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installation, start-up and service instructions

HIGH WALL FAN COIL UNITS

619B
Sizes 018-024
1-1/2 to 2 Tons

Cancels: New

II 619B-18-1
12/15/91

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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 and on 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 heater or indoor fan coil power if applicable. Electrical shock can cause personal injury.

INSTALLATION

The 619B(E) high wall fan coil unit (see Fig. 1) is installed with the 594C outdoor condensing unit, and the 619B(W) unit is installed with the 694C heat pump. Refer to Table 1 to make sure the correct indoor unit is installed with the correct outdoor unit.

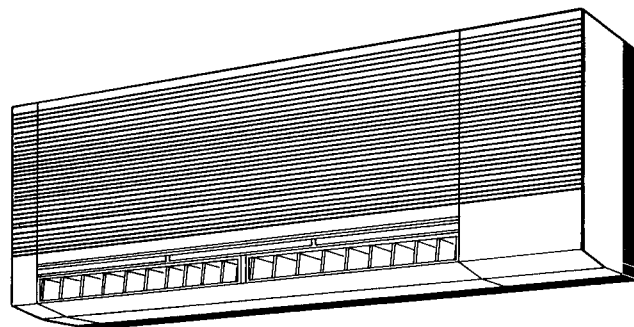


Fig. 1 — 619B High Wall Fan Coil Unit

Installation instructions for 619B fan coils are contained in this manual. Refer to this manual for proper installation of the complete system. Note that the 594C and 694C outdoor units are shipped with installation and service instructions for basic installation of the outdoor section. Be sure to make the modifications to the outdoor unit from Connections to Outdoor Unit section on page 8 so that the unit will operate properly with the 619B control system. Be sure the unit will be operated within the application guidelines shown in Table 2. When installing the 694C or 594C 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 head pressure control accessory. To install this unit you will need:

- 1 — 619B Fan Coil
- 1 — 594C or 694C Outdoor Unit
- 1 — Wired Remote Controller Kit
(Note that kit normally includes 15-ft long wire cable; however, cable length up to 200 ft can be ordered.)
- 1 — Check-Flo-Rater® Metering Device Kit (see Table 3)
- 1 — Low Ambient Kit (if required for your application)

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

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

Table 1 — System Combinations for Indoor and Outdoor Units

SPLIT SYSTEM	INDOOR UNIT	OUTDOOR UNIT
High Wall Cooling Only System		
535BNH018	619BNX018000MAEZ	594CNX018
535BNH024	619BNX024000MAEZ	594CNX024
High Wall Heat Pump System		
635BNH018	619BNX024000MAWZ	694CNX018
635BNH024	619BNX024000MAWZ	694CNX024

