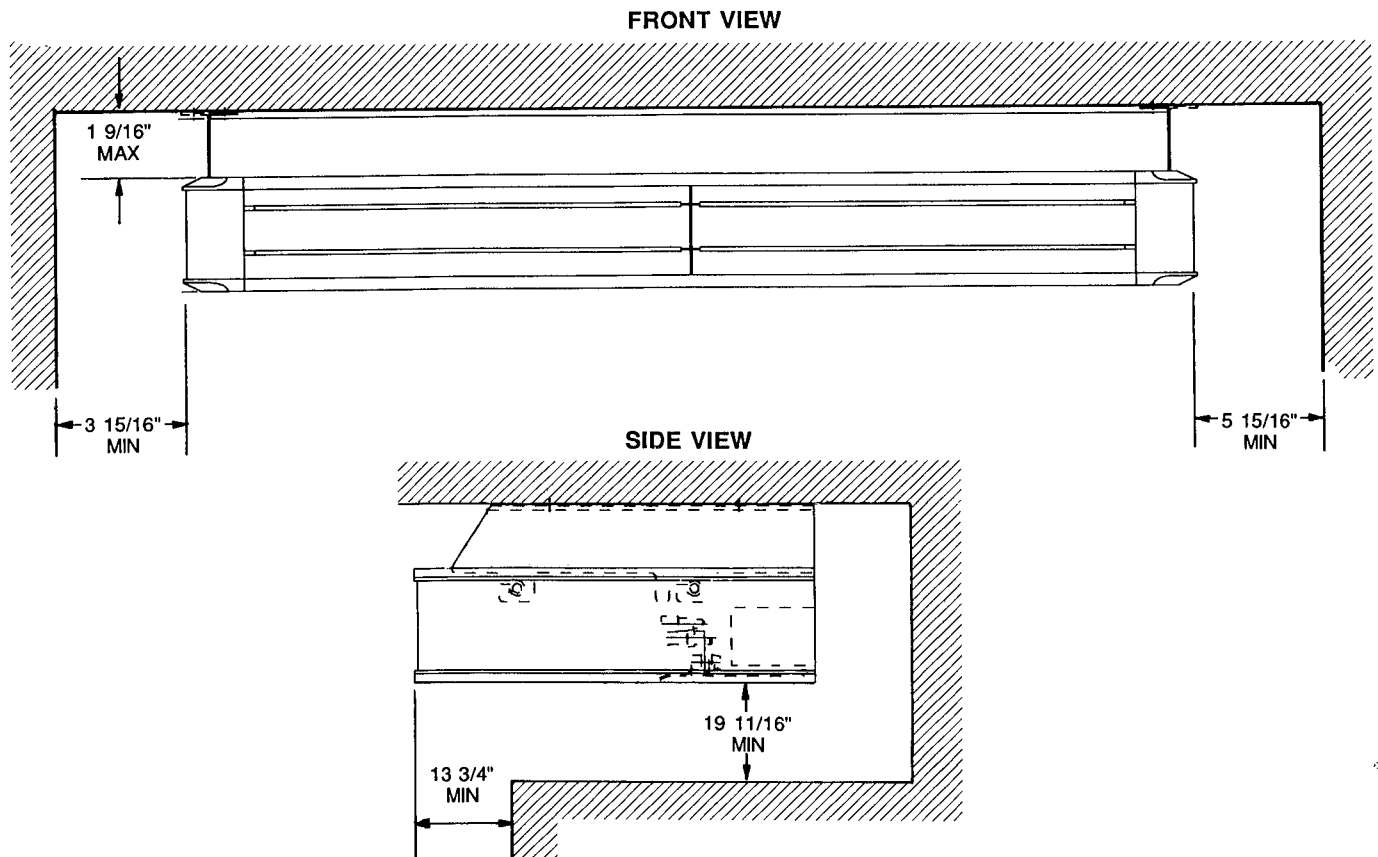
**Fig. 5 - Installing Hex-Head Mounting Bolts  
in 619C Unit**

- e. On heat pump installations check for factory-installed piston in service valve. If not already installed, install piston in the metering device located in the service valve on the outdoor unit (Fig. 13). Make sure Teflon seal on the piston faces toward the outdoor unit. Use Table 4 to determine required piston size for the system being installed.
  - f. Refer to 700C and 705C installation, start-up and service instructions for additional information.
  - g. Install a liquid line filter drier near the outdoor unit. On heat pump systems, a bi-flow filter drier must be used.
3. Insulate and caulk wall openings to reduce air infiltration and refrigerant pipe vibrations on structure.
  4. Evacuate piping, if necessary. If either refrigerant piping or the indoor coil is exposed to atmospheric conditions for longer than 5 minutes, it must be evacuated to 1000 microns to eliminate contamination and moisture in the system.

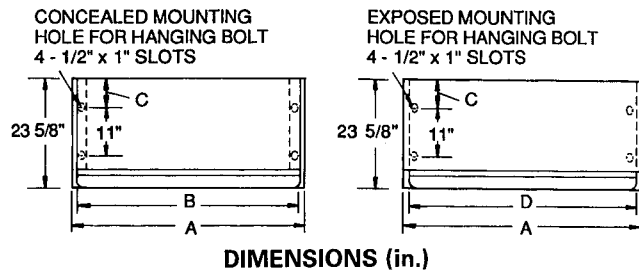
## V. CONNECT CONDENSATE DRAIN LINE

Observe all local sanitary codes when installing condensate drains. Refer to Fig. 3 and 14 for drain hose connection from indoor unit.

1. Use hard polyvinyl chloride (PVC) pipe material with nominal ID of 3/4 in. to connect at drain line. Use pipe insulation 1/4-in. thick, such as Armaflex insulation, on exposed piping inside the conditioned space.



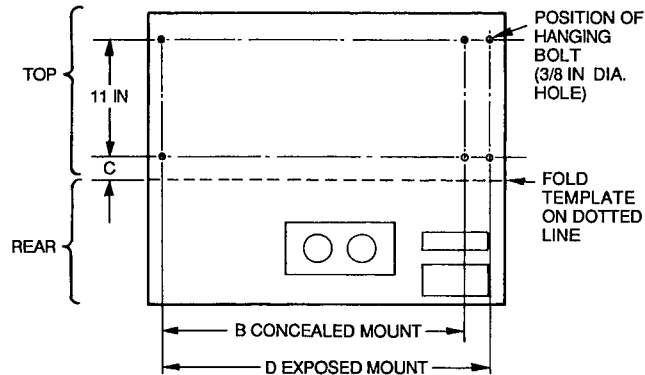
**Fig. 6 - 619C Clearances**



DIMENSIONS (in.)

