

Installation, Start-Up and Service Instructions

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SAFETY CONSIDERATIONS

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

Untrained personnel can perform basic maintenance functions of cleaning coils and cleaning and replacing filters. All other operations should be performed by trained service personnel. When working on air conditioning equipment, observe precautions in the literature, tags and labels attached to the unit, and other safety precautions that may apply.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth and have fire extinguishers available for all brazing operations.

⚠ WARNING

Before performing service or maintenance operations on unit, turn off main power switch to unit. Electrical shock could cause personal injury.

INSTALLATION

Step 1—Check Equipment and Jobsite

UNPACKAGE UNIT:

1. Move to final location.
2. Remove shipping bands and lift carton from cabinet. See Table 1 for unit weights. *Save carton and use to protect unit until construction, painting, etc., are completed.*
3. Remove chassis from base by removing 2 screws holding unit to crate base (one below air filter near compressor end of unit, the other at the edge of the base within the piping compartment).

INSPECT EQUIPMENT—File claim with shipping company if shipment is damaged or incomplete.

SYSTEM REQUIREMENTS—Complete or consider these system requirements before installation:

1. Consult local building codes and NEC (National Electrical Code) for special installation requirements.
2. Ensure there is an adequate supply of water at temperature of 60 F to 90 F.

⚠ WARNING

Do not operate unit outside this range. Damage to equipment and property will result.

3. Provide sufficient space for water piping, condensate drain, wiring, and servicing unit. See Fig. 1 and 2.
4. Determine on which side piping and wiring connections are to be made. All units are shipped from the factory in the right-hand configuration. If chassis must be rotated, see details and illustration in Fig. 3.

Step 2—Level Unit and Secure Chassis to Wall:

1. Remove cabinet from chassis by removing 2 screws holding kickplate to chassis.
2. Lift cabinet with kickplates from chassis.
3. Level unit using field-supplied shims, ensuring that bottom of chassis is snug to floor.
4. Secure chassis to wall using 4 mounting clips to the rear panel flanges of the chassis.
5. Position cabinet over rear edge of chassis.
6. Center discharge grille between chassis bulkheads.
7. Replace 2 screws through kickplate into chassis, one at each end.
8. Lower frame.

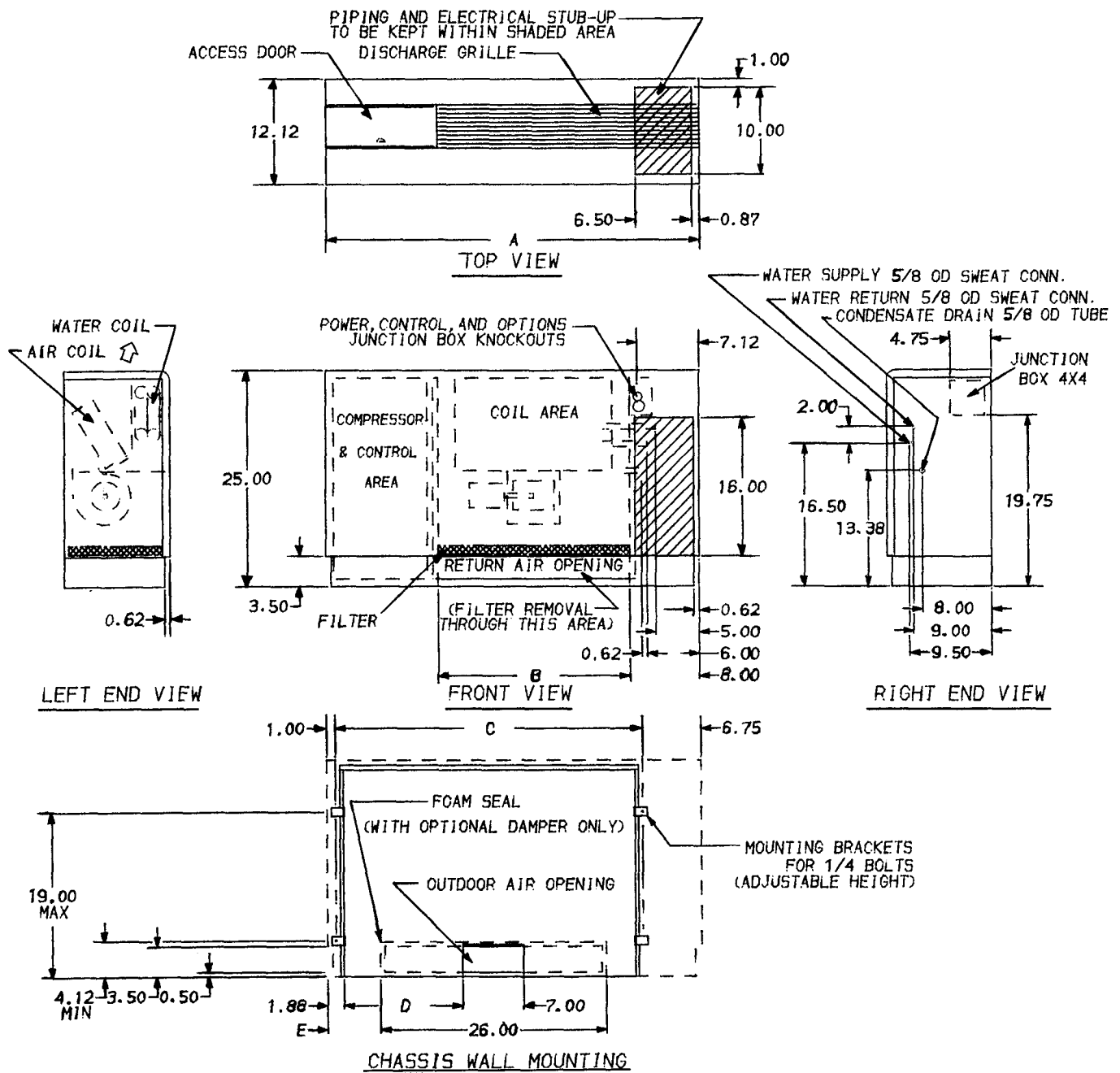
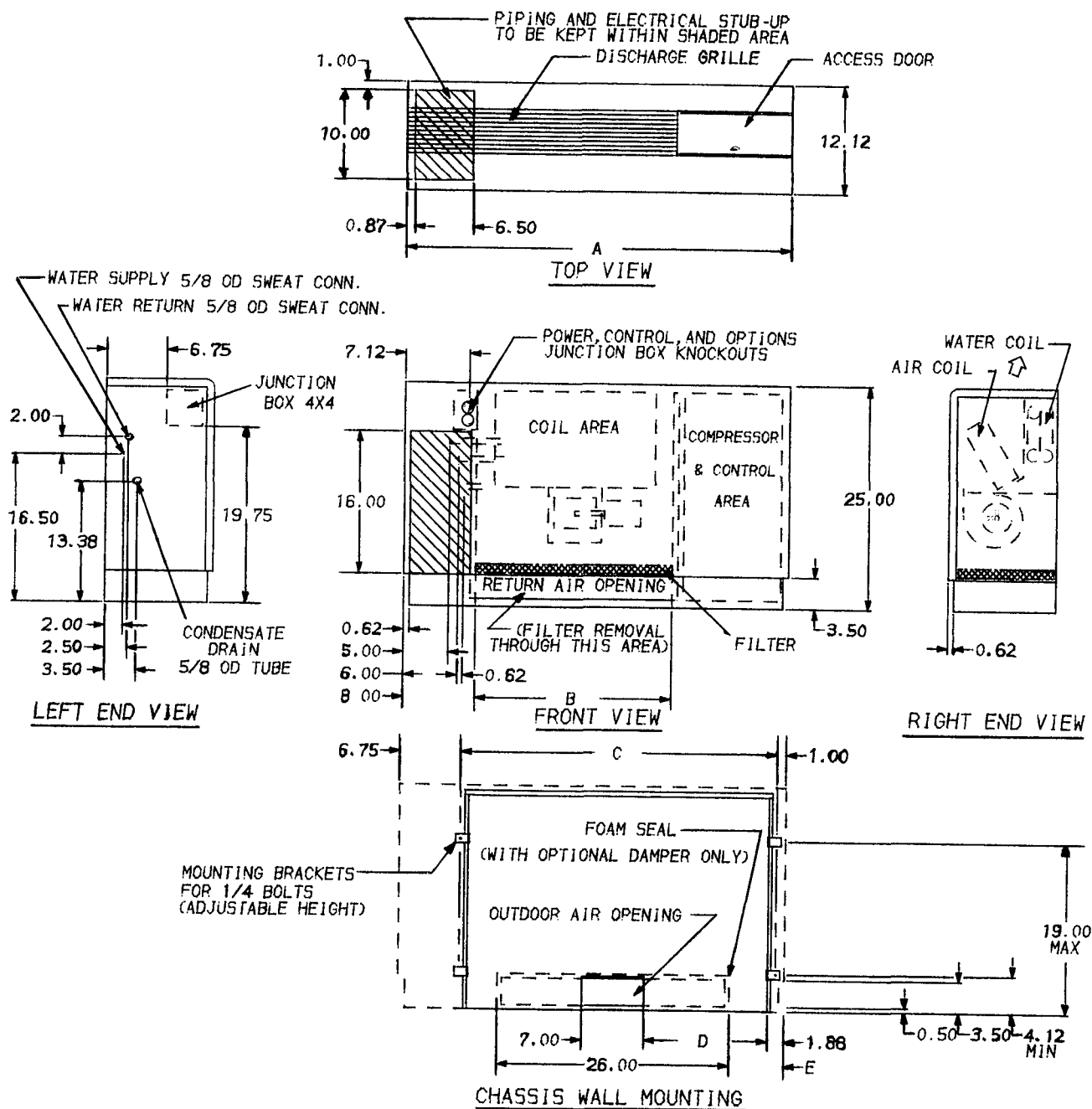


