

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 for brazing operations. 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 — Move to final location. Remove shipping bands and lift carton from cabinet. *Save carton and use to protect unit until construction, painting, etc., are completed.* 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.

COMPLETE OR CONSIDER THESE SYSTEM REQUIREMENTS before installation:

1. Consult local building codes and National Electrical Code (NEC) 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. 2 and 3.
4. Determine which side piping and wiring connections are to be made. If chassis must be rotated, see details and illustration in Fig. 1.

Step 2 — Level Unit and Secure Chassis to Wall

— Remove cabinet from chassis by removing 2 screws holding kickplate to chassis and lift cabinet with kickplates from chassis. Level unit using field-supplied shims, ensuring that bottom of chassis is snug to floor. Secure chassis to wall using 4 mounting clips to the rear panel flanges of the chassis. Position cabinet over rear edge of chassis and center discharge grille between chassis bulkheads. Replace 2 screws through kickplate into chassis, one at each end, lower frame.

Step 3 — Make Piping Connections

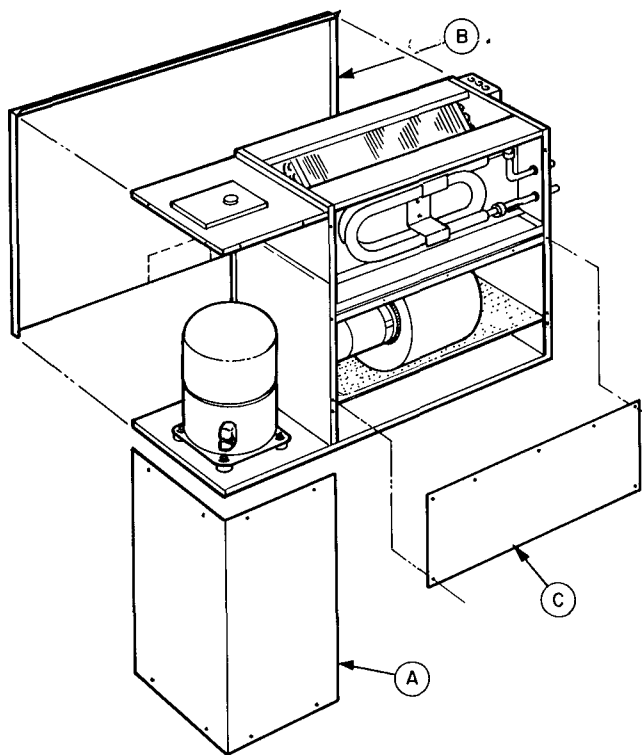
FLUSH WATER SYSTEM LINES prior to connecting to unit (Fig. 4). Unit will not function properly if water-to-refrigerant heat exchangers are restricted with dirt, pipe dope, or other foreign matter.

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

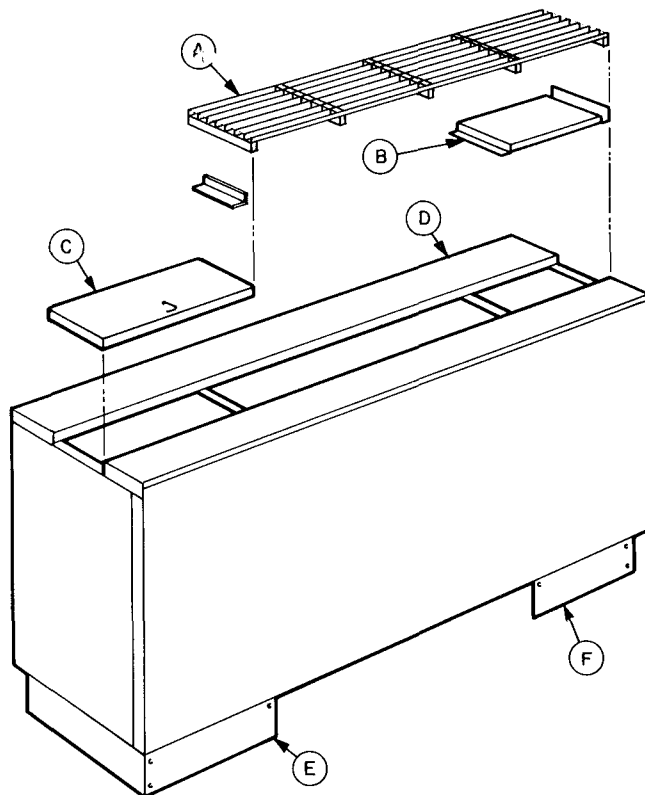
Improper heat exchanger water, quality, or flow due to piping, valving or improper pump operation is hazardous to unit and property.

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.