NOTE: The 619BNX024(W) unit is matched with the 694CNX018 or 694CNX024 unit

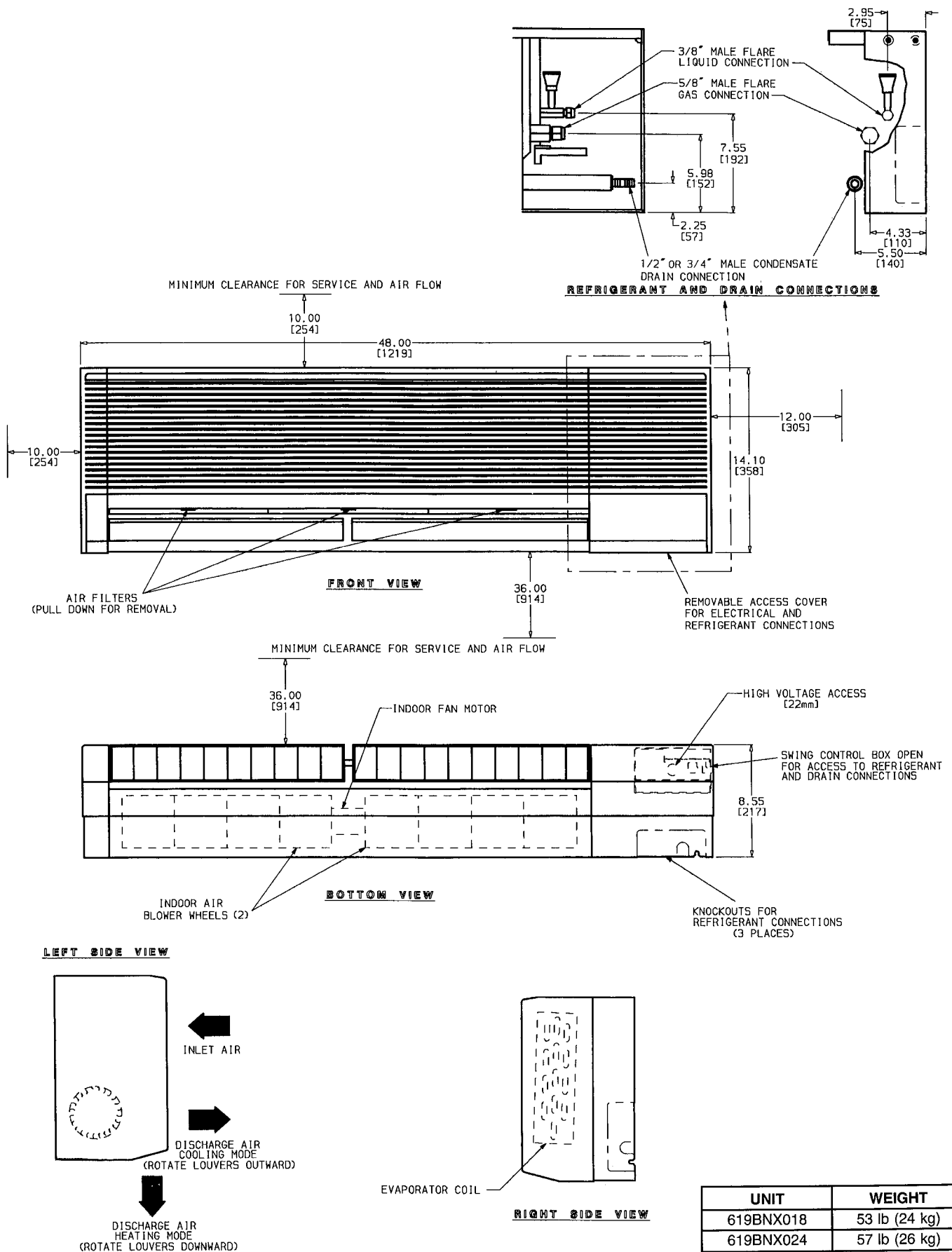


Fig. 2 – 619BNX018, 024 Dimensional Drawing

Table 2 — Application Range

COOLING			
Maximum		Minimum	
Indoor	Outdoor	Indoor	Outdoor
95 F DB 71 F WB	115 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	0 F DB

*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 by its four corners. Also, note that there is a plastic bag containing mounting screws taped to the mounting bracket.

B. Inspect Shipment

Upon receipt of shipment check unit (Fig. 1) 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.

II. SELECT LOCATION

Consult local building codes and National Electrical Code (NEC) for special installation requirements.

There are several ways the unit may be installed to different types of wall construction. These instructions do not cover all installation methods. As a typical installation, these instructions focus primarily on mounting the unit to wall studs in new construction. See Fig. 2 for unit dimensions and Fig. 3 for required clearances. Plan your installation carefully before you begin. Listed below are some guidelines that should be followed when determining location for the unit.

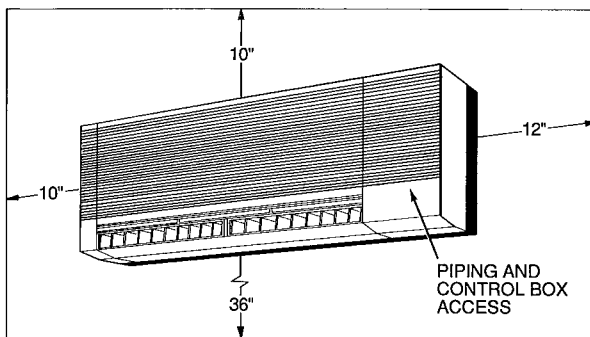


Fig. 3 — Minimum Required Clearances

1. Place unit as centrally as possible in the room to ensure air is completely distributed.
2. Before installing the wired remote controller, select a convenient and accessible location to mount the control. Note that 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 accessory installation instructions.

3. Allow sufficient space for airflow clearance, wiring, refrigerant piping, and servicing unit. See Fig. 2 and 3.
4. Select walls that are:
 - a. Strong enough to support weight of the unit.
 - b. Accessible to convenient condensate drainage.
 - c. Free of obstacles that may block air circulation to the fan coils.
5. Place top of fan coil unit as high on the wall as possible making sure the unit is at least 10 in. down from ceiling to permit removal of access cover for maintenance. Also, make sure that the unit is not placed directly over anything to prevent filter removal or block air flow.
6. Make sure units are easily accessible to electrical power.
7. Refrigerant piping can enter the unit through the pre-punched sheet metal holes. Refrigerant piping can run up or down along the wall, to the right along the wall, or straight through the wall or into the wall (Fig. 4). Once the piping is through the wall, it can run inside walls, in ceilings, between floors, or straight to the outside. See Fig. 5 for maximum line lengths.

NOTE: Run refrigerant piping as directly as possible avoiding any unnecessary turns or bends.