Fig. 1 — Base Unit Dimensions, Right-Hand Stub-Up



LEGEND

CONN — Connection
OD — Outside Diameter

Direction of airflow

NOTE: All dimensions are in inches

UNIT 50KQ	A	B	C	D	E
006,009,012	43	22	34.88	13.5	5.88
015,019	55	34	46.88	19.5	11.88

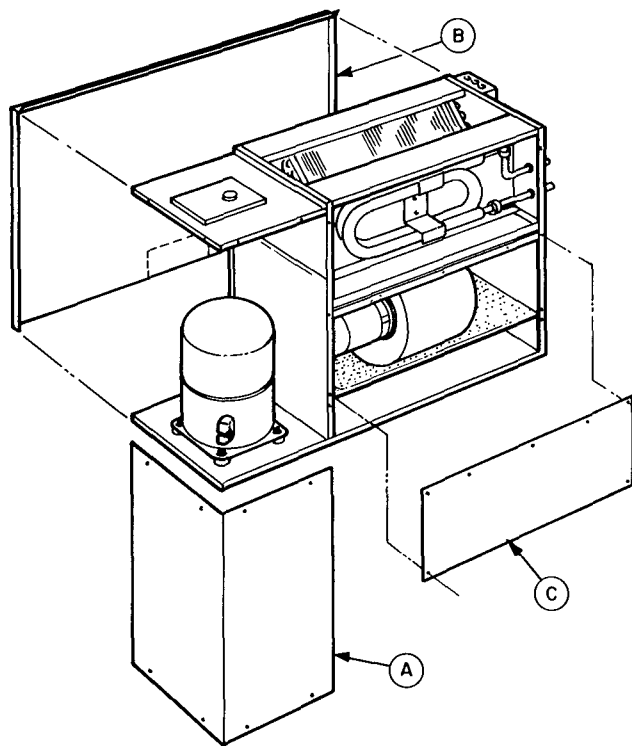
Fig. 2 — Base Unit Dimensions, Left-Hand Stub-Up

Table 1 – Physical Data

UNIT 50KQ	006	009	012	015	019
REFRIGERANT					
Control			Capillary Tube		
R-22 Charge (lb-oz)*	0-14	0-15	1-1	1-9	2-1
FAN†					
Quantity	1	1	2	2	2
Diameter (in.)	6 ⁵ / ₁₆	6 ⁵ / ₁₆	6 ⁵ / ₁₆	6 ⁵ / ₁₆	6 ⁵ / ₁₆
Width (in.)	6 ¹ / ₂	6 ¹ / ₂	4 ¹ / ₂	6 ¹ / ₂	6 ¹ / ₂
Motor Hp	¹ / ₂₀	¹ / ₂₀	¹ / ₂₀	¹ / ₂₀	¹ / ₂₀
Motor Rpm (nominal)	1000	1000	1000	1000	1000
COIL					
Face Area (sq ft)	1.0	1.25	1.25	1.67	1.67
Rows (no.)	2	2	3	3	4
OPERATING WEIGHT (lb)	130	140	160	175	190
SHIPPING WEIGHT (lb)	145	155	180	195	210
FILTER SIZE (in.) 1 x w x ¹ / ₂ thick Disposable	21 ³ / ₄ x 10 ¹ / ₂			33 ³ / ₄ x 10 ¹ / ₂	

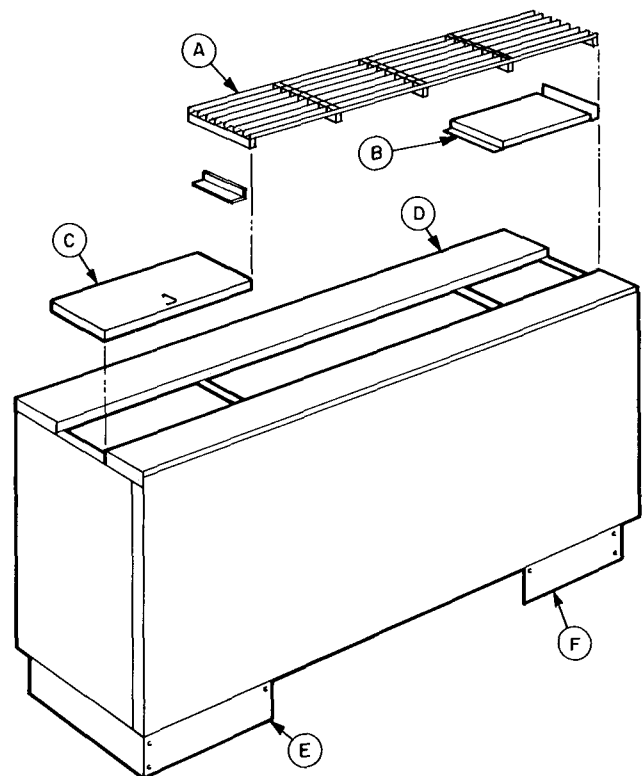
*Factory charged

†Fan data is for each fan



CHASSIS

1. Remove panel A
 2. Remove (and exchange positions with each other) panels B and C.
- NOTE: Carefully remove compressor capacitor from panel B and reattach to panel B in new position provided.
3. If unit is equipped with outdoor-air assembly, move entire outdoor assembly to new position on panel B.
 4. Replace panel A to new "front" side and turn panel 180 degrees from top to bottom.