UNIT 619C	A	B	C	D
024	50 $\frac{1}{4}$ "	46"	6 $\frac{1}{8}$ "	49 $\frac{5}{8}$ "
036	58 $\frac{1}{4}$ "	53 $\frac{3}{8}$ "	6 $\frac{1}{8}$ "	57 $\frac{1}{2}$ "
048	71 $\frac{1}{4}$ "	66 $\frac{5}{8}$ "	7 $\frac{3}{8}$ "	70 $\frac{1}{4}$ "

Fig. 7 - 619C Unit Hanging Dimensions



NOTE: Dimensions are found in Fig. 7.

Fig. 8 - Mounting Template Included with 619C Unit

#### SIDE VIEW OF RIGHT-SIDE PANEL

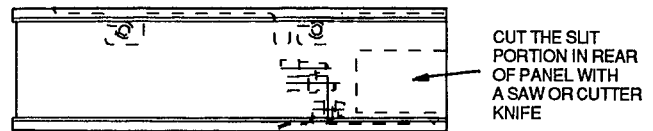


Fig. 9 - Removing Rear Knockout in Side Panel If Right-Side Piping Connection is Used

2. To ensure regular flow of condensate water, the drain pipe should be pitched toward an open drain or sump at a downward slope of at least 1/4-in. per foot.
3. Secure drain pipe with nylon wire tie passing through the knockout, as shown in Fig. 15.
4. Attach plate with screws under piping hole.
5. Attach drain pipe with nylon wire tie passing through hole (Fig. 15).

**NOTE:** Do not fasten nylon wire ties tight enough to deform the insulation, as this affects its performance.

6. Insulate condensate drain line(s). Insulate the condensate drain lines that are located in or above an occupied area with a condensate proof material such as polyurethane or neoprene.
7. Install an external trap at the end of the condensate line.