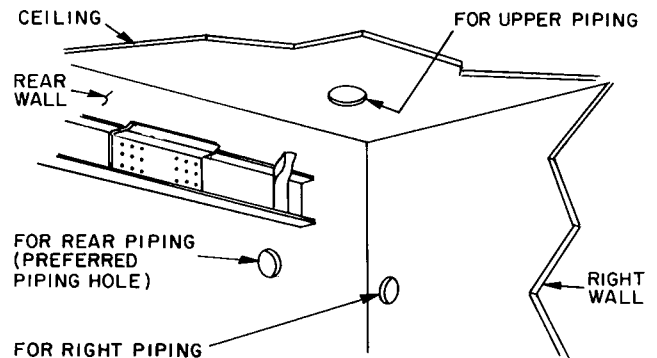


Fig. 4 — Wall Holes for Piping Connections

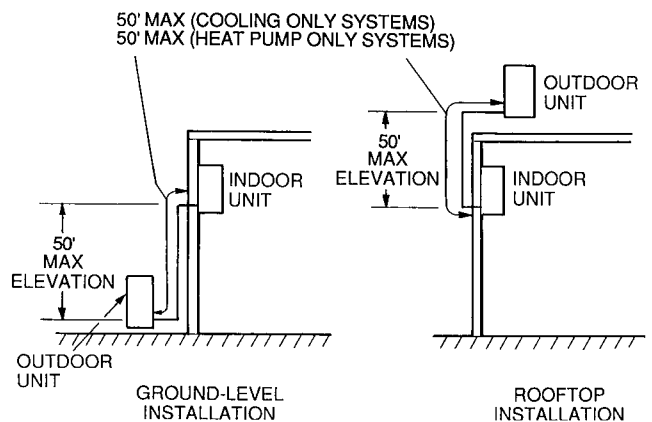


Fig. 5 — Maximum Line Lengths

8. 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 be made at a downward slope to ensure proper drainage.

III. MOUNT UNIT ON WALL

1. Decide how refrigerant will be piped. If it is necessary, knock out the appropriate pre-punched sheet metal holes (Fig. 6) on unit for piping and electrical connections.

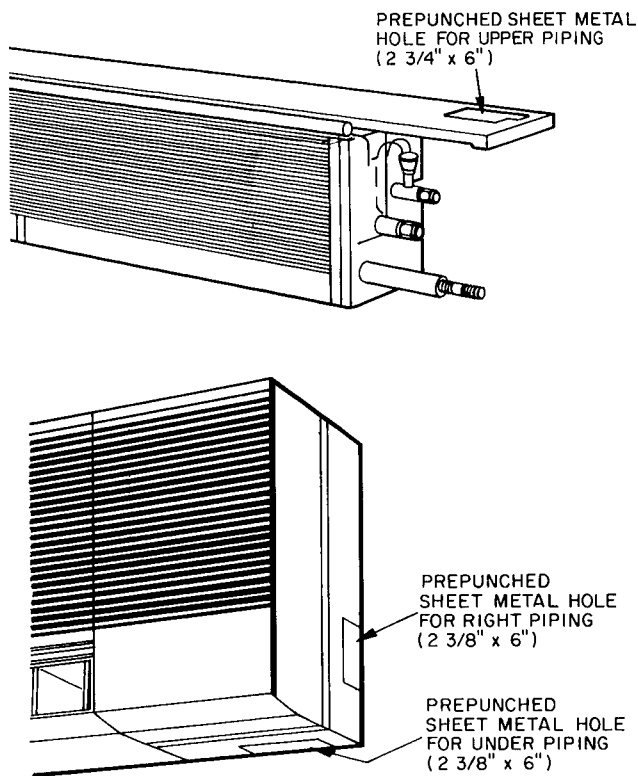


Fig. 6 — Pre-punched Sheet Metal Holes

2. Using a carpenter's level, fasten mounting brackets *into the studs in the wall* at least 10 in. away from the ceiling with the 6 screws provided. Make sure the attached bracket will support a 200-lb vertical load. For a masonry wall, anchor shields can be used to attach bracket to the wall.
3. Temporarily hang unit on bracket to check location and level.

⚠ CAUTION: If wall hook bracket is not mounted level, the indoor section will be mounted unevenly, and condensate drainage water may drip onto floor. Also, a gap between bracket and wall may result in vibration and noise from indoor section.

- a. Remove outer plastic casing over control box, remove the screw from the top of the control box, and swing control box towards coil.
 - b. To align unit on the mounting bracket, move unit side to side until the hole on top flange matches up with tab on mounting bracket (Fig. 7).
4. Mark and cut condensate and piping holes.
 - a. For piping through the wall, mark the wall below the condensate connection and cut a 2½-in. hole into the wall.
 - b. For piping to the side of the unit, mark the wall below the condensate connection and cut 2½-in. hole.

NOTE: The 2½-in. hole must be made at a downward slope to ensure proper condensate drainage. See Fig. 8. Slope condensate line at a minimum pitch of