CABINET

1. Use carpeted or other suitable work surface to prevent marring cabinet finish.
2. Remove grille A and blockoff B
3. Remove door C and top D, one piece.
4. Remove C from D
5. Reinstall C to other end of D by using new pop rivets, or no. 6 screws, lock washers, and nuts. Keep screw head size to minimum to prevent interference with door action
6. Reinstall C and D assembly to unit.
7. Reinstall grille A and blockoff B, shifting both to opposite end of cabinet.
8. Remove kickplates E and F, exchange with each other, and re-install.

Fig. 3 – Chassis and Cabinet Rotation Detail

Step 3—Make Piping Connections

WATER SYSTEM LINES—Flush water system lines prior to connecting to unit (Fig. 4). Unit will not function properly if water-to-refrigerant heat exchangers are restricted with dirt, pipe dope, or other foreign matter.

WATER SUPPLY AND RETURN LINES—Connect water supply and return lines to water inlet and outlet pipe connections shown in Fig. 5. Use flexible hose for water line to reduce possible vibration and improve unit serviceability. Make sure hoses or pipes are suitable for system water pressure and sized for proper flow rate.

⚠ CAUTION

Improper heat exchanger water, quality, or flow due to piping, valving or improper pump operation is hazardous to unit and property.

⚠ CAUTION

Galvanized pipe or fittings are not recommended for use with these units due to possible electrolysis

BALANCING VALVES—Install balancing valves (with shut-off) in water supply and return lines for water flow adjustment and a means of water shutoff, if necessary when servicing unit. When multiple units are connected in parallel, valves permit removal of one unit without interrupting water flow to other units.

CONDENSATE DRAIN LINE CONNECTION—Make condensate drain line connection to connection provided on unit. See Fig. 1 and 2. Install a trap in condensate line as close as possible to unit. Trap must be at least 3-in. deep and not higher than the bottom of unit condensate drain opening. Pitch condensate line to open drain or sump.

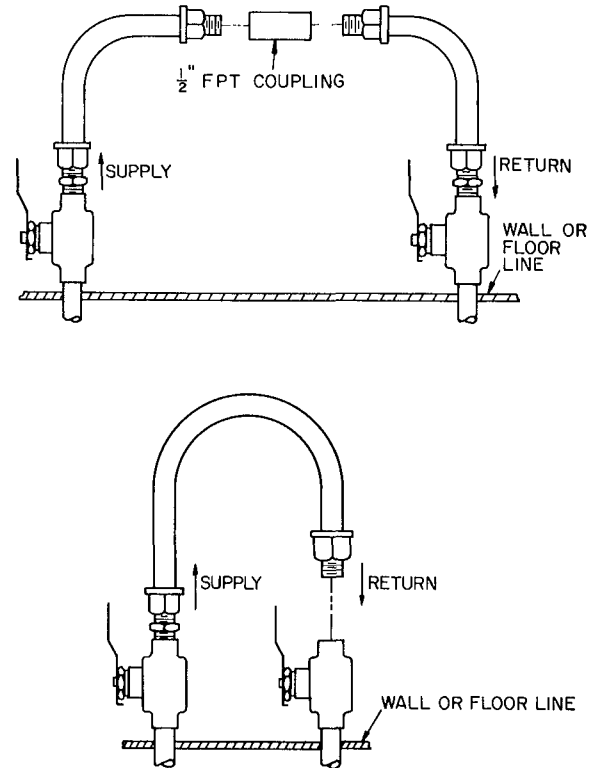


Fig. 4 — Flushing System Piping

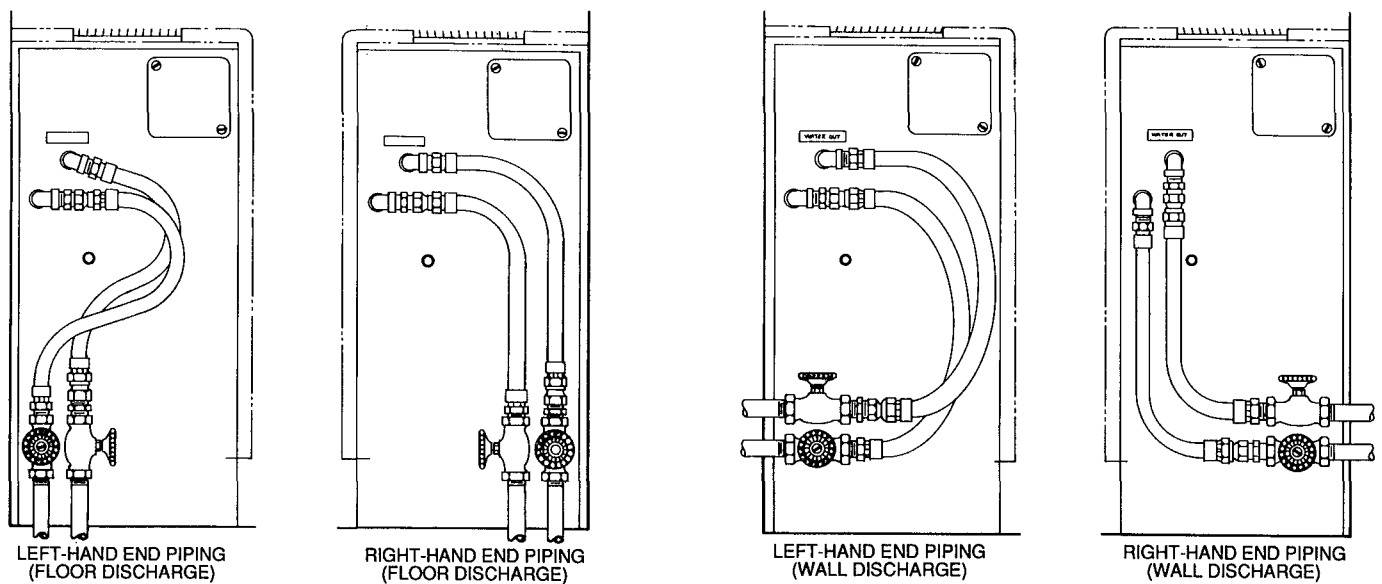


Fig. 5 — Piping Connections

Step 4—Make Electrical Connections (Fig. 6-8b) — All 208/230-v units are factory wired for 230 v. When power supplied is 208 v, change transformer connections as shown on the unit wiring diagram. See Table 2 for nameplate and nominal unit voltages.

Field wiring must comply with local and national fire, safety and electrical codes. Voltage to unit must be as indicated on nameplate and Table 3. Use copper conductors only.

Operation of unit on improper line voltage constitutes abuse and is not covered by Carrier warranty

BRANCH CIRCUIT DISCONNECT—Install a branch circuit disconnect per NEC of adequate size to handle unit starting current. Locate disconnect within sight and readily accessible from the unit, or if remote, with locking device, per Section 440-14 of NEC.

POWER LEADS—Bring power leads into unit. Extend leads from disconnect through hole provided into line wiring junction box per NEC.

GROUND LEAD—Connect ground lead to ground lug in junction box for safety. Connect power wiring. See Fig. 6.