**NOTE:** Should your particular installation require one, a condensate pump may be ordered as an accessory option.

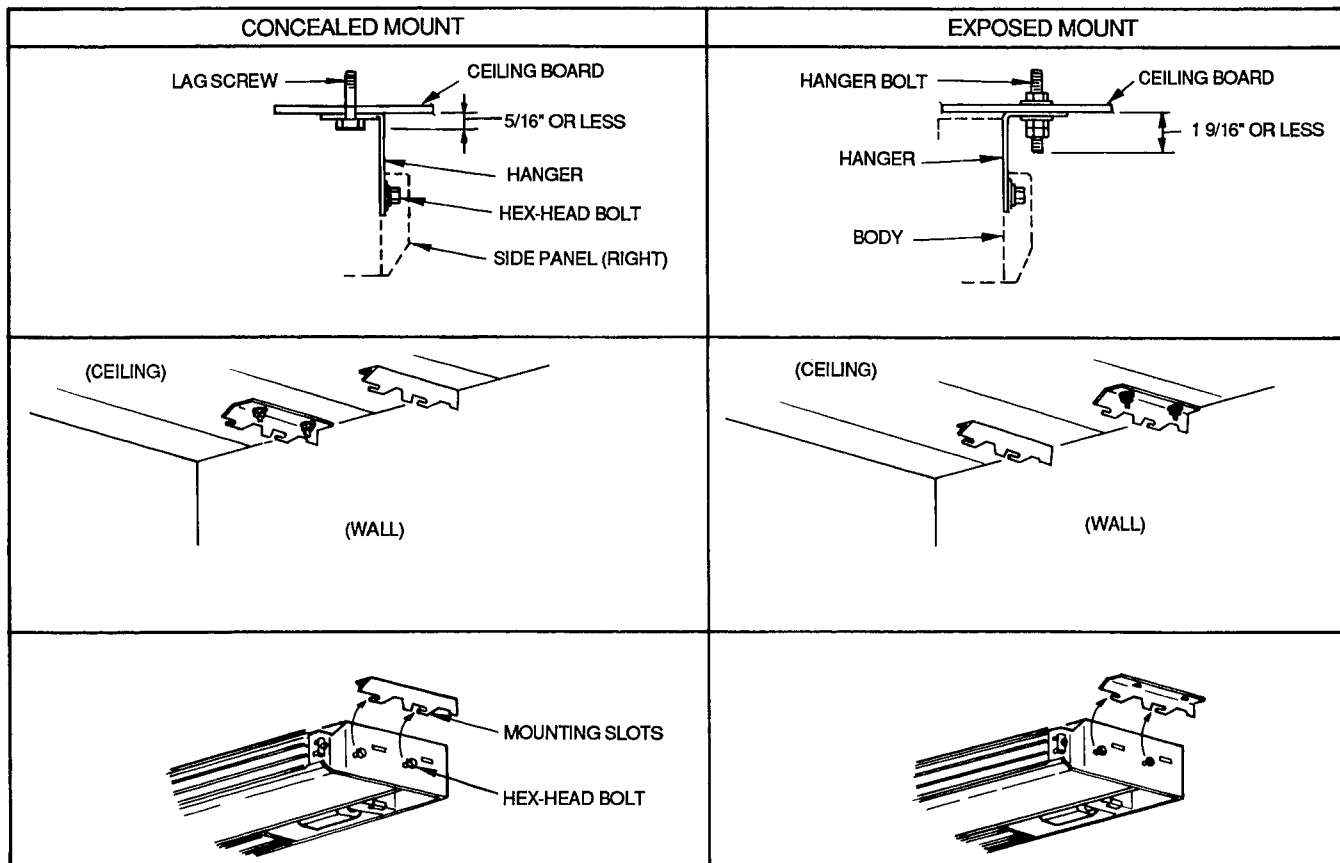


Fig. 10 - Mounting Ceiling Brackets

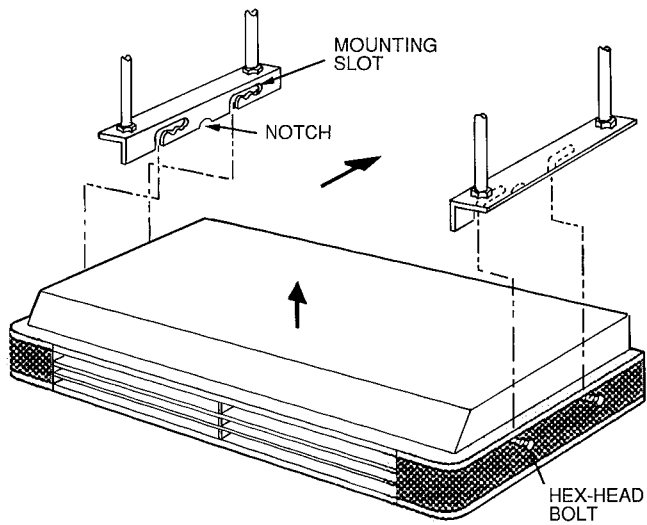


Fig. 11 — Hanging 619C Unit

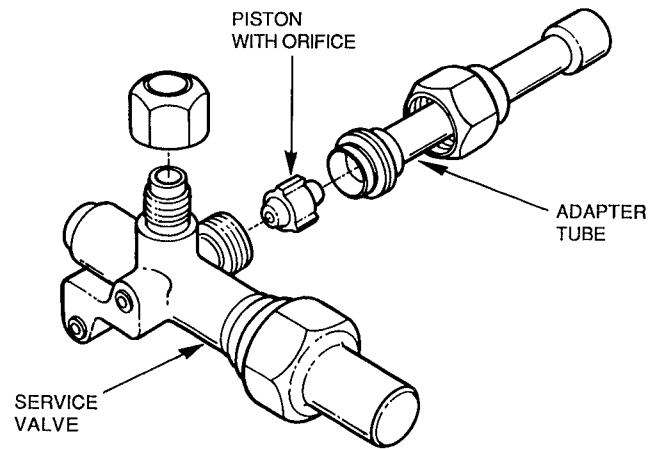
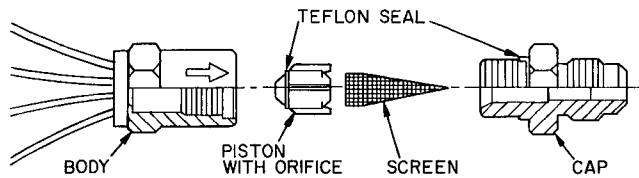
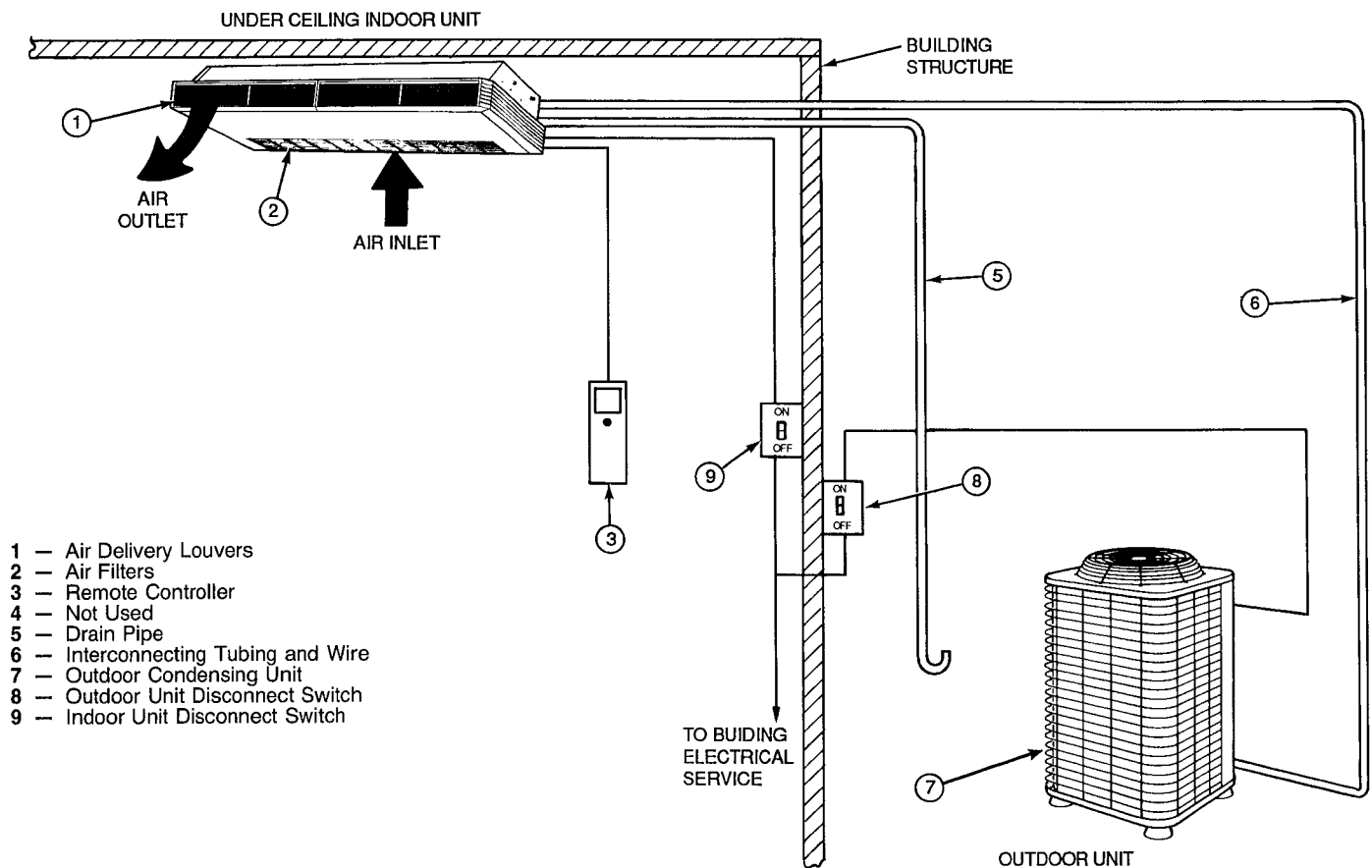


Fig. 13 — Check-Flo-Rater Metering Device at Service Valve (Bypass-Type Components)



**NOTE:** Arrow on Check-Flo-Rater body points in *free flow* direction away from the indoor coil

Fig. 12 — Check-Flo-Rater™ Metering Device in Liquid Line (Bypass-Type Components)



- 1 — Air Delivery Louvers
- 2 — Air Filters
- 3 — Remote Controller
- 4 — Not Used
- 5 — Drain Pipe
- 6 — Interconnecting Tubing and Wire
- 7 — Outdoor Condensing Unit
- 8 — Outdoor Unit Disconnect Switch
- 9 — Indoor Unit Disconnect Switch

Fig. 14 — Component Location (Typical Under Ceiling System)

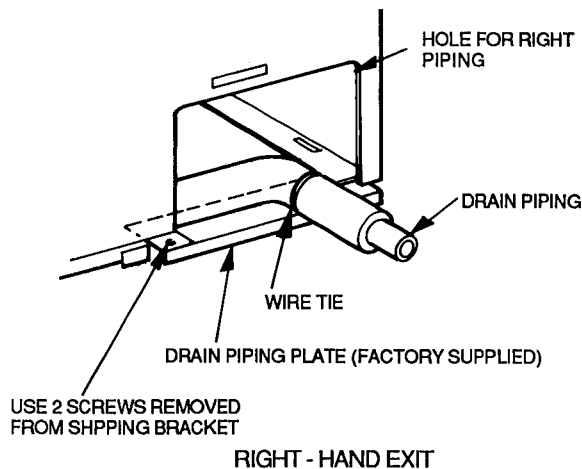
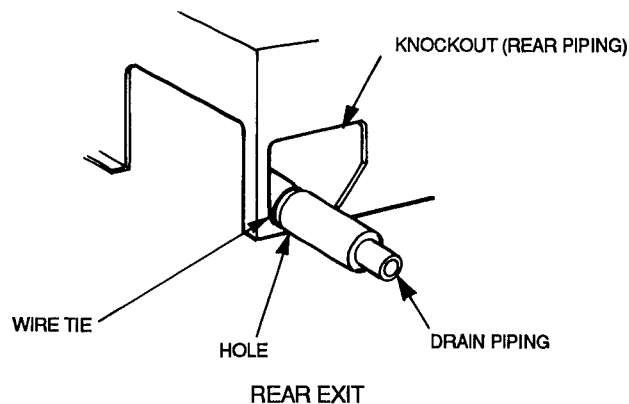


Fig. 15 — Routing Drain Piping

## VI. MAKE ELECTRICAL CONNECTIONS

Be sure field wiring complies with local building codes and NEC, and unit voltage is within limits shown in Table 5.