CHASSIS

- 1 Remove panel A
- 2 Remove (and exchange positions with each other) panels B and C
NOTE: Carefully remove compressor capacitor from B and reattach to B in new position provided
- 3 If unit is equipped with outdoor air assembly, move entire outdoor assembly to new position on rear 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, 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
- 5 Reinstall C and D assembly to unit
- 6 Reinstall grille A and blockoff B, shifting both to opposite end of cabinet
- 7 Remove kickplates E and F and exchange with each other, reinstall E and F

Fig. 1 — Detail, Chassis and Cabinet Rotation

Table 1 — Physical Data

UNIT 50KQ	006	009	012	015	019
R-22 CHARGE (lb-oz)*	0-14	0-13½	1-8	1-9	2-4
Refrigerant Control	Capillary Tube				
FAN					
Diameter (in.)	6⅞	6⅞	6⅞	6⅞	6⅞
Width (in.)	6½	6½	4½	6½	6½
Motor Hp	⅓	⅓	⅓	⅓	⅓
Motor Rpm (nominal)	1000	1000	1000	1000	1000
COIL					
Face Area (sq ft)	1.0	1.25	1.25	1.67	1.67
Rows (number)	2	2	3	3	4
OPERATING WEIGHT (lb)	130	140	160	175	190
SHIPPING WEIGHT (lb)	145	155	180	195	210
FILTER SIZE (in.) LxWx½ thick	Permanent; 22 x 10¾			Permanent; 34 x 10¾	