Table 2 — Voltage

NAMEPLATE VOLTAGE	NOMINAL VOLTAGE
208 v	208 v
230 v	240 v
265 v	277 v

Table 3 — Electrical Data

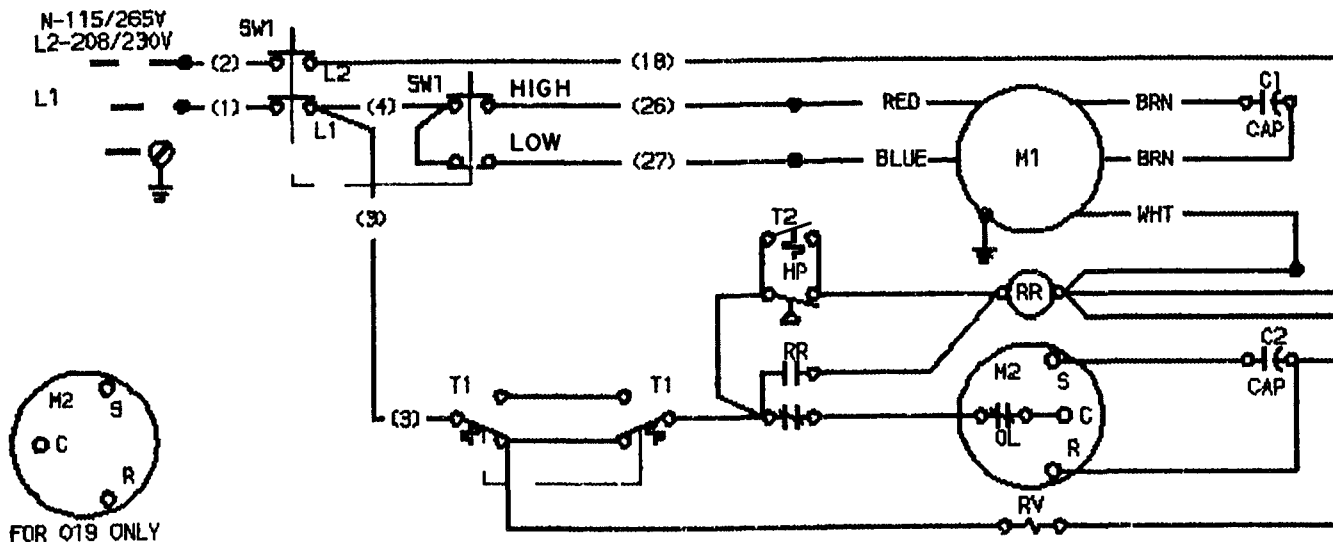
UNIT 50KQ	VOLTAGE (1-60 Hz)	COMPRESSOR		FAN	MINIMUM CIRCUIT AMPS	MAXIMUM FUSE AMPS
		RLA	LRA	FLA		
006	115	5.1	29.8	0.9	7.3	15
	208/230	2.7	15.9	0.5	3.9	15
	265	2.4	12.3	0.4	3.4	15
009	115	6.2	40.0	0.9	8.7	15
	208/230	3.5	20.0	0.5	4.9	15
	265	2.7	16.0	0.4	3.8	15
012	208/230	4.6	31.2	1.3	7.1	15
	265	4.1	27.0	1.2	6.4	15
015	208/230	5.4	31.2	1.3	8.1	15
	265	4.3	27.0	1.2	6.6	15
019	208/230	9.6	54.0	1.3	13.3	20
	265	8.0	42.0	1.2	11.2	20



LEGEND

FLA — Full Load Amps
LRA — Locked Rotor Amps
RLA — Rated Load Amps

UNIT-MOUNTED AUTO. CHANGEOVER THERMOSTAT



UNIT-MOUNTED MANUAL CHANGEOVER THERMOSTAT

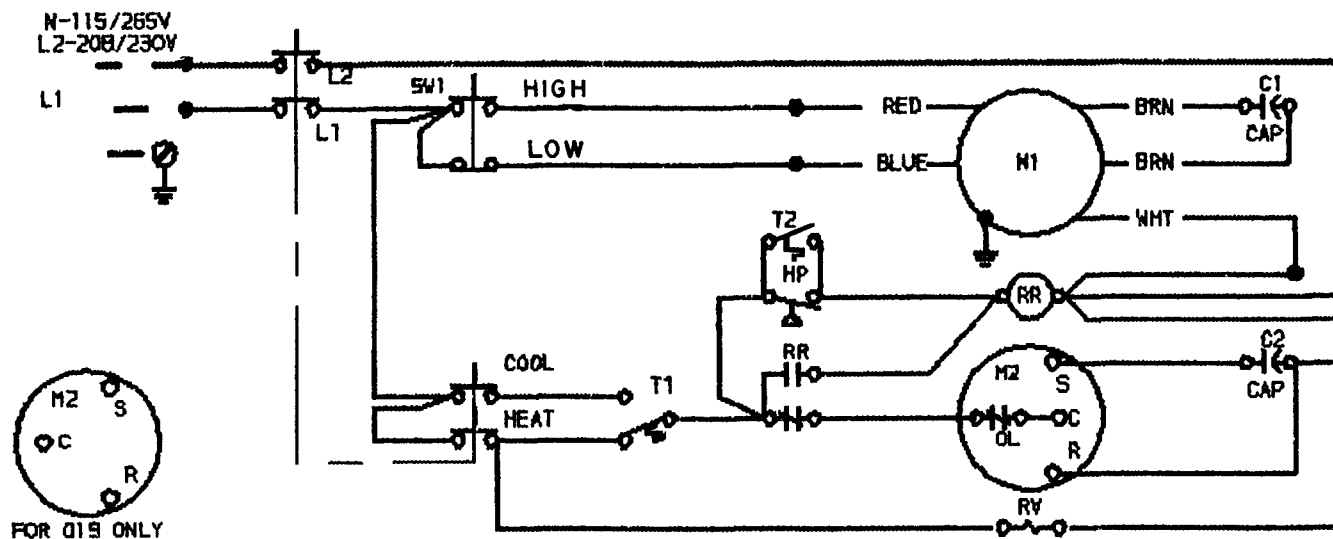


Fig. 6 – Typical Wiring Schematics, Unit Controls

LEGEND (Fig. 6 – 8b)

C1	— Fan Capacitor	R5	— Relay, Night Setback
C2	— Compressor Capacitor	R6	— Relay, Vent Lockout
HP	— High-Pressure Switch	RR	— Reset Relay
M1	— Fan Motor	RV	— Reversing Valve
M2	— Compressor	SW1	— Fan Switch
M3	— Motor-Damper	SW3	— Switch, Ventilation
NOT	— Night Override Timer	SW5	— Switch, Unit
NS	— Thermostat, Night Setback	T1	— Room Thermostat
OL	— Compressor Overload	T2	— Low-Temperature Protection
R2	— Compressor Relay	X1	— Transformer
R4	— Fan Relay		