Contact local power company for correction of improper line voltage.

**WARNING:** To avoid personal injury or damage to unit, do not make electrical connections until all power sources are shut down, locked out, and tagged off. Failure to do so could result in personal injury or unit damage.

**CAUTION:** Operation of unit on improper line voltage constitutes abuse and could affect warranty. Refer to Table 5 for permissible operating limits. Do not install unit in system where voltage may fluctuate above or below permissible limits.

**NOTE:** Use copper wire only between disconnect switch and unit.

**NOTE:** Install branch circuit disconnect of adequate size to handle unit starting current per NEC. Locate disconnect within sight from and readily accessible from unit, per Section 440-14 of NEC. Some codes allow indoor unit to share disconnect with outdoor unit if disconnect can be locked; check local code before installing in this manner.

1. Route ground and power wires.

**WARNING:** According to NEC and most local codes, the unit must have an uninterrupted, unbroken ground to minimize personal injury if an electric fault should occur. The ground may consist of electrical wire or metal conduit when installed in accordance with existing electrical codes. Failure to follow this warning could result in an electric shock, fire, or death.

2. Route line power leads (see Fig. 16) from indoor disconnect to the fan coil unit. Place wire through hole on the control box (Fig. 17). Connect wire to high voltage terminal board (TB-1) and ground screw. When routing the wire in the unit, use care to keep the wire away from refrigerant and condensate piping and any sharp edges. Units are factory wired for 230 V to 24-V transformer operation. For 208 V to 24-V operation, interchange blue (208 V) and red (230 V) wires. Cap unused wires with wire nuts.

## VII. INSTALL CONTROL

The 619C unit is equipped with a microprocessor control which operates the system. This control is located in the control box of the fan coil, with thermistors located in the fan coil inlet and discharge, on the indoor coil, on the outdoor coil, and in the outdoor-air inlet (heat pump systems only). The thermistors monitor system operation and control the operating mode. To change settings or modes of operation, a wired remote controller is supplied.

The factory-preset DIP switches on the 619C control board set the operation of the unit cooling only or for heat pump operation. Be sure the switches are set correctly. See wiring diagram on page 16 or 17, and also the control, service, and troubleshooting guide (available from your distributor) for more information.

### A. Wired Remote Controller

The wired controller is directly connected to the unit by the plug connection provided. Standard cable length is 15 ft, but the cable can be any length up to 200 ft.

Determine where the best location is to mount the controller. Since the controller is not used to sense the temperature of the room, locate the controller in a convenient place that is easily accessible to the user.

The cable can be surface mounted or may be run over ceilings and through walls. Follow local codes when installing low voltage wires.

To install remote controller, see separate remote controller installation instructions.

Table 4 — Required Piston Size for Check-Flo-Rater™ Metering Device

OUTDOOR UNIT	INDOOR UNIT	INDOOR PISTON	INDOOR PISTON TYPE	OUTDOOR PISTON	OUTDOOR PISTON TYPE	REQUIRED SYSTEM CHARGE * (lb)
700CNX024	619CNX0240E0	55	B	—	A	6.8
700CNX036	619CNX0360E0	65	B	—	A	6.8
700CNX048	619CNX0480E0	84	B	—	A	10.0
705CNX024	619CNX0240W0	—	B	—	A	—
705CNX036	619CNX0360W0	—	B	—	A	—
705CNX048	619CNX0480W0	—	B	—	A	—

### LEGEND

B — Chatteflex

\*Charge amount is determined with 25 ft. of line



Table 5 — Electrical Data

INDOOR UNIT	V-PH	OPERATIONAL VOLTAGE*		FAN		WATTS	ELECTRIC HEATER kW AT 240 V	MCA	MAX FUSE OR HACR TYPE CKT BKR AMPS
		Max	Min	LRA	FLA				
619CNX0240E0	208/230-1-60	187	253	0.7	0.5	92	—	1.0	15
619CNX0360E0				2.0	1.3	160	—	2.0	15
619CNX0480E0				3.7	1.0	396	—	1.8	15
619CNX0240W0				0.7	0.5	2092	2	11.5	20
619CNX0360W0				2.0	1.3	3160	3	17.9	35
619CNX0480W0				3.7	1.0	4396	4	22.9	40

LEGEND

FLA — Full Load Amps  
HACR — Heating, Air Conditioning, Refrigeration  
LRA — Locked Rotor Amps  
MCA — Minimum Circuit Amps per NEC Section 430-24  
NEC — National Electrical Code

\*Permissible limits of the voltage range at which unit will operate satisfactorily.

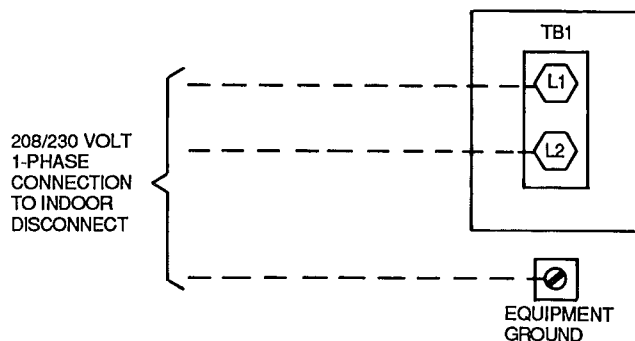


Fig. 16 — Line Power Connections

## VIII. CONNECTIONS TO OUTDOOR UNIT

### A. Cooling Only Systems

The following connections must be made to the 700C unit for it to operate as a system with the indoor unit:

1. A thermistor connection cord with a lead length of 35 ft is shipped with the 619C unit. Run the connection cord from the condensing unit to the low-voltage terminal strip on the control board of the fan coil unit. The stripped end of the connection cord goes to the fan coil end. Use care to route the wires so that they will not be damaged, and do not run them near power wires. Connect the orange wires to terminals D1 and D2 on the control board.
2. Route 2 wires of 18-gage thermostat cable between the low-voltage terminal block of the fan coil and the 700C unit. Connect the wires Y to blue wire going to high-pressure switch, and R to R on the low-voltage transformer.