*Factory charged

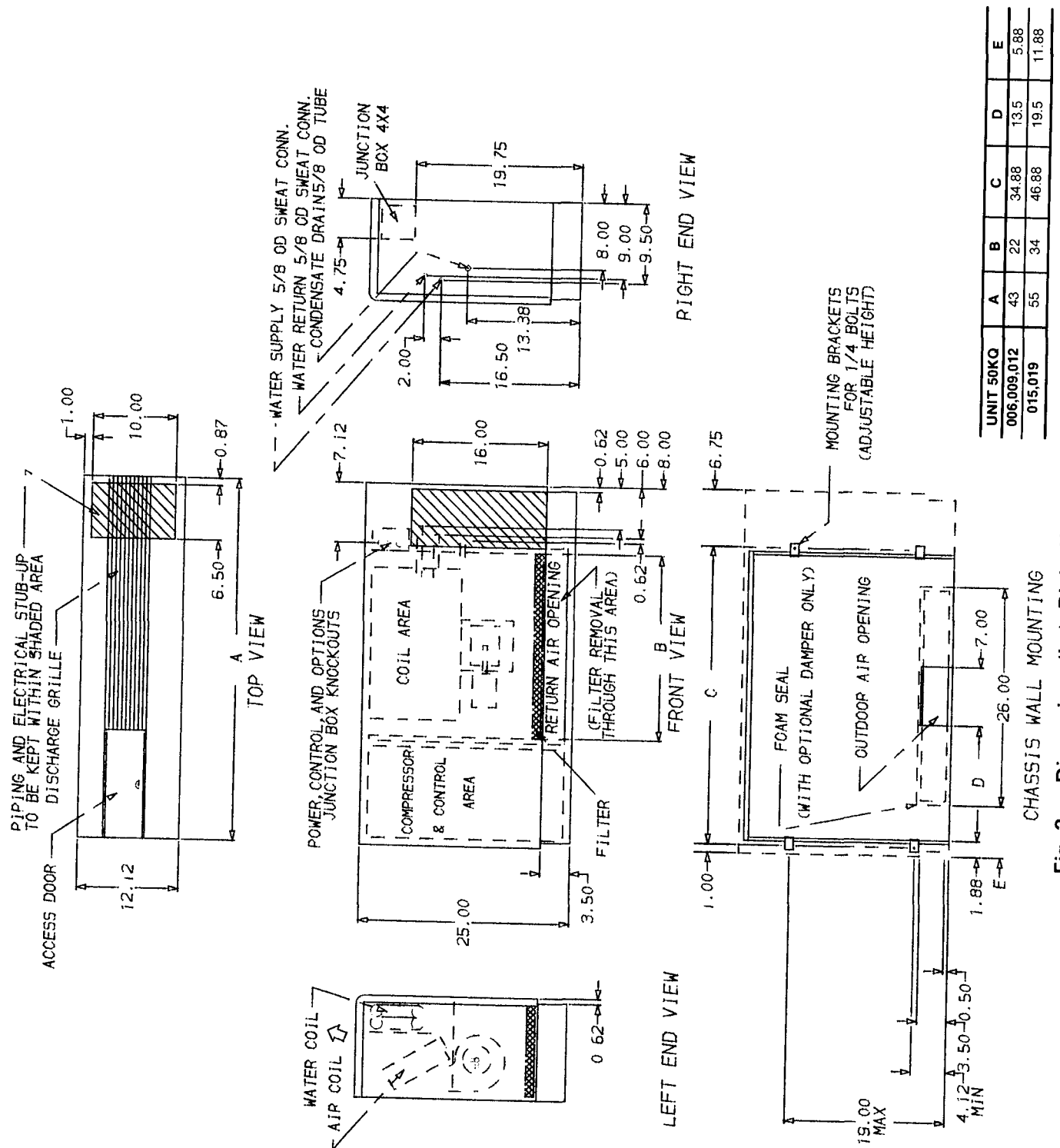


Fig. 2 — Dimensions (in.), Right-Hand Stub-Up

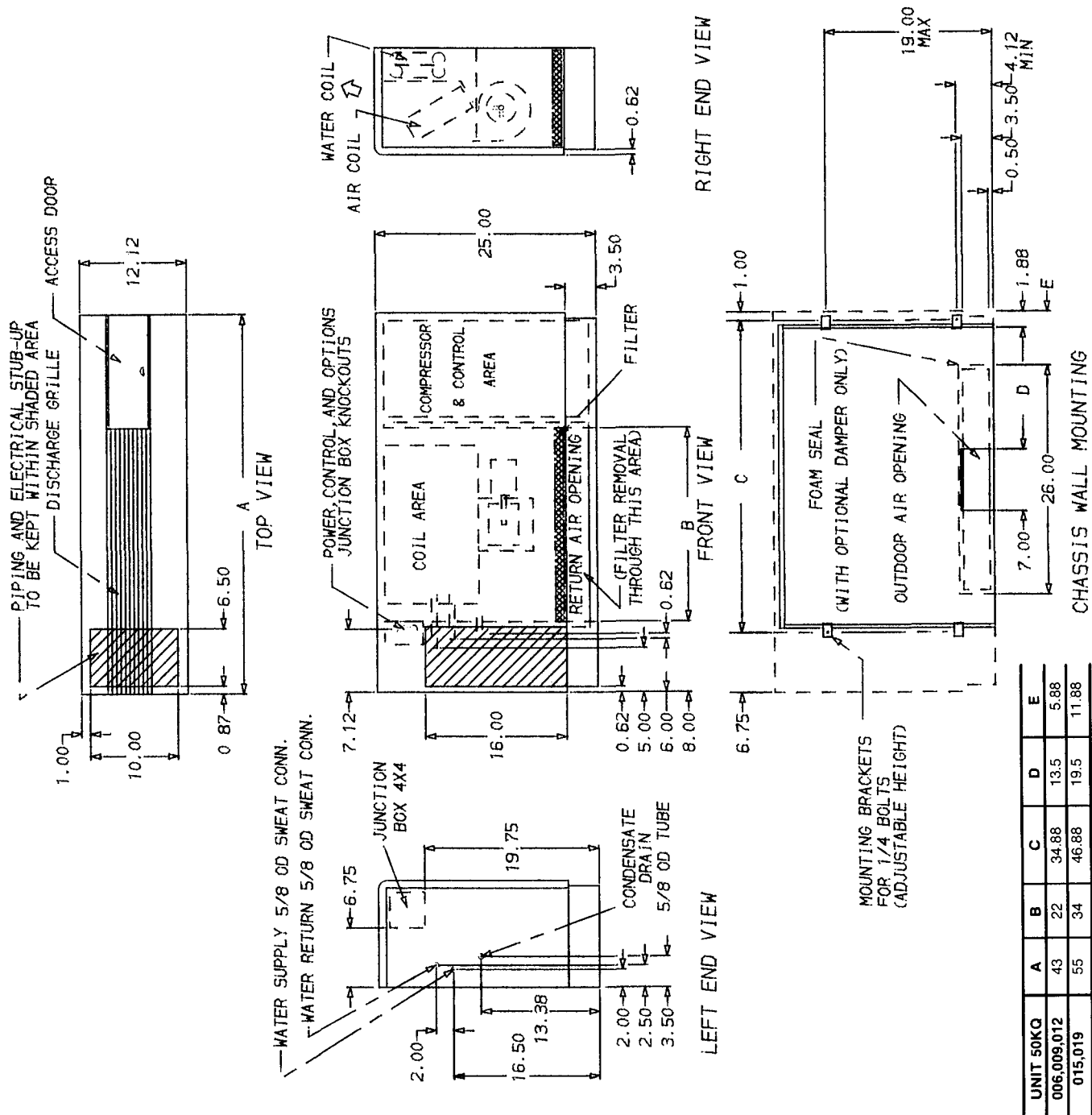


Fig. 3 — Dimensions (in.), Left-Hand Stub-Up

⚠ CAUTION

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

INSTALL BALANCING VALVES (with shutoff) 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.

MAKE CONDENSATE DRAIN LINE CONNECTION to connection provided on unit, Fig. 2 and Fig. 3. 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.