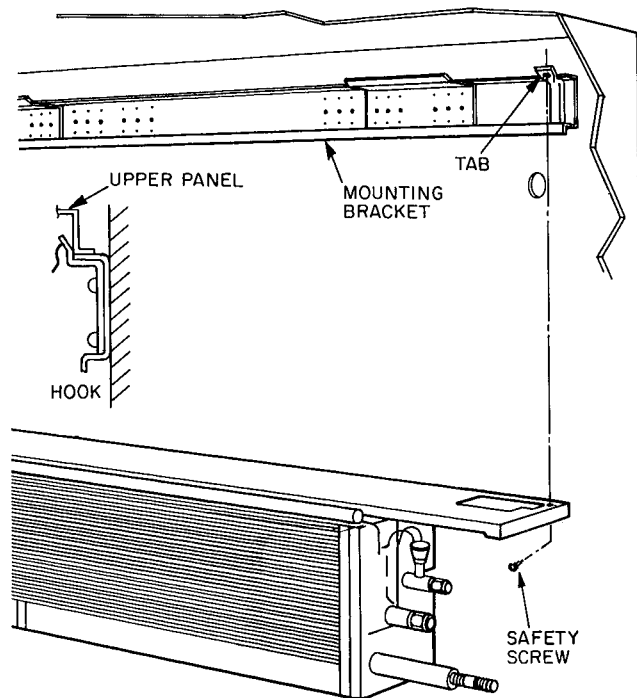


Fig. 7 — Align Unit on Bracket

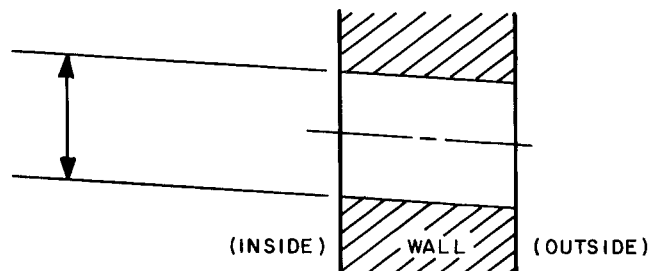


Fig. 8 — Piping Hole

one in. per 10 ft. The condensate line cannot be run up for upper piping connections — only refrigerant lines may be run up. A ¾-in. hole may be used if condensate line only is to be run below.

5. Fasten fan coil unit to the tab in the bracket *with safety screw provided.*

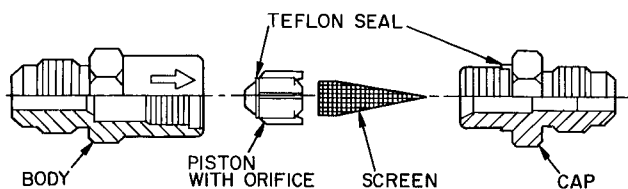
IV. CONNECT REFRIGERANT PIPING

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.

⚠ 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 and Check-Flo-Rater metering device in liquid line at fan coil (Fig. 9). If it is necessary, remove auxiliary drain pan to make connection easier. Make sure arrow on metering device body points away from the coil. Use Table 4 to determine required piston size for the system being installed. A connection elbow is shipped with the unit for the suction line to avoid interference with the control box. This connection may be used if required for the selected piping connections.
 - e. On heat pump installations, install piston in the Check-Flo-Rater metering device located in the service valve on the outdoor unit (Fig. 10). 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.



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

Fig. 9 – Check-Flo-Rater Metering Device in Liquid Line (Bypass Type Components)

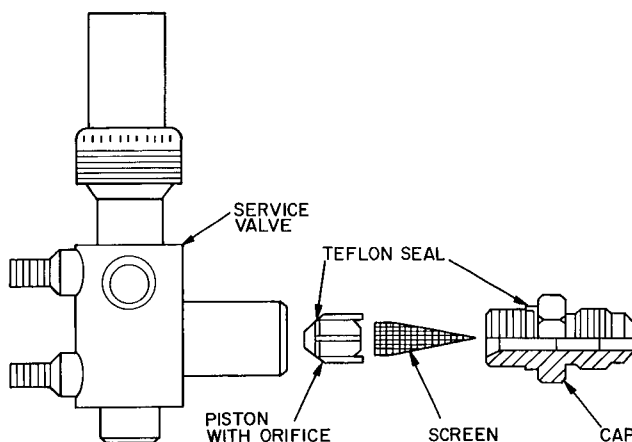


Fig. 10 – Check-Flo-Rater Metering Device at Service Valve (Bypass Type Components)

NOTE: Check-Flo-Rater metering device is not included with fan coil unit; it is provided in a separate kit.

- f. Refer to 594C and 694C 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.

1. Connect drain line by inserting either a 1/2 or 3/4-in. rigid PVC pipe over the drain connection. Refer to Fig. 11.

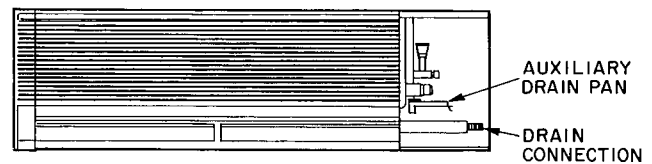


Fig. 11 – Drain Connection

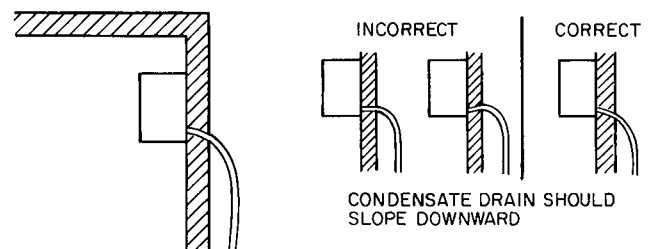


Fig. 12 – Drainage Systems

CAUTION: The drain tube extension must be securely fastened to the condensate drain. Failure to do so can result in condensate water dripping onto the floor.