### B. Heat Pump Systems

The following connections must be made to the 705C unit for it to operate as a system with the indoor unit:

1. A thermistor cord with a lead length of 35 ft is shipped with the 619C unit. Run this cable from the heat pump to the low-voltage terminal strip on the control board on the fan coil unit. Use care to route the wires so that they will not be damaged, and do not run them near power wires. Connect the orange wires to terminals D1 and D2 on the terminal strip, and the blue wires to terminals A1 and A2 on the terminal strip.
2. Route 4 wires of 18-gage thermostat cable between the low-voltage terminal block of the fan coil and the 705C unit low-voltage terminal block. Connect Y to Y, O to O, G to G, and C to C with the wires.

## START-UP

**⚠ WARNING:** Never operate unit without a filter or with grille removed; damage to the unit or personal injury may result.

The following checks should be made before system start-up. Refer to 700C or 705C installation, start-up and service instructions for system start-up instructions and refrigerant charging methods.

1. Check condensate drainage system.
  - a. Remove grille and frame from the unit.
  - b. On the opposite side of the drain connection, insert a water bottle up into the fan coil unit and fill drain pan. Refer to Fig. 18. Water must flow regularly; if not, check the pipe slope or inspect for any pipe restrictions.
2. Make sure that all wiring connections are correct and that they are tight.
3. Check that all barriers, covers, and panels are in place. Ensure that the filters and return-air grilles have been installed and that the discharge louvers are positioned correctly.

## I. AFTER EXTENDED SHUTDOWN

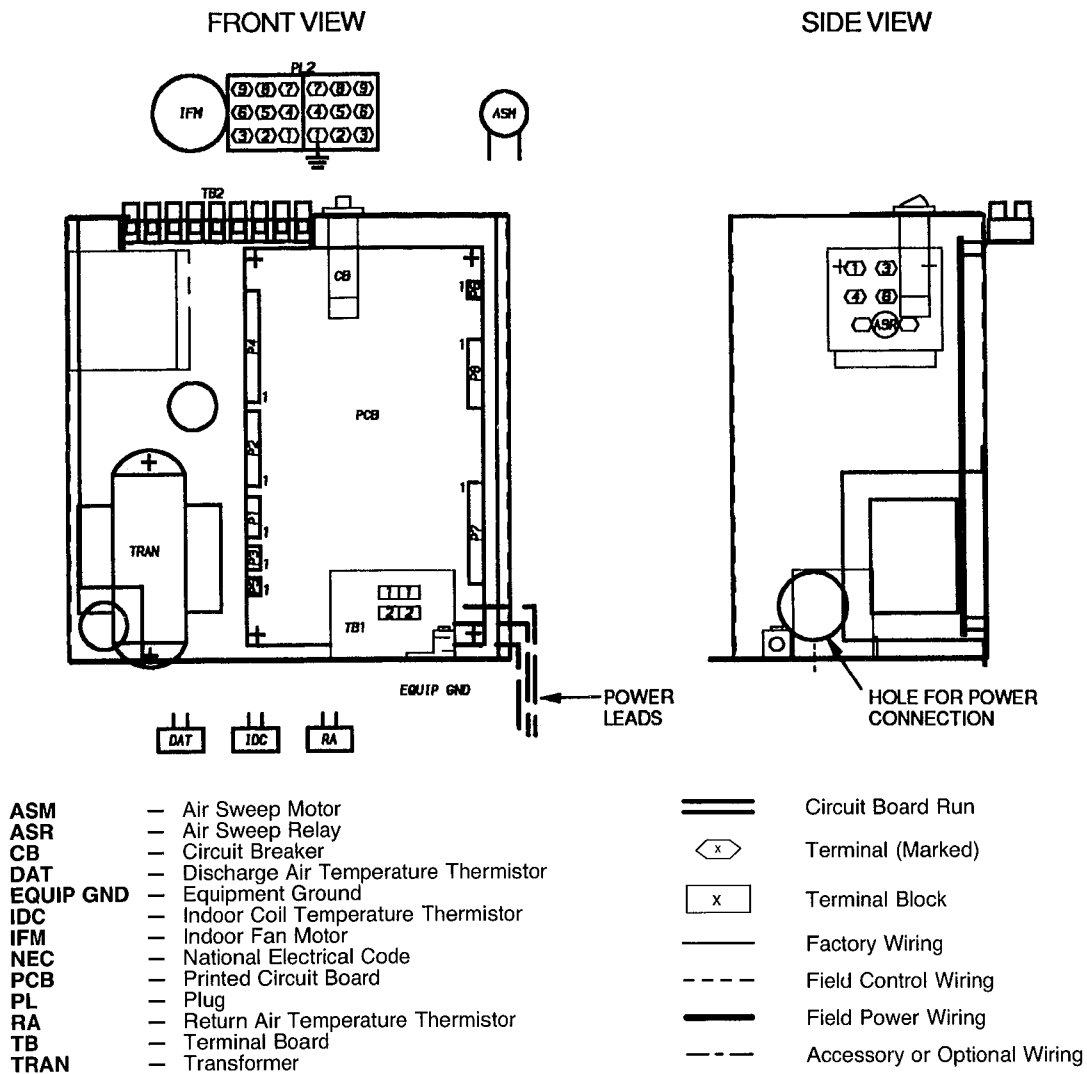
If the system has been turned off for more than 12 hours, turn on the indoor and outdoor unit disconnect switches to supply power to the system for 12 hours BEFORE starting the system.

## II. SEASONAL CHANGEOVERS

When changing heat pump system from cooling to heating or heating to cooling, or before starting cooling only system after it has been out of use for the winter season, the following steps must be performed.

### BEFORE starting the system:

1. Inspect and clean the outdoor unit, particularly the coil.
2. Clean or replace the air filters in the indoor unit.
3. Clean the indoor unit drain pan and drain pipe, and remove any obstructions.
4. Turn on indoor and outdoor unit disconnect switches to supply power to the system 12 hours before starting the system.



**NOTES:**

- 1 If any of the original wire furnished must be replaced, it must be replaced with type 90 C wire or its equivalent.
- 2 Wire in accordance with NEC and local codes

**Fig. 17 — Control Circuit Connections**

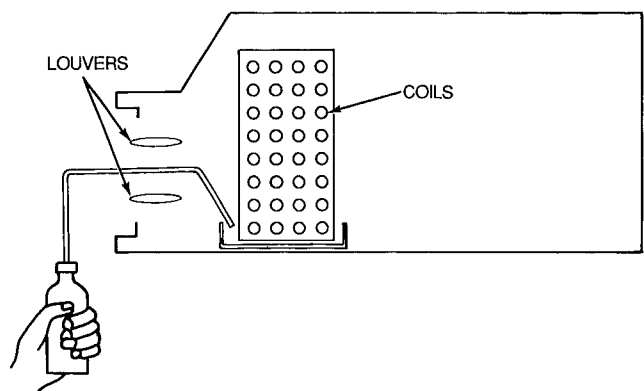


Fig. 18 — Inserting Water into Drain Pan

### III. ADJUSTING AIRFLOW

#### A. Automatic Air Sweep

All units are equipped with an automatic air sweep feature which automatically directs the airflow louvers up and down to provide optimum room air circulation. If the auto sweep feature is not desired, temporarily start the auto sweep using the remote controller. When the louvers are in the desired position, turn the auto sweep off to hold them in that position.