Step 4 — Make Electrical Connections — Field wiring must comply with local and national fire, safety and electrical codes. Voltage to unit must be as indicated on nameplate and Table 2. Use copper conductors only.

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

INSTALL A BRANCH CIRCUIT DISCONNECT PER NEC of adequate size to handle unit starting current. Locate disconnect within sight of and readily accessible from the unit, or if remote, with locking device, per Section 440-14 of National Electrical Code (NEC).

BRING POWER LEADS INTO UNIT — Extend leads from disconnect per NEC through hole provided into line wiring junction box.

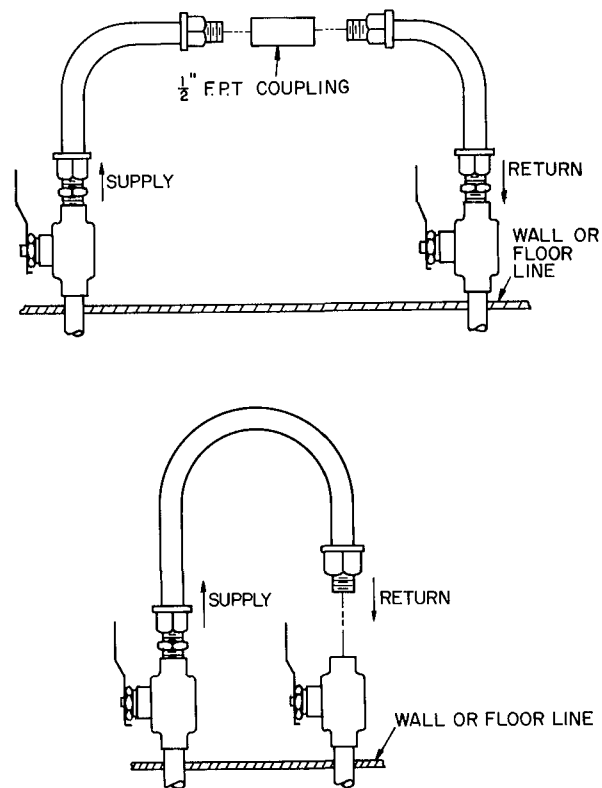


Fig. 4 — Flushing System Piping

CONNECT GROUND LEAD TO GROUND LUG IN JUNCTION BOX for safety. Connect power wiring. See Fig. 6.