REMOTE-MOUNTED THERMOSTAT

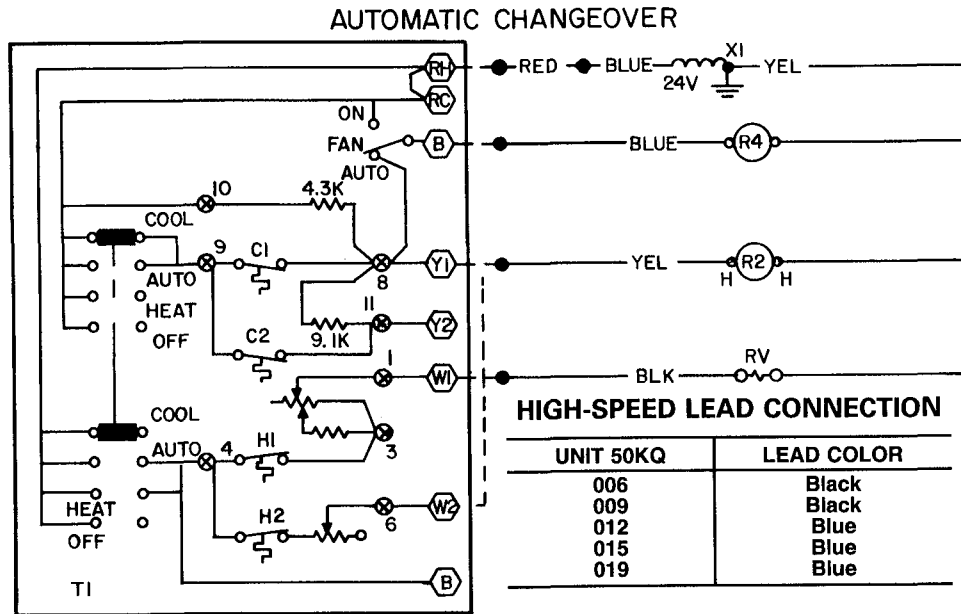
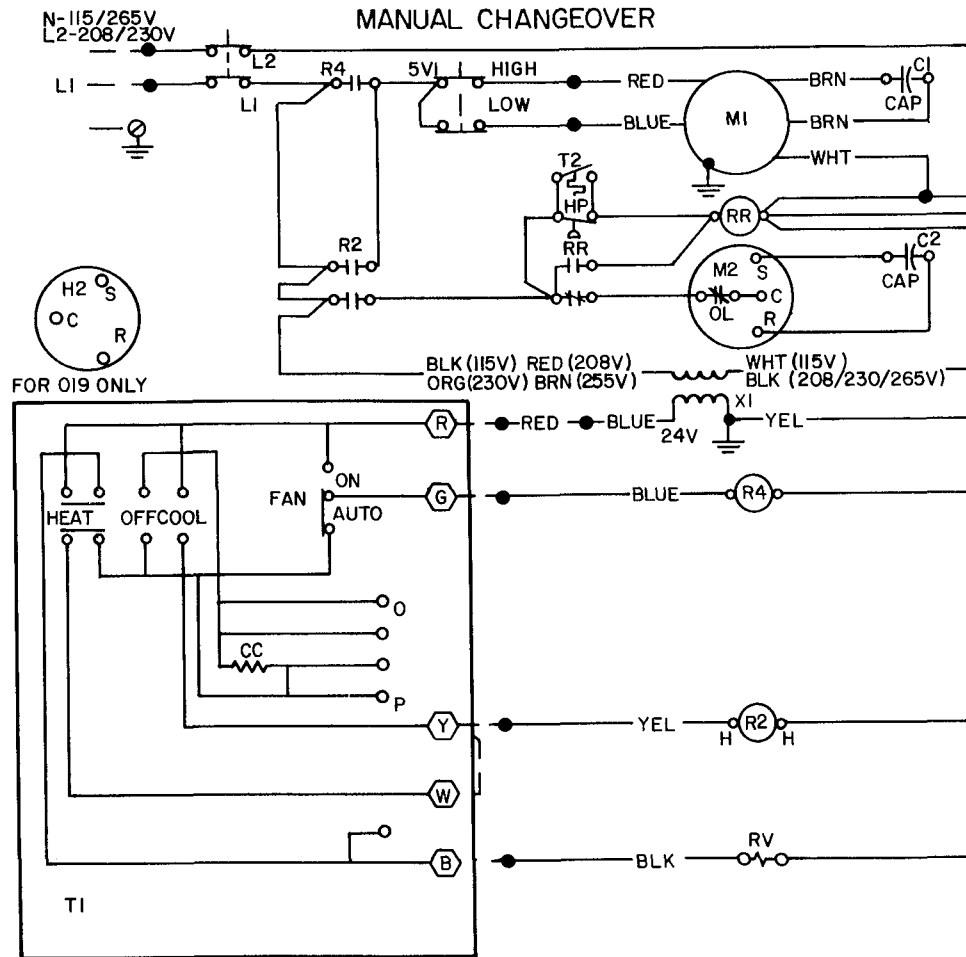
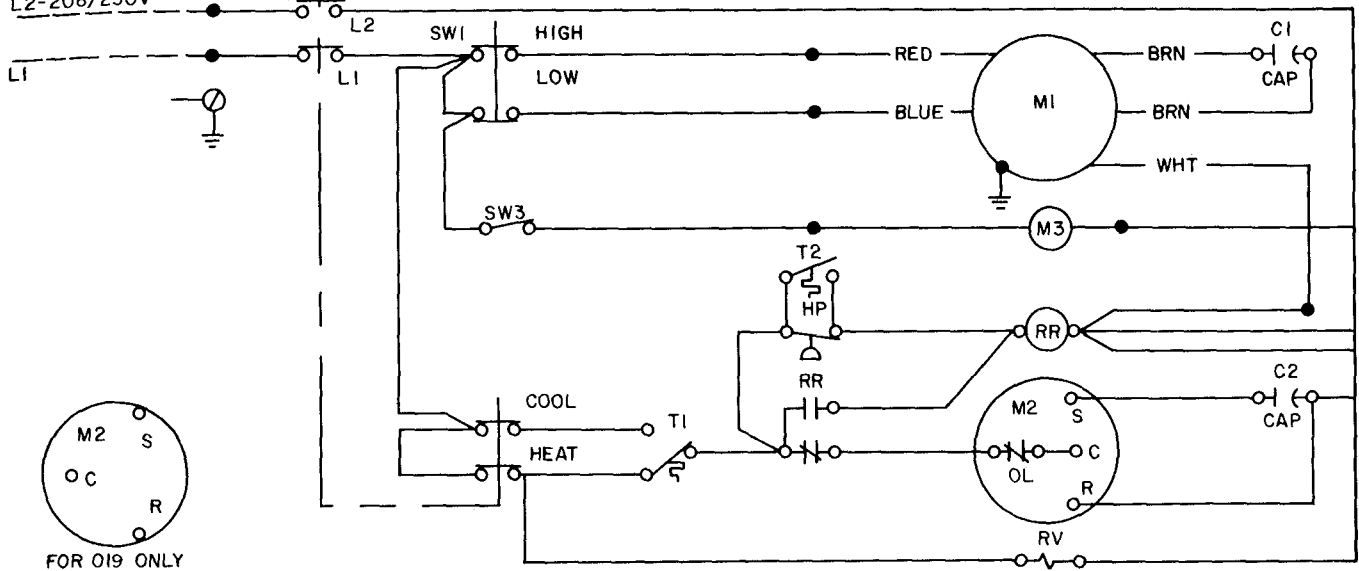


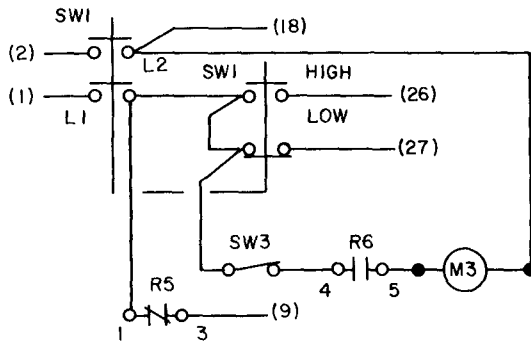
Fig. 7 - Typical Wiring Schematics, Remote Controls