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. Refer to Fig. 12.

IMPORTANT: Be sure the drain hose has no slack which might form a trap. Do not insert a trap in the drain line; the drain is internally trapped.

3. 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.

Table 3 — Specifications

UNIT 619B	018	024
OPER WT (lb)	53	57
REFRIGERANT	R-22 Check-Flo-Rater™ Control	
FAN Rpm Nominal Cfm (High Speed)	1327 520	1393 535
COIL Rows Face Area (sq ft) Fins/in. Number of Circuits	2 2.54 14.4 3	3 2.54 14.4 4
CONNECTIONS Suction (in.) Flare Liquid (in.) Flare Condensate Drain*	5/8 Male 3/8 Male 1/2 Male	
LINE SIZES Suction (in.) Liquid (in.) Condensate Drain*	5/8 3/8 1/2 or 3/4	

*Either a 1/2-in. or 3/4-in. pipe can be connected to unit drain pan connection

VI. MAKE ELECTRICAL CONNECTIONS

Be sure field wiring complies with local building codes and National Electrical Code (NEC), and unit voltage is within limits shown in Tables 5 and 6.

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 Tables 5 and 6 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 per NEC of adequate size to handle unit starting current. Locate disconnect

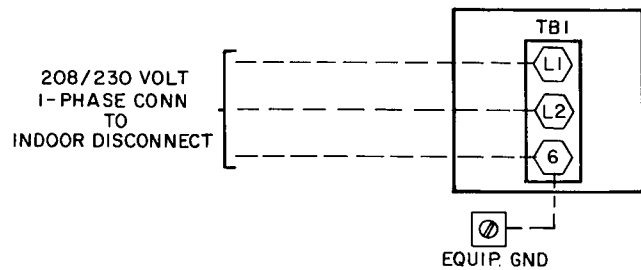
within sight from and readily accessible from unit, per Section 440-14 of NEC. Some codes allow indoor unit to share disconnect with outdoor unit if disconnect can be locked; check local code before installing in this manner.

1. Route ground and power wires. First, remove the factory test leads connected to the power terminal box. These leads are for factory testing only and cannot be used for power connections.

⚠ 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. 13) from indoor disconnect to the fan coil unit. Place wire through hole on the control box (Fig. 14). Connect wire (Fig. 15) to high voltage terminal board (TB-1) and ground screw. Be sure to leave some slack wire so that the control box can swing full open for access to the drain and piping connections. When routing the wire in the unit, use care to keep the wire away from refrigerant and condensate piping and any sharp edges.

⚠ CAUTION: Do not short circuit the 619B transformer — it is fused. The transformer can be short circuited by connecting the wrong wires or by touching a live wire to the side of a grounded control box.



FAN COIL UNITS

Fig. 13 — Line Power Connections

Table 4 — Required Piston Sizes for Check-Flo-Rater® Metering Device

OUTDOOR UNIT	INDOOR UNIT	INDOOR PISTON	INDOOR PISTON TYPE	OUTDOOR PISTON	OUTDOOR PISTON TYPE	REQUIRED SYSTEM CHARGE (lb)*
594CNX018	619BNX018(E)	49	B	N/A	N/A	6 0
594CNX024	619BNX024(E)	57	B	N/A	N/A	5 8
694CNX018	619BNX024(W)	55	B	62	B	5 4
694CNX024	619BNX024(W)	51	B	61	B	5 3

LEGEND

N/A — Not Applicable

*Charge amount determined with 25 ft of line. Check charge for longer lines using superheat method. See 594C or 694C installation, start-up, and service instructions for charging procedures.

Table 5 – Electrical Data

INDOOR UNIT	V-PH (60 Hz)	OPERATING VOLTAGE*		FAN		WATTS	MCA	MAX FUSE OR HACR TYPE CKT BKR AMPS
		Max	Min	LRA	FLA			
619BNX018(E)	208/230-1	253	187	2.3	.37	70	.5	20
619BNX024(E)	208/230-1	253	187	2.4	.40	72	.5	20
619BNX024(W)	208/230-1	253	187	2.4	.40	72	10.3	20