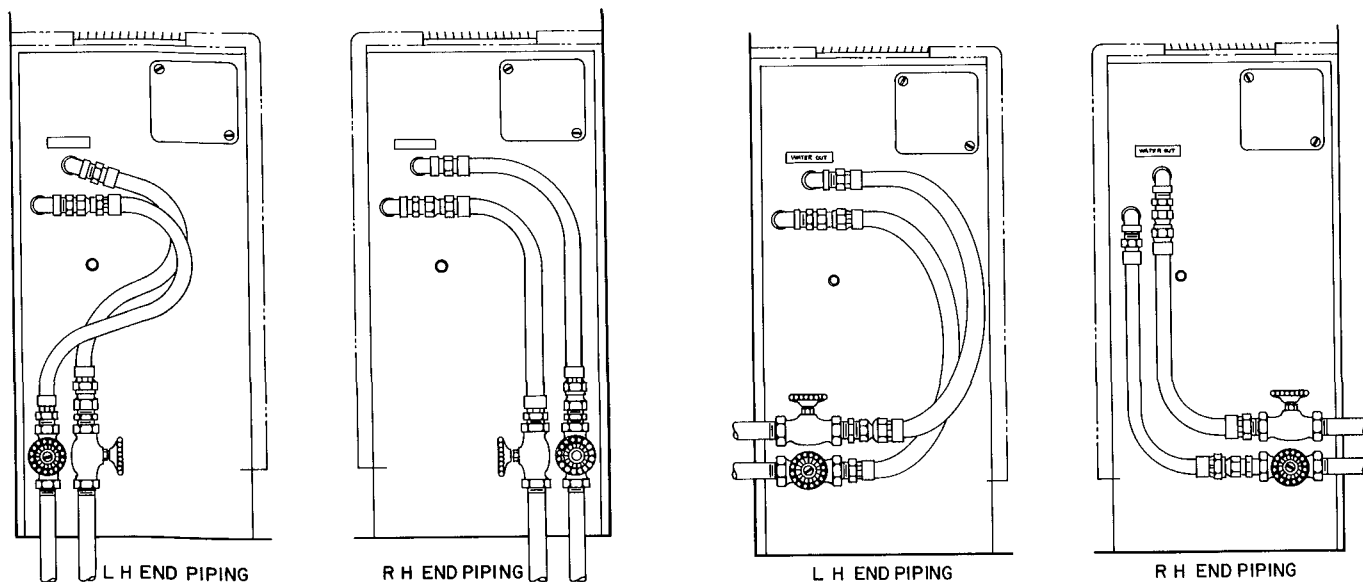


Fig. 5 — Piping Connections

Table 2 — Electrical Data

UNIT 50KQ	VOLTAGE (1 - 60 Hz)	COMPRESSOR		FAN	MIN CIRCUIT AMPS	MAX FUSE AMPS
		RLA	LRA	FLA		
006	115	4.9	29.8	0.9	7.0	15
	208/230	2.7	15.9	0.5	3.9	15
	265	2.1	12.3	0.4	3.0	15
009	115	6.3	40.0	0.9	8.8	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	3.6	27.0	1.2	5.7	15
015	208/230	5.4	31.2	1.3	8.1	15
	265	4.2	27.0	1.2	6.5	15
019	208/230	7.2	43.0	1.3	10.3	15
	265	5.6	39.5	1.2	8.2	15

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



NOTES (Fig. 6 - 8)

VOLTAGES

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

208/230 units are factory wired for 230. When power supplied is 208 volts, change transformer connections as shown on the unit wiring diagram.

HI-SPEED LEAD CONNECTION

UNIT 50KQ	LEAD COLOR
006	Blue
009	Black
012	Blue
015	Blue
019	Blue

UNIT OPERATION

Heating/Cooling — Thermostat cycles compressor to maintain thermostat setting. Reversing valve is energized in heating mode.

Room Fan — With fan switch in 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.

Changeover — Automatic or manual changeover is dependent upon the type of thermostat purchased.

LEGEND (Fig. 6 - 8)

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

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

L1

SW1

L2

L1

HI

LO

(18)

(26)

(27)

RED

BLUE

MI

BRN

BRN

WHT

CI

CAP

(3)

T2

HP

RR

T1

M2

S

OL

C

R

C2

CAP

RV

FOR 019 ONLY

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

LI

SWI HI LO

RED

BLUE

M1

BRN

BRN

WHT

RR

HP

T2

RR

COOL

HEAT

T1

M2

S

OL

C

R

RV

C1

CAP

C2

CAP

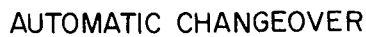
TH THERMOSTAT

FOR 019 ONLY

Diagram illustrating the wiring for a thermostat system, showing connections for power (N-115/265V, L2-208/230V), switches (SWI, HI, LO), relays (RR), motors (M1, M2), capacitors (C1, C2), and a ground symbol. The diagram includes a note: "FOR 019 ONLY".

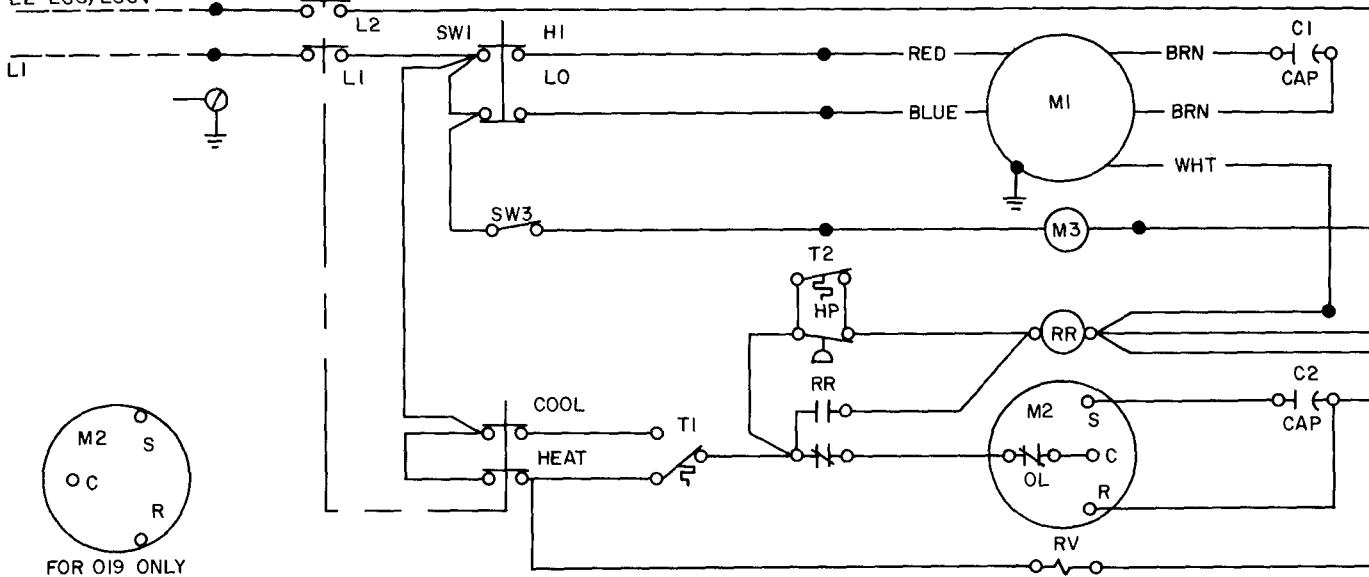
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MANUAL CHANGEOVER