N-115/265V
L2-208/230V

UNIT WITH MOTORIZED DAMPER



UNIT- MOUNTED NIGHT SETBACK RELAY- MOTORIZED DAMPER



UNIT-MOUNTED NIGHT SETBACK RELAY- MOTORIZED DAMPER AND NIGHT SETBACK THERMOSTAT

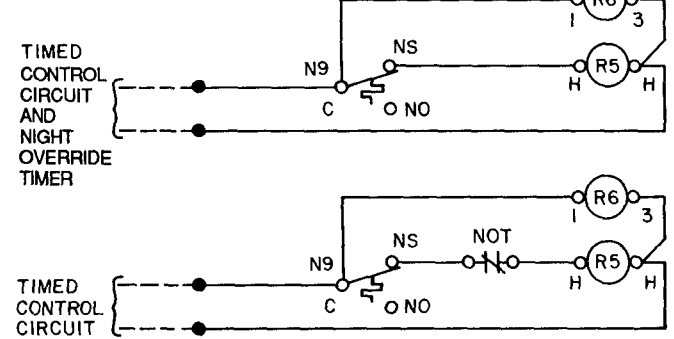
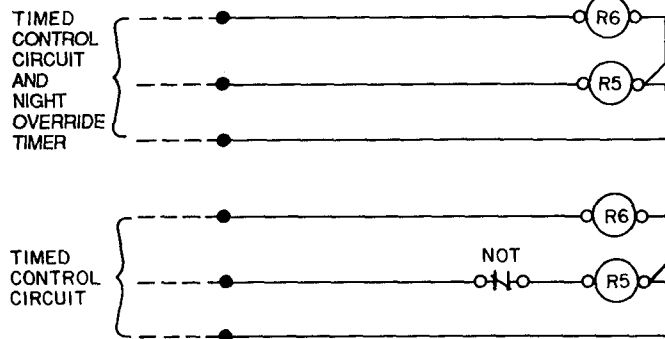
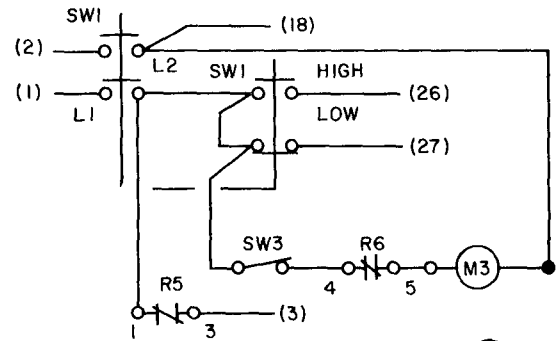
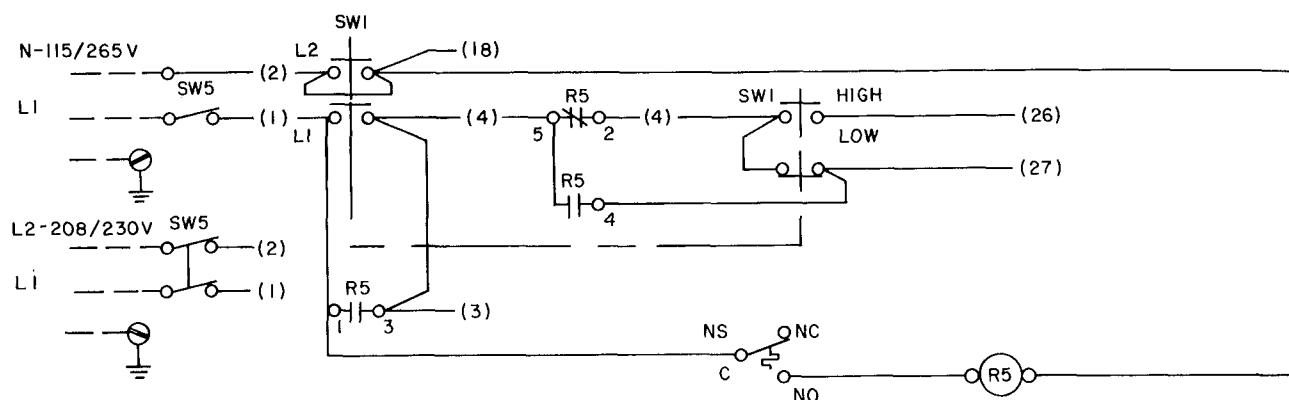


Fig. 8a — Typical Wiring Schematics, Options

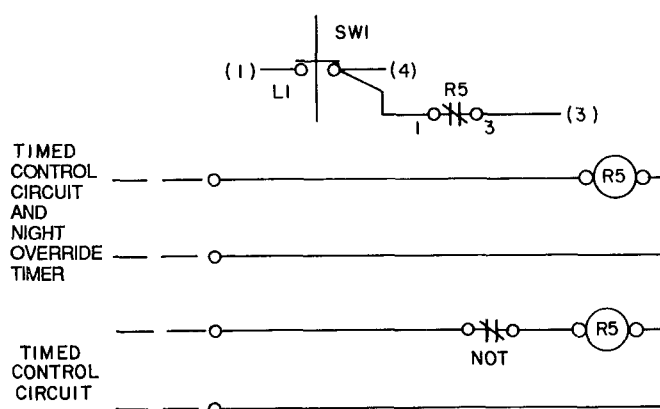
LEGEND (Fig 6 — 8b)

- | | |
|---------------------------------------|--|
| C1 — Fan Capacitor | R5 — Relay, Night Setback |
| C2 — Compressor Capacitor | R6 — Relay, Vent Lockout |
| HP — High-Pressure Switch | RR — Reset Relay |
| M1 — Fan Motor | RV — Reversing Valve |
| M2 — Compressor | SW1 — Fan Switch |
| M3 — Motor-Damper | SW3 — Switch, Ventilation |
| NOT — Night Override Timer | SW5 — Switch, Unit |
| NS — Thermostat, Night Setback | T1 — Room Thermostat |
| OL — Compressor Overload | T2 — Low-Temperature Protection |
| R2 — Compressor Relay | X1 — Transformer |
| R4 — Fan Relay | |

SELF-CONTAINED UNIT-MOUNTED NIGHT SETBACK



UNIT-MOUNTED NIGHT SETBACK RELAY



UNIT-MOUNTED NIGHT SETBACK RELAY AND NIGHT SETBACK THERMOSTAT

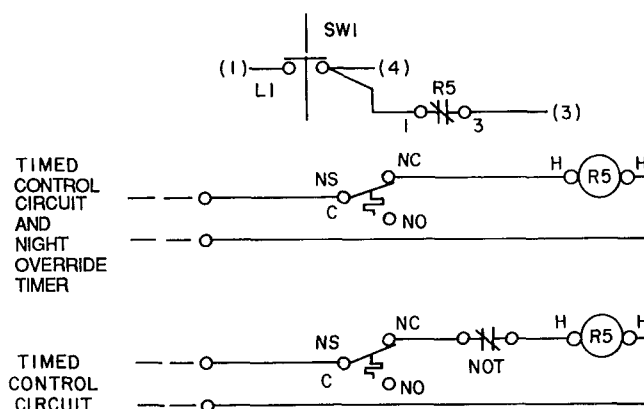


Fig. 8b — Typical Wiring Schematics, Options (cont)

LEGEND (Fig. 6 — 8b)

C1 — Fan Capacitor	R5 — Relay, Night Setback
C2 — Compressor Capacitor	R6 — Relay, Vent Lockout
HP — High-Pressure Switch	RR — Reset Relay
M1 — Fan Motor	RV — Reversing Valve
M2 — Compressor	SW1 — Fan Switch
M3 — Motor-Damper	SW3 — Switch, Ventilation
NOT — Night Override Timer	SW5 — Switch, Unit
NS — Thermostat, Night Setback	T1 — Room Thermostat
OL — Compressor Overload	T2 — Low-Temperature Protection
R2 — Compressor Relay	X1 — Transformer
R4 — Fan Relay	

START-UP

Water Flow and Temperature Data (See Fig. 9)

1. Ensure that design water flow rate for efficient operation and jobsite flow rate are the same
2. Ensure that water temperature entering unit is between 60 F minimum and 90 F maximum.