### IV. OPERATING MODE MEMORY

After the system is turned off or after a power failure, the system remains in the last operating mode selected. When the system is turned back on, or when power is automatically restored, operation continues in the same operating mode as when it shut down.

### V. AUTOMATIC OPERATION (AUTO.) MODE

If Auto. mode is selected, the system automatically switches over the Operating mode from heating to cooling, or from cooling to heating (heat pump system only) depending on the selected temperature.

**NOTE:** Between the cooling cycle and the heating cycle there is a neutral zone of approximately 2° F above and 2° F below the selected temperature when only the fan is operating. This neutral zone lasts for a minimum of 10 minutes.

### VI. OPERATING FAULT DIAGNOSIS

The system includes an automatic diagnosis feature which is activated under difficult or unacceptable operating conditions. If such conditions occur, the system stops automatically, the operating fault signal appears on the liquid crystal display (LCD) of the remote controller, and an analysis of the system operating conditions is initiated. The system will then be restarted automatically, as soon as normal conditions have been restored, or it will remain off. If the system does not start again, the temperature indicator on the LCD display alternates between the selected temperature value and an error code. See separate controls, service, and troubleshooting guide to troubleshoot the problem.

### VII. OPERATION OF MICROPROCESSOR CONTROL

This system is controlled by a microprocessor control designed to give optimum levels of comfort and operating efficiency. The control is located in the 619C unit. To operate the unit, a remote controller is required. This control may be wired directly to the unit and mounted on the wall up to 200 ft away from the unit.

See separate owner's manual for remote controller operation instructions. More detailed operating sequence and timing are located in the controls, service, and troubleshooting guide. Both manuals are available from your distributor.

There are 7 operating modes (including the OFF mode) for cooling only systems and 11 operating modes (including the OFF mode) for heat pump systems. The following operation should be expected in each mode.

- **OFF Mode** — When the unit is in the OFF mode, all functions (compressor, outdoor fan, indoor fan, electric heat, and air sweep) are off, except the reversing valve, which will stay energized if the unit was last operated in the COOLING mode.
- **AIR CIRCULATION Mode (Fan Operation Only)** — When AIR CIRCULATION mode is selected, the indoor fan will operate continuously in the selected speed (high, medium, low, or auto). If the AUTO. mode is selected, the indoor fan will operate at high speed. The compressor, outdoor fan, and electric heat are off. The reversing valve will remain in the last operating mode. The air sweep motor will operate if selected.
- **COOLING Mode** — When the COOLING mode is selected, the indoor fan will operate continuously at the selected speed if the speed is high, medium, or low. If the indoor fan is in auto., the fan will change operating speeds depending on the room temperature. The electric heat will be off and reversing valve will be on. The compressor cannot run for 3 minutes from the time the system starts up or for 3 minutes from the time it last operated. When the temperature of the room is 2° F above the selected temperature, the compressor and outdoor fan will operate until the room temperature is equal to the selected temperature. If the room temperature is 4° F or more above the selected temperature, the indoor fan will run at high speed. When the room temperature is between 2° F and 4° F above the selected temperature, the indoor fan will operate at medium speed. When the room temperature is 2° F below the selected temperature, the indoor fan will operate at low speed. When the room temperature is equal to the selected temperature, the compressor and outdoor fan shut off. The indoor fan, if in auto. operation, operates for one minute after the compressor shuts off. The fan remains off for 3 minutes, then operates for one minute at low speed. The indoor fan repeats this process until cooling is again required.
- **MAXIMUM DEHUMIDIFICATION Mode** — When the DEHUMIDIFICATION mode is selected, the indoor fan will operate continuously at the selected speed if the speed is high, medium, or low. If the indoor fan is in auto. operation, the fan will change operating speeds depending on the room temperature. The electric heat will be off and reversing valve will be on. The compressor cannot run for 3 minutes from the time the system starts up or for 3 minutes from the time it last operated.

**Initial Operation** — When the mode is first selected, or if the indoor fan has been off for more than one minute, the fan will operate at low speed for 30 seconds. Then, if the room temperature is above the selected temperature, the unit will operate for 16 minutes, and the compressor and outdoor fan will operate. The indoor fan will operate as in the cooling mode. After 16 minutes of operation, the unit switches to normal operation.

If the room temperature is below the selected temperature, the unit will operate for 8 minutes, and the compressor and outdoor fan will operate for 3 minutes. The indoor fan will operate in low speed, and one minute after the compressor stops the indoor fan stops. After remaining off for 3 minutes, the indoor fan starts in low speed for one minute, then switches to normal operation.

**Normal Operation** — When the temperature of the room is 6° F above the selected temperature, the compressor and outdoor fan will operate for 8 minutes. The indoor fan will operate in low speed. If the room temperature is above the selected temperature, but not by more than 6° F, the compressor and outdoor fan operate for 4 minutes. The indoor fan will run at low speed and will stop 30 seconds after the compressor stops. After 3 minutes, the indoor fan runs at low speed for 30 seconds. The normal dehumidification operation is repeated for the new room temperature.

When the room temperature is within 4° F below the selected temperature, the system operates for 8 minutes. The compressor and outdoor fan operate for 3½ minutes. The indoor fan will operate at low speed and will stop 30 seconds after the compressor stops. After 3 minutes, the indoor fan starts in low speed for one minute. The normal dehumidification operation is repeated for the new room temperature.

If the room temperature is 4° F below the selected temperature, the compressor, outdoor fan, and indoor fan remain off. After 3 minutes, the indoor fan operates at low speed for one minute. This is repeated until 8 minutes have elapsed. The normal dehumidification operation is repeated for the new room temperature.

- **HEAT PUMP Heating Mode (Heat Pump Systems Only)** — When the HEAT PUMP mode is selected, the indoor fan will operate continuously at the selected speed if the speed is high, medium, or low. If the indoor fan is in auto operation, the fan will change operating speeds depending on the room temperature. The electric heat is off and the reversing valve will be on. The compressor cannot run for 3 minutes from the time the system starts up or for 3 minutes from the time it last operated. When the temperature of the room is 8° F below the selected temperature, the unit will operate in HEAT PUMP mode until the temperature is 2° F above the selected temperature. If the temperature of the room is between 2° F and 8° F below the selected temperature, the unit operates in HEAT PUMP mode until the selected temperature is reached.