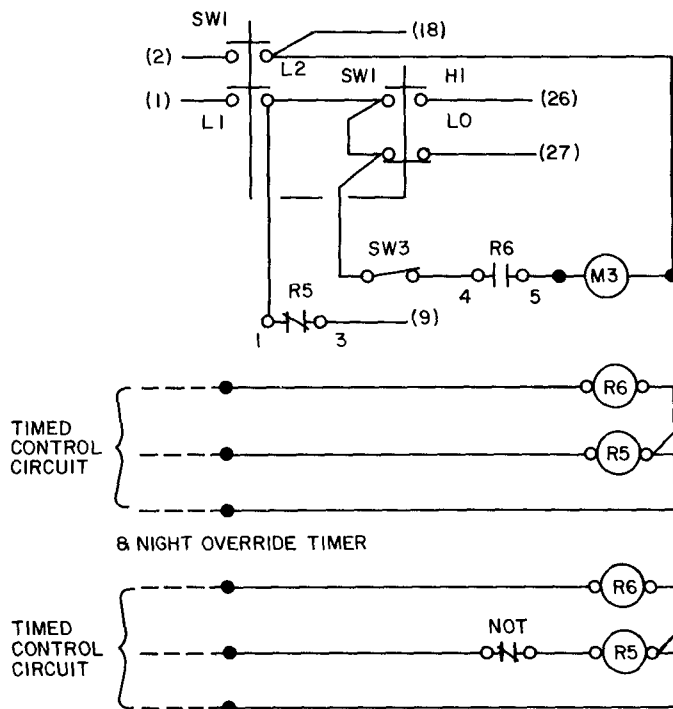


N-115/265V
L2-208/230V

UNIT WITH MOTORIZED DAMPER



UNIT-MOUNTED NIGHT SETBACK RELAY MOTORIZED DAMPER



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

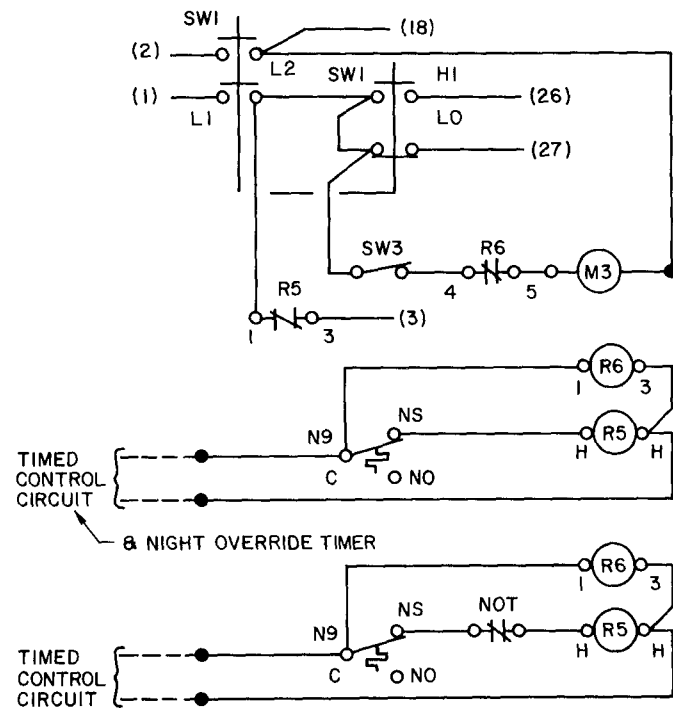
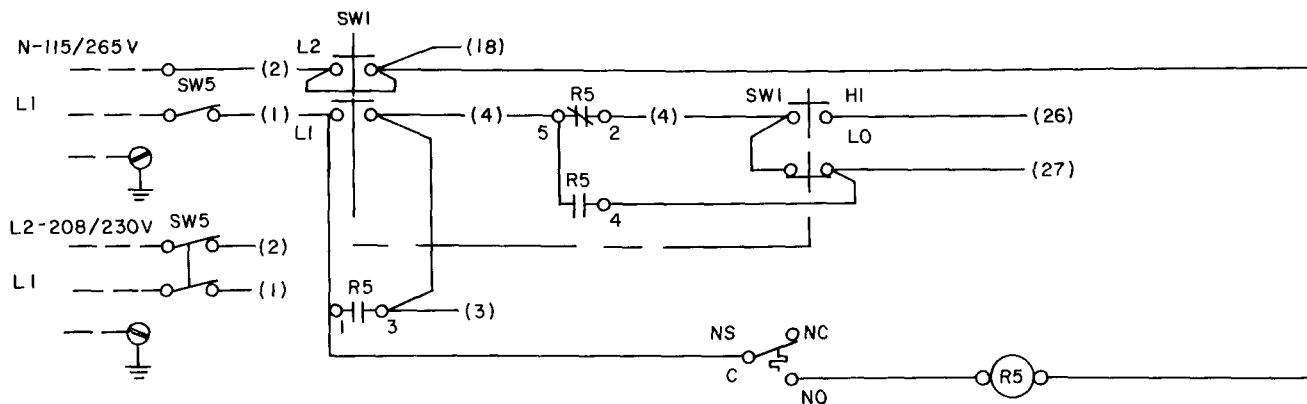