⚠ CAUTION

Water temperature outside specified temperature range may cause damage to unit and property. Do not operate unit below 60 F or above 90 F range.

3. Ensure that supply water is clean and air is purged from system. Air in supply water causes scaling in heat exchanger. Foreign material in water and/or excessive velocity of water can cause damage to tubing and water pumps.

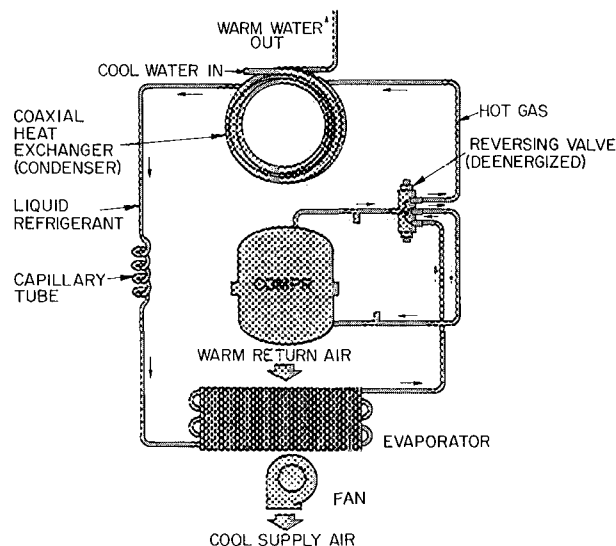
To Start Unit — Ensure that air filter is in place on unit filter flanges provided. Do not operate unit without filter in place. Adjust the thermostat as follows:

1. Set selector switch at OFF position.
2. Turn on disconnect switch to unit.
3. Set thermostat dial at desired temperature.
4. Set selector switch for desired mode.

Unit Controls and Safety Devices

HIGH-PRESSURE RELIEF VALVE — The high-pressure relief valve is located in the compressor. Relief valve opens at a pressure differential of approximately 550 psig between suction (low side) and discharge (high side) to allow pressure equalization.

CURRENT AND TEMPERATURE SENSITIVE OVERLOAD (linebreak) — Overload resets automatically when internal compressor motor temperature drops to a safe level (overload may require up to 45 minutes to reset). When an internal overload is suspected of being open, check by using an ohmmeter or continuity tester. If necessary, refer to Carrier Standard Service Techniques Manual, Chapter 2, for complete instructions.



HIGH-PRESSURE SWITCH — The high-pressure switch opens and shuts compressor off if discharge pressure rises above 395 psig. Switch closes at 300 psig.

To Restart Unit — Set system selector switch to OFF position and then to desired mode.

FREEZE-UP PROTECTION — Two controls are used to prevent unit from operating if water approaches freezing temperature during heating cycle:

1. Low Water Temperature Cutout (LWTC) — The LWTC shuts unit off and energizes lockout relay if water temperature reaches 43 F.
2. Lockout Relay — The lockout relay locks itself in energized position and prevents unit from starting.

The unit can be restored to heating operation if the water temperature rises to 63 F, where the LWTC will reset, and if the thermostat circuit is interrupted either by lowering the thermostat setting or by moving system switch to OFF or COOL position. Thermostat may then be readjusted to normal set point.

HEAT PUMP CIRCUITS — The heat pump circuits shown in Fig. 9 are refrigerant and water flow diagrams for heating and cooling cycles.

Operating Sequence

HEATING AND COOLING — Thermostat cycles compressor to maintain thermostat setting. Reversing valve is energized in heating mode.

ROOM FAN — With fan switch on ON position, fan runs continuously. In AUTO. position, fan cycles on demand for heat or cool.

RESET RELAY — Opens circuit upon high refrigerant pressure or low water temperature. To reset, unit power can be shut off at thermostat or main power source and then turned back on.

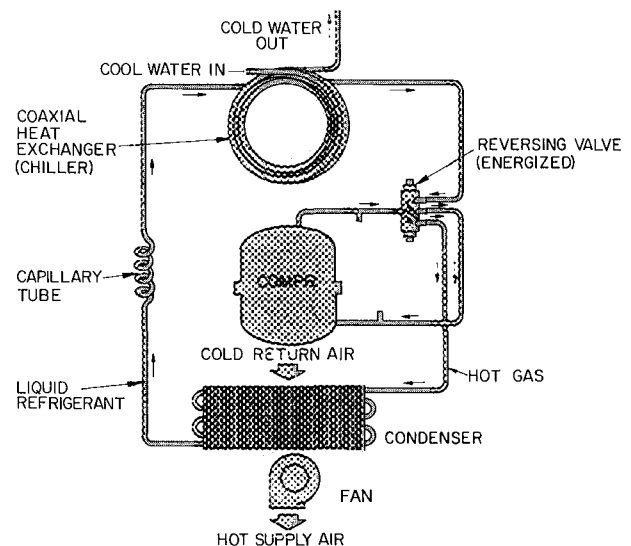


Fig. 9 — Typical 50KQ Refrigerant and Water Flow Diagrams

SERVICE

⚠ CAUTION

Before performing recommended maintenance, be sure main power switch to unit is turned off.

Cleaning Coil and Condensate Pan — Clean and inspect coil, condensate pan and drain before each cooling season.

1. Remove unit cabinet.
2. Slide air filter out of filter track.
3. Disconnect condensate drain line at drain connection.
4. Use vacuum cleaner nozzle to clean the face of coil.
5. Clean condensate drain trap with a bottle brush.
6. Clean condensate pan.
7. Hold pail under condensate pan drain connection and flush pan out with clean water. Ensure water flows freely through condensate drain. Do not overflow pan.
8. Reconnect condensate drain line.
9. Install unit air filter.
10. Install cabinet.

Return-Air Filter — Inspect filter every month. Replace as required to ensure proper and efficient unit operation.

⚠ CAUTION

Never operate unit without a filter; coil will plug and damage to fan motor may result.

Heat Exchanger — If excessive discharge pressure is experienced with normal water flow, the heat exchanger tubes may be fouled and require cleaning. Contact a local water treatment firm for details on chemical cleaning.

Fan Motor Lubrication — The fan motor has been oiled at the factory and must be reoiled every year. Carrier recommends adding six (6) drops of nondetergent SAE (Society of Automotive Engineers) no. 20 oil to each bearing (2 bearings per motor). DO NOT OVERLUBRICATE. For access to the fan motor, remove the outer cabinet.