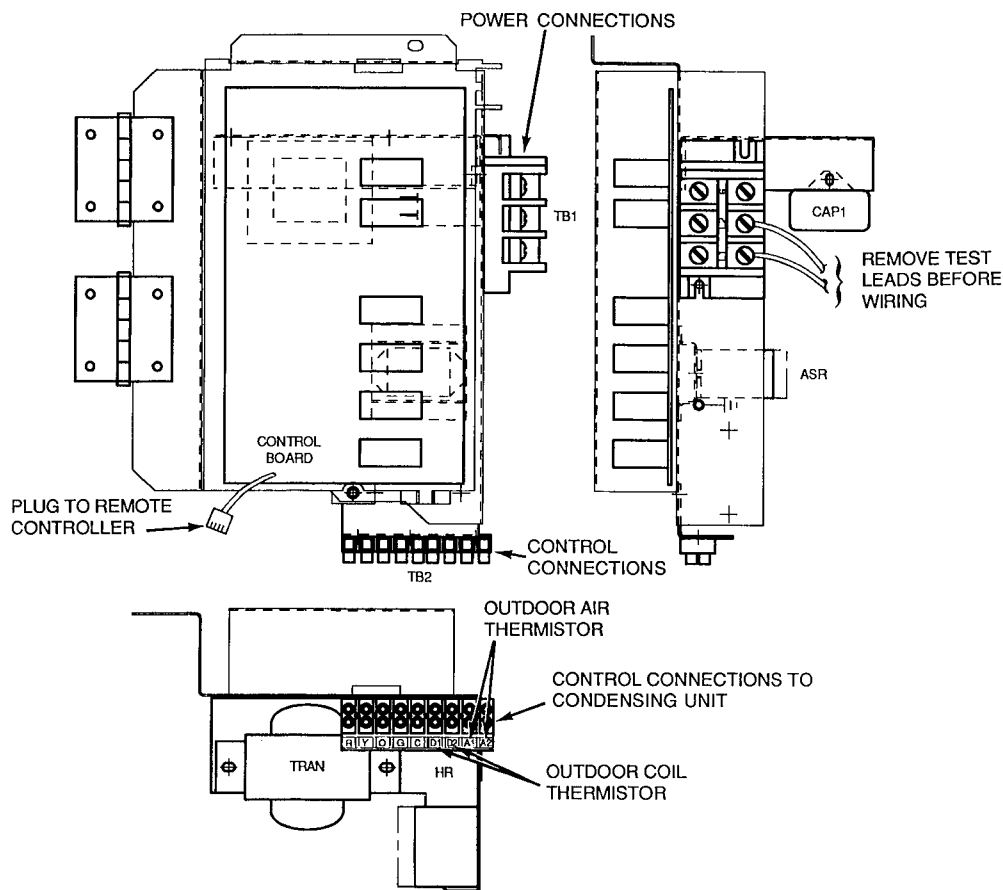
LEGEND

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

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

Table 6 – Electric Heater Data (Heat Pump Units Only)

INDOOR UNIT	V-PH	INPUT AMPS	kW	MIN WIRE SIZE	MAX FUSE OR HACR TYPE CKT BKR AMPS
619BNX024(W)	230-1	7.8	1.8	14	20



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 National Electrical Code (NEC) and local codes

LEGEND

ASR — Air Sweep Relay
CAP — Capacitor
PL — Plug
TB — Terminal Block
TRAN — Transformer
— — — — — Field Control Wiring
— — — — — Field Power Wiring
— — — — — Circuit Board Run
⊠ — Terminal Block

Fig. 14 – Control Circuit Connections

VII. INSTALL CONTROL

The 619B 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. The thermistors monitor system operation and control the operating mode. To change settings or modes of operation, use of a wired remote controller is required.

The DIP switches on the 619B control board set the operation of the unit — for cooling only or for heat pump operation. Be sure the switches are set correctly. See wiring diagram on page 14 or 15, and also the control, service, and troubleshooting guide (available from your distributor) for more information.

The remote controller is directly connected to the unit by a wire cable. Standard cable length is 15 ft, but the cable can be any length up to 200 ft.

Determine where the best location to mount the controller is. 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:

1. Cut the cable to required length on the end which attaches to the controller.
2. Strip wire ends and attach the controller base plate.
3. Attach mounting bracket to the wall with screws provided.
4. Plug the base plate into the back of the controller and slide the controller into the mounting bracket (see Fig. 15).
5. Attach the other end of the cable to the control plug from the board in the fan coil control box (see Fig. 15).

VIII. CONNECTIONS TO OUTDOOR UNIT

A. Cooling Only Systems

The following connections must be made to the 594C unit for it to operate as a system with the indoor unit:

1. A thermistor and a thermistor connection cord with a lead length of 20 ft are shipped with the 619B(E) unit. Run the connection cord from the low voltage plug on the control board in the fan coil unit to the condensing 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. Attach the thermistor to the outdoor coil with the wiretie provided, and plug the thermistor into the connection cable. The thermistor should be located as shown in Fig. 16 on the return bend.
2. Route 2 wires of 18-gage thermostat cable between the low-voltage terminal block of the fan coil and the 594C unit. Connect the wires Y to the white wire from the high-pressure switch and C to the white wire from the compressor contactor.