Fig. 8 — Typical Wiring Schematics, Options

SELF-CONTAINED UNIT-MOUNTED NIGHT SETBACK



UNIT-MOUNTED NIGHT SETBACK RELAY

UNIT-MOUNTED NIGHT SETBACK RELAY
AND NIGHT SETBACK THERMOSTAT

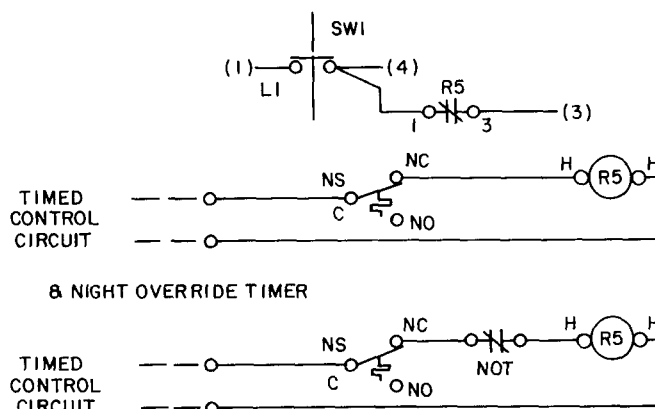
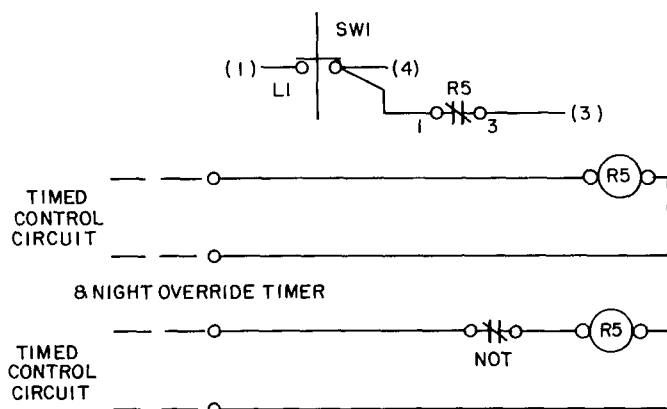


Fig. 8 — Typical Wiring Schematics, Options (cont)

START-UP

Water Flow and Temperature Data

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.
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 is located in compressor. Relief valve opens at a pressure differential of approximately 550 psi 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 opens and shuts compressor off if discharge pressure rises above 395 psig. Switch closes at 300 psig.

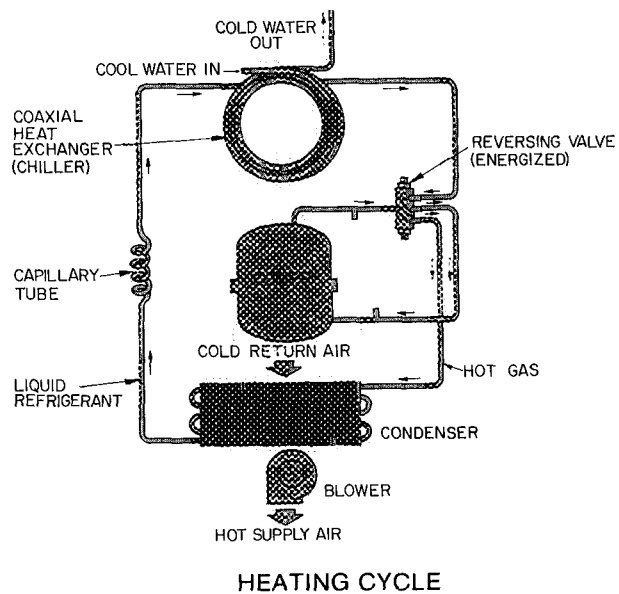
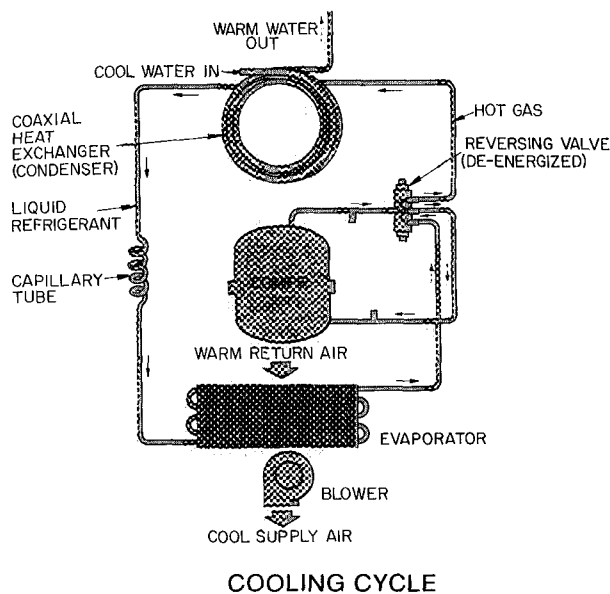