In the HEAT PUMP mode, the compressor and outdoor fan will operate until the room temperature has reached the temperature indicated above. The indoor fan will remain off until the discharge temperature of the fan coil is 86 F. The fan will then operate in low speed until the discharge temperature is 98 F. Then the fan will operate at high speed if the room temperature is 4° F or more below the selected temperature. The indoor fan will run at medium speed when the room temperature is between 2° F and 4° F below the selected temperature. The indoor fan will operate at low speed if the room temperature is within 2° F of the selected temperature. When the heating demand is satisfied, the compressor and outdoor fan will stop and the indoor fan will operate until the discharge air temperature is 77 F. The fan will turn off for 3 minutes, then turn on for one minute — this will be repeated until heating is again required.

- **MAXIMUM HEATING Mode (Heat Pump Systems Only)** — This mode of operation is the same as the HEAT PUMP heating mode, except that electric heat is used to assist the heat pump.

- **ELECTRIC HEATING Mode (Heat Pump Systems Only)** — The indoor fan operation is the same as the HEAT PUMP mode, except that electric resistance heating only is used.
- **AUTOMATIC OPERATION Mode** — AUTOMATIC OPERATION mode runs the system in cooling or heating at 2° F above the selected temperature for cooling and 2° F below the selected temperature for heating. In the temperature range between heating and cooling, only the fan will operate. A minimum of 10 minutes is required between a change from heating to cooling or from cooling to heating.
- **DEMAND DEFROST Mode (Heat Pump Systems only)** — This unit uses a demand defrost system to remove frost from the outdoor coil during heating operation. The indoor fan and outdoor fan are shut off during defrost. For complete description of defrost operation, see the controls, service and troubleshooting guide sections of the duct-free systems manual, available from your distributor.
- **SLEEP Mode** — The SLEEP mode timer will turn the unit off when the timer reaches zero minutes. During the first 1½ hours from the time the SLEEP mode timer starts, the room temperature is set back from the selected temperature a total of 4 F in cooling and 6 F in heating.
- **AWAKE Mode** — The awake timer will turn the unit on when the timer reaches zero minutes. The unit will start in the same mode and at the same selected temperature as when the system shut off.

**NOTE:** The system can be programmed for the sleep mode or the awake mode, but it cannot be programmed for both of these modes simultaneously.

## CLEANING AND MAINTENANCE

**⚠ CAUTION:** To avoid the possibility of electric shock, before performing any cleaning and maintenance operations always turn off power to the system by pressing the green on/off button on the remote controller, and turning off the outdoor disconnect switch located near the outdoor unit. If the indoor unit is on a separate switch, be sure it is also disconnected.

**⚠ CAUTION:** Do not wash filter in water over 120 F (to avoid shrinkage). Do not expose filter to fire (to avoid fire damage). Do not expose filter to direct sunlight. Clean filter more frequently when air is extremely dirty.

**⚠ CAUTION:** Do not attempt to clean or service components in control box.

For proper system operation we recommend that the cleaning and maintenance operations in Table 6 be performed.

## I. LUBRICATION

The indoor-fan motor, automatic air sweep motor, and the outdoor fan motor are factory lubricated and require no oiling.

## II. TO REMOVE AND CLEAN OR REPLACE AIR FILTERS (FIG. 21)

**⚠ CAUTION:** Operating your system with dirty air filters may damage the indoor unit and, in addition, can cause reduced cooling performance, intermittent system operation, frost build-up on the indoor coil, and blown fuses. Although the Dirty Filter indicator on the remote controller LCD display will illuminate after every 250 hours of operation, you should still inspect and clean or replace the air filters *monthly*.

### A. To Remove Air Filters

Remove filters by pulling them straight out.

### B. To Clean or Replace Filters

Filters can be vacuumed, or washed in warm water. See Fig. 19. Shake filter to remove any excess water, and replace by sliding filter behind grille until filter snaps in place.

**NOTE:** After cleaning, be sure to press the Filter Reset button on the mode selection panel of the remote controller.

If the filter has begun to break down or is torn, it needs to be replaced. Replacement filters are available through your distributor.

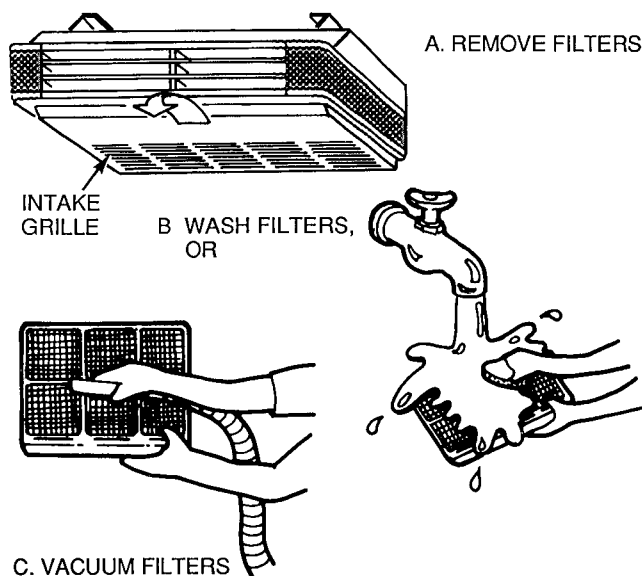


Fig. 19 — Cleaning Filters

## III. TO CLEAN INDOOR UNIT BOTTOM PANEL

If the bottom panel of the unit becomes dirty or smudged, wipe the outside of the panel with a soft dry cloth. Use a mild liquid detergent and wipe off carefully with a dry cloth.

## IV. TO CLEAN INDOOR COIL

To clean the coil, remove indoor unit bottom panel and condensate pan, and then vacuum the coil fins, using care not to bend or damage fins.

## V. TO CLEAN OUTDOOR COIL

**⚠ WARNING:** Some metal parts and sharp fins of outdoor unit condensing coil can cause personal injury during cleaning. Clean coil carefully.

To clean the outdoor coil:

1. Remove any dirt or obstruction from discharge opening.
2. Use a garden hose to spray water on the coil. Debris that collects between coil fins inhibits heat transfer — direct the water spray between coil fins to flush out debris.

## VI. TO CLEAN CONDENSATE DRAIN PIPE AND PAN

Clean drain pipe quarterly and drain pan at the start of each cooling season. Check the flow by pouring water into the drain pipe.

### A. To Clean or Replace Drain Pan

1. Place a plastic sheet on the floor to catch any water that may spill from drain pan.
2. Remove the air intake and distribution assembly.
3. Remove the condensate water in the drain pan by letting water drain into a 3-gallon bucket.

**⚠ CAUTION:** Do not use a screw driver to pry drain pan out of assembly — it could damage the pan.

4. Remove the 4 screws holding the drain pan.
5. Carefully hold the drain pan to remove it from the assembly.

Table 6 — Cleaning and Maintenance Schedule

TASK	MONTHLY	QUARTERLY	YEARLY
<b>INDOOR UNIT</b>			
Clean Air Filters	X		
Clean Drain Pipe		X	
Clean Condensate Drain Pan			X
Clean Indoor Unit Front Panel		X	
<b>OUTDOOR UNIT</b>			
Clean the Fins From Outside		X	
Open the Unit and Clean Fins Inside			X
Remove Dust From Electrical Parts			X
Check Electrical Connections are Tight			X
Clean Outdoor Fan			X
Check that Outdoor Fan Assembly is Tight			X
Clean Condensate Drain Pan		X	

**NOTE:** Maintenance procedures for the outdoor unit are in the 700C and 705C installation instructions

## SERVICE

**⚠ WARNING:** When servicing unit, turn off all electric power to unit to avoid shock hazard or injury from rotating parts.