TROUBLESHOOTING

SYMPTOM	PROBABLE CAUSE	PROBABLE REMEDY
Entire unit does not operate	Power Failure	Check for blown fuses or circuit breakers. Check fuse size. Check both high- and low-voltage wiring connections.
	Pressure Switch or Freezestat Contacts Closed	Reset thermostat to OFF position then to COOL or HEAT position as desired. Unit should start.
	Unit Control Panel	Check controls and replace if necessary. Check low voltage for open circuit. Check 24-v transformer for burn out. Check contactors. They may be dirty or binding. Check for loose wires. Check transformer for low voltage; if below 20 v, reconnect or replace
	Thermostat	Set thermostat on COOL position and lowest temperature setting. The unit should turn on. Set thermostat on HEAT position and highest temperature setting. The unit should run. If the unit does not operate, thermostat may be out of calibration, faulty, or wired improperly. Check wiring. If wiring is all right and the thermostat still does not work, remove the thermostat and replace.
	Voltage Supply Low	If voltage is below minimum voltage specified on nameplate, contact local power company.
Blower operates but compressor does not start up	Power	Check for low voltage. On 208/240 v, one-phase, voltages should not be below 197 v. If the voltage is low at the power source, report it to the power company. If the voltage is low at the unit and not the power source, check for proper wiring size.
	Thermostat	Check thermostat setting calibration and wiring.
	Control Panel	Check compressor contactor. It may be stuck open or burned; also check wiring to compressor contactor.
	High-Pressure Switch or Freezestat	Check wiring to pressure switch and check freezestat capillary. Reset to OFF position and then back to COOL or HEAT position. Determine if high pressure by disconnecting. After test, reconnect wiring.
	Wiring	Check for loose or broken wires at compressor, capacitor, and contactor.
	Stuck Compressor	Try an auxiliary capacitor in parallel with the run capacitor for a few minutes. If the compressor starts, but the problem reoccurs on starting, install an auxiliary start kit. The hard start kit contains a recommended start relay and correctly sized capacitor. If the compressor still does not start, replace the compressor.
	Compressor Overload; may be Stuck or Open	Check both internal and external overloads. If defective, replace. Install a jumper to the switch contacts, and if compressor runs, replace overload.
	Defective Capacitor	If the capacitor is defective, remove and replace. Be sure that the new capacitors are wired exactly as the old ones were wired. Check with ohmmeter. If good, indicator swings to 0 and slowly returns to infinity.
	Compressor Motor Grounded or has an Open Winding	Internal windings grounded to compressor shell. Replace the compressor. Check continuity of the compressor windings with an ohmmeter. If the windings are open, replace the compressor.
Unit short cycles	Thermostat	Ensure heat anticipator is set correctly.
	Wiring	Loose connection in electrical circuit. Trace and repair.
	Control Contacts Fluttering	Repair or replace.
	Cycles or Goes Off on Freezestat	Dirty filter or other air restriction. Closed system water valve or insufficient water flow.
	Short Cycles on High-Pressure Cutout	1. Lack of water flow or water that is too hot. Check for proper water flow. 2. Overcharge of refrigerant. Check for defective high-pressure switch. Check for dirty filter or other air restriction.
	Compressor Overload	Defective compressor overload. Check and replace if necessary. If the compressor runs too hot, it may be due to a deficient refrigerant charge.

TROUBLESHOOTING (cont)

SYMPTOM	PROBABLE CAUSE	PROBABLE REMEDY
Compressor starts and runs but short cycles on overload or internal thermostat	Low Line Voltage	Check power supply. Also check electrical installation for sizing of wires and length of run of wiring for extreme voltage drop
	System Pressure High	Possible overcharge of refrigerant. Check blower air and check condenser for cleanliness. Check filter.
	Overload Protector Defective	May be weak. Replace (cannot replace on 50KQ019).
	Run Capacitor Defective	Check capacitor. Replace
	Compressor Motor — Shorted Windings or Grounded to Side	Check resistances of windings. Check for ground.
	Compressor Too Hot	May be low on refrigerant. Check for leaks, repair, and add refrigerant
Noisy operation	Compressor	Make sure the compressor is not in direct contact with the base or sides of the cabinet. The compressor should be floating free on its isolator mounts. Excessive noise will occur if the compressor has a broken valve, loose discharge tube, or broken internal springs. Replace the compressor.
	Contactors	A "clattering" or "humming" noise in the contactor could be due to control voltage less than 18 v. Check for low supply voltage, low transformer output or extra long runs of thermostat wires. If the contactor contacts or coil is defective, repair or replace.
	Copper Tubing Vibrating	Adjust by bending slightly to firm position.
	Loose Cabinet or Internal Components	Check and tighten loose screws.
	Airborne Noises and Other Sounds	Excessive water through the water-cooled heat exchanger will cause a rattling sound. Throttle back on the water flow, ensuring adequate flow for good operation, but eliminating the noise. On heating, the water ΔT should be 6-9 F. On cooling, 12-18 F ΔT .
	Loose Blower Wheel	Tighten screws on blower wheel to shaft.
	Fan Hitting Casing	Adjust fan position
	Fan-Motor Bearing Defective	Replace fan motor.
Run capacitors burn out	High Voltage and Light Load	Reduce line voltage to not over 10% above rating of compressor.
	Capacitor Voltage Rating Too Low	Change capacitor to correct capacitance and voltage rating. See wiring diagrams.
	Capacitor Terminals Shorted	Short due to water on terminals or terminals touching one another.

TROUBLESHOOTING (cont)

SYMPTOM	PROBABLE CAUSE	PROBABLE REMEDY
Insufficient cooling	Unit Too Small for Load	Recheck heat gain. Add additional insulation, shading, etc.
	Compressor Short Cycling	Thermostat improperly located, or thermostat differential set too close. Check for drafts, excess heat on thermostat, or vibration that would cause cycling
	Outdoor Air Entering Space	Check for open doors, windows and other openings.
	Evaporator Airflow Restricted	Dirty filter or obstructions in ductwork. Dirty evaporator, clean coil, change filter, remove obstruction. (Allow 6-in. minimum clearance between wall and air intake on unit.)
	Evaporator Airflow Restricted	Fan motor not running, fan motor not up to full speed, or fan wheel slipping on shaft. Tighten setscrew
	Low Refrigerant Charge	Causes cycling. Check return bends on evaporator coil to see if all are equally cold and moist. Check for leaks in system.
	Defective Compressor	Not pumping properly. Discharge line is slightly warm and suction line is hot. If discharge pressure low and suction pressure high, may be bad compressor. Check with factory.
	Condenser Coil Malfunctioning	Insufficient water flow, recommended flow is 2.5 gpm per ton of unit cooling capacity. Check pump for proper operation. Possibility of restriction in water line or too high a temperature rise on water. Check condenser for scale, grease, etc.
	Restriction in Refrigerant System	Check strainer, liquid line and capillary tubes for restriction.
	Capillary Tubes Frosted	Apply hot cloth to capillaries. If pressure increases, moisture is present in system. Dehydrate and install drier. Insufficient passage of refrigerant due to kinks or plugged tubes. Repair.
	Reversing Valve	Defective reversing valve creating bypass of refrigerant from discharge to suction side of compressor.
Insufficient heating	Water-Inlet Temperature Too Cold	Check water inlet using a thermometer.
	Low Pressure or Restricted Inlet	Check for proper water flow. Recommended unit gpm is 2.5 gpm per ton of unit cooling capacity. DO NOT OPERATE UNIT ON HEATING WITHOUT WATER FLOW.
	Reversing Valve Inoperative	First check for power at reversing valve solenoid. If there is insufficient heating, check to see that reversing valve solenoid is energized. If it is not, check to see if there is continuity through the solenoid coil. If the coil is defective, remove and replace. If coil is all right, switch the unit back to the COOL position and then back to HEAT position to see if it dislodges the reversing valve. If not, remove and replace reversing valve, and recharge unit.
	Thermostat	Check for calibration, proper setting and wiring.
	Control Panel	Check wiring circuit, per diagram