Fig. 9 — Typical 50KQ Refrigerant and Water Flow Diagrams

To Restart Unit — Set system selector switch to OFF 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) — shuts unit off and energizes lockout relay if water temperature reaches 43 F.
2. 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. Thermostat may then be readjusted to normal set point.

HEAT PUMP CIRCUITS shown in Fig. 9 are refrigerant and water flow diagrams for heating and cooling cycles.

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 and slide air filter out of filter track.

2. Disconnect condensate drain line at drain connection.
3. Use vacuum cleaner nozzle to clean the face of coil.
4. Clean condensate drain trap with a bottle brush. Clean condensate pan.
5. 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.
6. Reconnect condensate drain line.
7. Install unit air filter and cabinet.

Return Air Filter — Inspect filter every month. Replace as required to ensure proper 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. It is recommended to add six (6) drops of nondetergent SAE #20 oil to each bearing (2 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 wiring connections, both high and low voltage.
	Thermostat	Set thermostat on COOL, and lowest temperature setting, the unit should turn on. Set thermostat on HEAT and highest temperature setting, unit should run. If the unit does not operate, thermostat may be out of calibration, faulty or wired improperly. Check wiring, if this is all right and the thermostat still does not work, remove the thermostat and replace.
	Pressure Switch or Freezestat Contacts Closed	Reset thermostat to OFF then to COOL or HEAT as desired, unit should start.
	Unit Control Panel	Check controls, replace if necessary. Check low voltage for open circuit. Check 24-volt transformer for burn out. Check contactors, may be dirty or binding. Check for loose wires. Check transformer for low voltage, if below 20 volts, reconnect or 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 volts, one-phase, voltages shall not be below 197 volts. 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, check freezestat capillary. Reset to OFF and then back to COOL or HEAT. Determine if high pressure by disconnecting. After test, reconnect wiring.
	Wiring	Check for loose or broken wires at compressor, capacitor, or contactor.
	Stuck Compressor	Try an auxiliary capacitor in parallel with the run capacitor momentarily. If the compressor starts, but the problem re-occurs on starting, install an auxiliary start kit. The hard start kit comprises of 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. Jumper switch contacts and if compressor runs, replace overload.
	Defective Capacitor	If the capacitor is defective, remove and replace. Be sure that the capacitors are wired exactly as the old one was wired. Check with ohmmeter. If good, indicator swings to 0 and slowly returns to infinity.
Unit short cycles	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.
	Thermostat	Insure 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	Lack of water flow or water that is too hot. Check for proper water flow. 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 but does not switch OFF start winding	Improperly Wired Low Line Voltage	Check against wiring diagram. Check voltage at compressor. Available voltage may be ascertained at locked rotor conditions. Place voltmeter leads at common and run terminals. Start compressor, stop, and restart compressor. Read voltage. If below tolerance, check electrical installation for sizing of wires and length of run of wiring for extreme voltage drop.
	Run Capacitor Defective	May be shorted or open, replace
	High Head Pressure	Unit may be overcharged, or plugged up tubes preventing equalization of pressures.
	Compressor Motor has an Open Winding	Check and replace
Compressor starts and runs short cycles on overload or internal thermostat	Low Line Voltage	Check power supply and electrical installation
	System Pressure High	Possible overcharge of refrigerant, check blower air, 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 volts. 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 MFD 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. Thermostat differential set too close, check for drafts or excess heat on thermostat, or vibration that would cause cycling.
	Outside Air Entering Space	Check for open doors, windows and other openings.
	Evaporator Airflow Restricted	Dirty filter, 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, 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 slightly warm and hot suction line. 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, too high a temperature rise on water, check condenser for scale, grease, etc.
	Restriction in Refrigerant System	Check strainer, liquid line, 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. 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 COOLING position and then back to HEATING 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.

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

Book 1 4
Tab 5a 5a

PC 111

Catalog No 565-071

Printed in U S A

Form 50KQ-1SI

Pg 16

5-86

Replaces: 50BQ-1SI

For replacement items use Carrier Specified Parts