**⚠ CAUTION:** Do not vent refrigerant to atmosphere when servicing unit. Recover refrigerant during system repair or unit removal.

**NOTE:** Refer to the control, service and troubleshooting guide sections of the duct-free systems manual for a complete description of the control system and for detailed service and troubleshooting procedures. This manual is available from your distributor.

## TROUBLESHOOTING

### I. DIAGNOSTIC CODES

This unit is equipped with a microprocessor control which continuously monitors the operation of the unit. If an operational fault is detected, a fault code appears on the LCD display of the remote controller. A red LED indicator light, located on the control board in the control box of the indoor unit, will emit a flash code which can be used to troubleshoot a system problem. The control will continue to monitor the unit and, if the conditions which cause the fault are cleared, the unit will return to normal operation. If the fault code is present for 5 cycles of the unit, the unit will be locked out and the alarm code will be displayed alternately with the temperature on the remote controller LCD display.

If the LED indicator light continuously flashes on for one second, then off for one second, the control is functioning properly and no fault is present. A fast flashing LED indicates that a fault has been detected. Table 7 lists the number of quick flashes and the associated fault. If the system does not operate, the remote controller does not display a fault code, and the LED indicator does not flash, either the power to the control board is off, or the control board has failed.

Table 7 — System Fault Codes

FAULT CODE*	NO. OF FLASHES	SYSTEM FAULT
E2	2	Outdoor Coil Thermistor
E3	3	Outdoor Air Thermistor†
E4	4	Room Air Thermistor
E5	5	Indoor Coil Thermistor
E6	6	Discharge Air Thermistor
E7	7	Compressor Malfunction
E8	8	Reversing Valve Malfunction†
E11	11	Electric Heat Malfunction
E12	12	Outdoor Coil Temperature

\*The fault code is alternately displayed with the temperature on the remote controller LCD display

†Heat pump systems only

### II. TEST MODES

The remote controller allows troubleshooting of the system by running a series of test modes. These tests may be manually initiated with the remote controller to test the system operation:

- Fan Only Test
- Cooling Mode Test
- Dehumidification Test
- Heat Pump Heating Test
- Emergency Heat Test

See separate controls, service, and troubleshooting guide for additional details on operating test modes.

### III. SYSTEM TESTS

System tests listed below are performed continuously by the microprocessor. If a fault is indicated, then the system allows only limited operation until the problem is resolved. If the problem resolves itself, then the code is cleared and operation resumes.

#### A. Indoor Coil High-Temperature Protection (Heat Pump Systems Only)

If indoor coil temperature is greater than or equal to 145 F but less than 165 F for one minute or more, the system shuts down.

#### B. Outdoor Coil High-Temperature Protection (Cooling or Dehumidification Mode Only)

If outdoor coil temperature is greater than or equal to 145 F but less than 165 F for one minute or more, the system shuts down.

#### C. Indoor Coil Freeze Protection (Cooling or Dehumidification Mode Only)

If indoor coil temperature is less than or equal to 28 F but more than -13 F for 4 minutes and the compressor has run for 24 continuous minutes, the system shuts down.

#### D. Thermistor Tests

Each thermistor is tested for high limit out of range (shorted condition) and low limit out of range (open condition). If the thermistor is out of range, the fault status indicator comes on and the LED flashes the appropriate fault code.

#### E. Compressor Failure

*If the System is in COOLING or DEHUMIDIFICATION Mode* — After 2 minutes of operation, if the temperature of the indoor coil is not 2° F less than at the time the call for cooling started, then a compressor failure is indicated on the remote controller LCD display.

*If the System is in HEAT PUMP HEATING Mode* — After 2 minutes of operation, if the temperature indicated by the outdoor thermistor is not 2° F less than at the time the call for heating started, then a compressor failure is indicated.

#### F. Reversing Valve Failure

*If the System is in COOLING or DEHUMIDIFICATION Mode* — After 4 minutes of operation, if the temperature at the indoor coil is 2° F more than at the time the call for heating started, then a reversing valve failure is indicated.

*If the System is in HEAT PUMP HEATING Mode* — After 4 minutes of operation, if the temperature indicated by the indoor coil is not 2° F less than at the time the call for heating started, then a reversing valve failure is indicated.

#### G. Electric Heater Failure

If, 4 minutes after the heater is energized, the discharge-air temperature is not 2° F above the return-air temperature, an electric heater failure is indicated.

#### H. Filter Dirty Indicator

Indicator (on remote controller LCD display) turns on after 250 hours of indoor fan operation.










## NOTES FOR FIG. 20 AND 21

1. Compressor and fan motor are thermally protected.
2. Wire in accordance with National Electrical Code (NEC) and local codes. If any of the original wire must be replaced, it must be replaced with type 90 C wire or its equivalent.
3. Use minimum of 60 C wiring for field power wiring.
4. Thermostat is internal to unit. Unit must be controlled with wired or infrared wireless remote controller.
5. Use copper conductors only.

## LEGEND FOR FIG. 20 AND 21

**ASM** — Air Sweep Motor  
**ASR** — Air Sweep Relay  
**C** — Compressor Contactor  
**CAP** — Capacitor  
**CB** — Circuit Breaker  
**CH** — Crankcase Heater  
**COMP** — Compressor  
**DAT TH** — Discharge Air Thermistor  
**DTS** — Discharge Temperature Sensor  
**EQUIP** — Equipment Ground  
**GND**  
**FL** — Fuse Link  
**HPS** — High-Pressure Switch  
**HR** — Heater Relay  
**HTR** — Heater  
**HTT** — Heater Temperature Thermostat

**IDC TH** — Indoor-Coil Thermistor  
**IFM** — Indoor-Fan Motor  
**LPS** — Low-Pressure Switch  
**OAT TH** — Outdoor Air Thermistor  
**OCT TH** — Outdoor Coil Thermistor  
**OFM** — Outdoor Fan Motor  
**OFR** — Outdoor Fan Relay  
**PCB** — Printed Circuit Board  
**PL** — Plug  
**RA TH** — Return Air Thermistor  
**RVS** — Reversing Valve Solenoid  
**SC** — Start Capacitor  
**SR** — Start Relay  
**TB** — Terminal Block  
**TDR** — Time-Delay Relay  
**TRAN** — Transformer

 Circuit Board Run  
 Terminal Marked  
 Terminal Unmarked  
 Splice  
 Terminal Block  
 Factory Wiring  
 Field Control Wiring  
 Field Power Wiring  
 Accessory or Optional Wiring