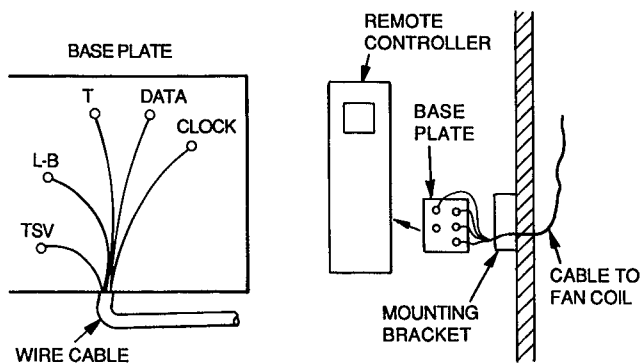


Fig. 15 — Wired Remote Controller Installation

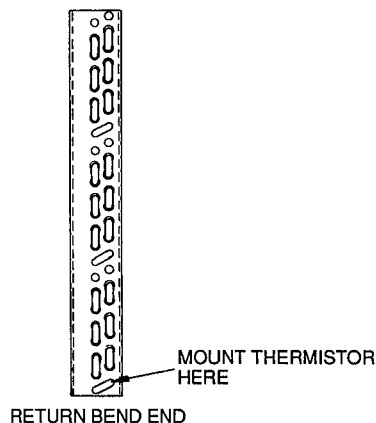


Fig. 16 — Thermistor Location

B. Heat Pump Systems

The following connections must be made to the 694C unit for it to operate as a system with the indoor unit:

1. Two thermistors and 2 thermistor connection cords with a lead length of 20 ft are shipped with the 619B(W) unit. Run both of these from the low voltage plug on the control board in the fan coil unit to the heat pump. Use care to route the wires so that they will not be damaged, and do not run them near power wires. Attach one thermistor to the inlet grille with the wire tie provided. Be sure to route the wires away from the fan and secure adequately. Attach the second thermistor to the outdoor coil with the wire tie provided. The thermistor should be located as shown in Fig. 16 on the return bend.
2. Route 5 wires of 18-gage thermostat cable between the low-voltage terminal block of the fan coil and the 694C defrost board. Connect Y to Y, R to R, O to O, G to G, and C to C with the wires.
3. An accessory outdoor-fan relay (part no. HN61KJ250) must be field installed. This relay is necessary so that the demand defrost board in the fan coil can work with the 694C unit. Mount the relay in the unit control box, and wire the coil of the relay from G to C on the defrost board of the 694C unit. Remove the 2 black wires from OF1 and OF2 of the defrost board, and attach to the normally open contacts of the relay. See wiring diagram on page 15.

START-UP

The following checks should be made before system start-up. Refer to outdoor unit installation, start-up and service instructions for system start-up procedures and refrigerant charging methods.

1. Check condensate drainage system.
Located in the control box, below the refrigerant connection is an auxiliary drain pan. Add water to check the drainage flow. If water does not flow regularly, check the pipe slope or see if there are any pipe restrictions.
2. Make sure that all wiring connections are correct and that they are tight.
3. Make sure that all barriers, covers, and panels are in place.
4. Ensure that the filters have been installed and that the discharge louvers are correctly positioned.

⚠ WARNING: Never operate unit without a filter. Damage to the unit or personal injury may result.

5. If the unit is equipped with a crankcase heater, energize a minimum of 24 hours before starting the unit. To energize heater only, close indoor unit disconnect, then with the remote controller, set unit in off mode and close the outdoor unit disconnect.
6. Fully backseat (open) the liquid and vapor tube service valves.
7. Unit is shipped with valve stems frontseated and caps factory installed. Replace stem caps after system is opened to refrigerant flow (backseated). Replace caps finger tight.
8. With the remote controller, turn on the unit and operate in each mode (if applicable) for 15 minutes to test for proper operation. Do not operate in cooling mode if outdoor temperature is below 50 F unless unit is equipped with low ambient control. Do not operate in heating mode if the outdoor temperature is above 75 F.
9. Test for proper refrigerant charge using the superheat method.
10. Explain basic system operation to the owner.

I. AFTER EXTENDED SHUTDOWNS

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.

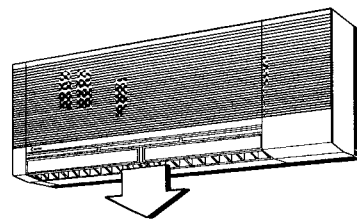
II. SEASONAL CHANGEOVERS

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:

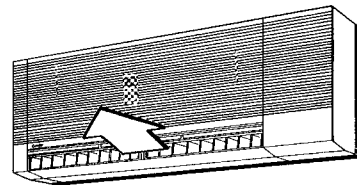
1. Inspect and clean the outdoor unit, particularly the coil.
2. Clean or replace the air filters in the indoor unit.
3. Clean the indoor unit drain pan and drain pipe, and remove any obstructions.
4. Turn on indoor and outdoor unit disconnect switches to supply power to the system 12 hours before starting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

III. ADJUSTING AIRFLOW

The airflow direction may be manually adjusted up and down. For cooling only units and heat pump when it is operated in the cooling mode, manually set the louvers to discharge horizontally (see Fig. 17). For the heat pump unit when operated in the heating mode, set the louvers to discharge vertically (see Fig. 17).



HEATING — DIRECT LOUVERS SO AIR BLOWS DOWN (VERTICAL DISCHARGE)



COOLING — DIRECT LOUVERS SO AIR BLOWS STRAIGHT OUT (HORIZONTAL DISCHARGE)

NOTE: Unit is equipped with auto sweep feature which automatically directs the air from side to side. See Adjusting Airflow section on this page for more information.

Fig. 17 — Louver Adjustments

A. Automatic Air Sweep

All units are equipped with an automatic air sweep feature which automatically directs the airflow louvers from side to side 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 LCD display 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 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 619B unit. To operate the unit, a remote controller is required. This control is 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 8 operating modes (including the off mode) for the unit. 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. However, 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** — 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.
- **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.

For proper system operation we recommend that the cleaning and maintenance operations in Table 7 be performed.

I. LUBRICATION

The indoor-fan 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

⚠ 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*.

Table 7 — Cleaning and Maintenance Schedule

TASK	MONTHLY	QUARTERLY	YEARLY
INDOOR UNIT			
Clean Air Filters	X		
Clean Drain Pipe		X	
Clean Condensate Drain Pan			X
Clean Indoor Unit Front Panel		X	
OUTDOOR UNIT			
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 Drain Pan		X	

NOTE: Maintenance procedures for the outdoor unit are in the 594C and 694C installation instructions.

A. To Remove Air Filters

1. Position the air delivery louvers on the indoor unit (see Fig. 17) for horizontal discharge.
2. Grasp the filter tabs (see Fig. 18) and carefully pull the filters straight down and out of the indoor unit.

NOTE: There are multiple filters to be removed and cleaned.

B. To Clean or Replace Filters

Filters can be vacuumed, or washed in warm water (see Fig. 18). Shake filter to remove any excess water, and replace by sliding filter behind front 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.

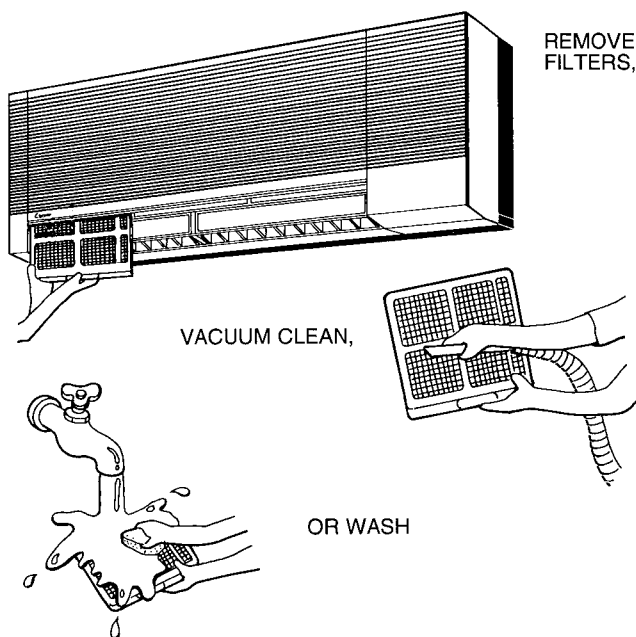


Fig. 18 — Air Filter Maintenance

III. TO CLEAN INDOOR UNIT FRONT PANEL

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

CAUTION: When cleaning the front panel, NEVER use water hotter than 105 F. Do not use abrasive or petroleum-based cleaners — damage to unit appearance will result.

IV. TO CLEAN INDOOR COIL

To clean the coil, remove indoor unit front panel, and 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. CLEANING CONDENSATE DRAINS

Clean all drains and drain pans at the start of each cooling season. Check the flow by pouring water into the drain.

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

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.

To access the LED indicator light, open the control box end cover of the indoor unit by removing the screws on the access panel.

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 8 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 8 — 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

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. 19 AND 20

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. The CLO (compressor lockout) is located in the outdoor

unit control box. The CLO locks out the compressor to prevent short cycling on compressor overload and safety devices. Before replacing CLO, check these devices.

4. Use minimum of 60 C wiring for field power wiring.
5. Thermostat is internal to unit. Unit must be controlled with wired or infrared wireless remote controller.

LEGEND FOR FIG. 19 AND 20

ASM	— Air Sweep Motor
ASR	— Air Sweep Relay
BRK W/AT	— Break With Amp Turns
C	— Compressor Contactor
CAP	— Capacitor
CB	— Circuit Breaker
CH	— Crankcase Heater
CLO	— Compressor Lockout
COMP	— Compressor
CT	— Current Transformer
DAT TH	— Discharge Air Thermistor
DFB	— Defrost Board
DFT	— Defrost Thermostat
DT	— Discharge Thermostat (Scroll Compressor Only)
EQUIP	— Equipment Ground
GND	
FL	— Fuse Link
FU	— Fuse

HPS	— High-Pressure Switch
HR	— Heater Relay
HTR	— Heater
HTT	— Heater Temperature Thermostat
IB	— Interface Board
IDC TH	— Indoor-Coil Thermistor
IFM	— Indoor-Fan Motor
LED	— Light Emitting Diode
LPS	— Low-Pressure Switch
LOR	— Lockout Relay
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



Fig. 19 – Typical System Wiring Diagram – Cooling Only System

