Installation & Maintenance Data

IM 497-3

Group: **PTAC**

Part No.: **106018663**

Date: **October 2005**

EnerSaver™ Packaged Terminal Air Conditioners and Heat Pumps

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McQuay® Air Conditioning

Receiving Equipment

Before signing the freight bill, carefully examine the units and note any shortages or damages on the freight bill. The purchaser is responsible for filing the necessary claims with the carrier. Concealed damage which was not discovered until after unloading should be reported to the carrier within 15 days after receipt. McQuay's responsibility ceases upon delivery of material in good order to a carrier.

To help avoid concealed damage, the units must be shipped, handled, and stored right side up as clearly marked on the container. If the units must be stored prior to installation, they should be stored within the carton in a clean, dry, protected area. When ready for installation, save the carton and use the carton shell to protect the cabinets until construction, painting, etc., is completed.

A complete EnerSaver unit is normally shipped in two cartons: one carton contains the cabinet/wall sleeve, front panel, louver and subbase; the other carton contains the integrated chassis.

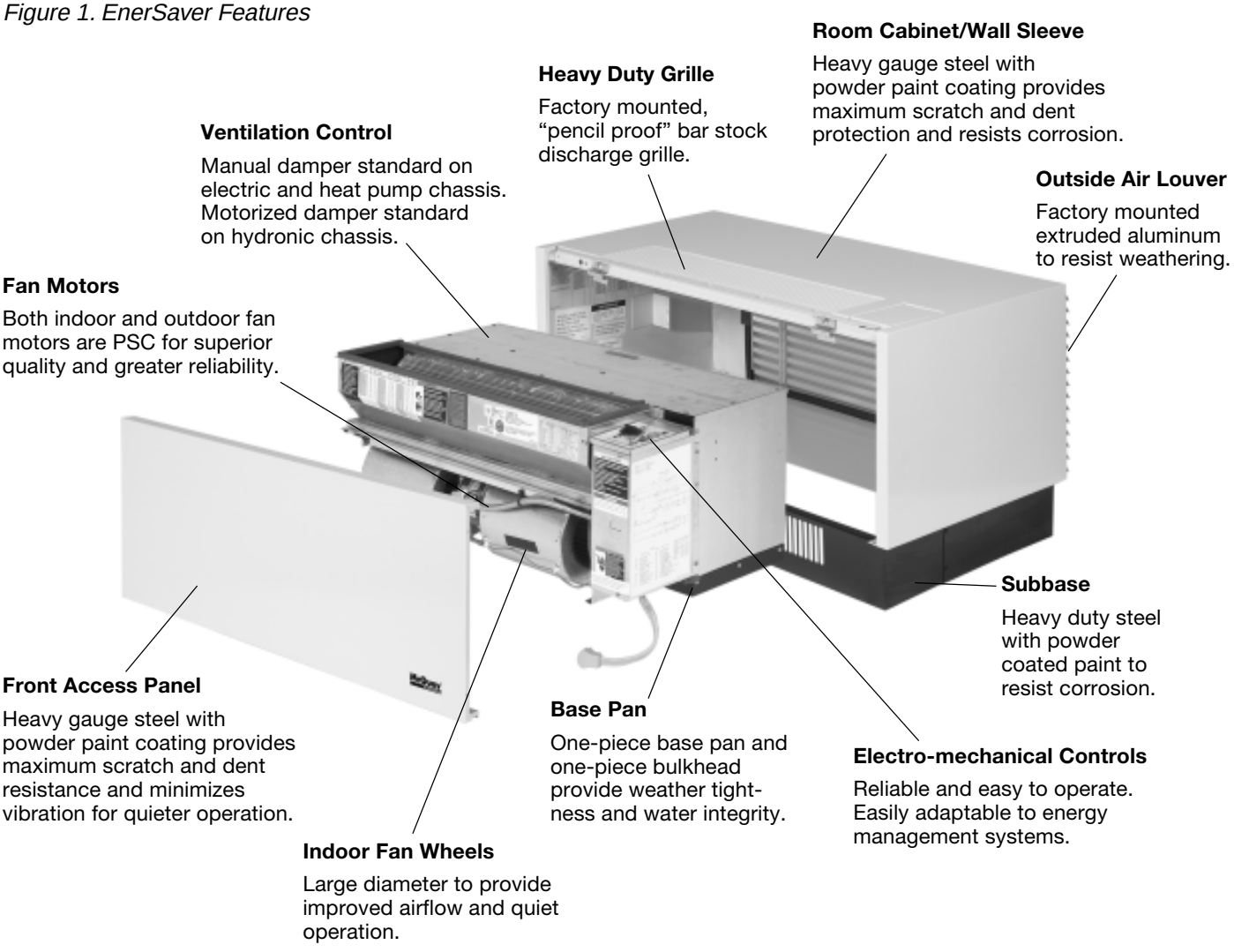
Cabinet/ Wall Sleeve

The EnerSaver cabinet/ wall sleeve is available in two sizes, 37 1/2" (952mm) or 41 1/2" (1054mm) long. This one-piece cabinet/wall sleeve functions as both the wall box as well as the room cabinet once the front panel is in place. Units with hydronic heat always utilize the long cabinet. The hydronic coil is factory mounted to the cabinet/ wall sleeve. Electric heat models are available in either size cabinet. Units ordered with either the stamped or the extruded aluminum louver are shipped with the louver factory mounted. Stamped flanged louvers must be field mounted after the room cabinet/wall sleeve is in place.

Chassis

The chassis is a completely self-contained, integrated heating/ cooling/ ventilation center. It houses the refrigeration components, air handling components, electric heater (if applicable), and controls. A single integrated chassis requires less on-site handling during installation and service periods.

Figure 1. EnerSaver Features



Model Nomenclature

P NES 1 009 C Z 35 Z 12 AR 14 C 1 A 1

Model
Product Category
P= PTAC

Product Identifier
NES1 = Enersaver Air Conditioner w/ Electric or Hydronic Heat

NHS1 = Enersaver Heat Pump w/ Electric Heat

Design Series
1 = A design - Enersaver

2 = SG45 Chassis Replacement

Nominal Capacity - BTUH
009 = 9000
012 = 12000
015 = 15000

Voltage
C = 208 - 60 - 1
J = 277/265 - 60 - 1

Coil Options
Z = None

Heating Options
00 = None
35 = 2.5 kW nominal
41 = 3.5 kW nominal
44 = 4.0 kW nominal
62 = Hydronic - Normally Open Valve (hwtr or steam) for EnerSaver

Hand Orientation
Z = Not Applicable

Controls
12 = Unit Mounted Manual ChangeOver (MCO)
24 = Unit Mounted Manual ChangeOver (MCO) & Night SetBack (NSB)

Discharge
AR = Flat Top

Return Air/Outdoor Air
14 = Bottom

Power Connection
C= Cord

Color
1= Antique Ivory

SKU
A = Stock
B = Standard Delivery
C = Extended Leadtime

Product Style
1= 1st Style Change

NOTE: Availability of voltages, heating options, and controls may vary amongst unit sizes. Consult your McQuay representative.

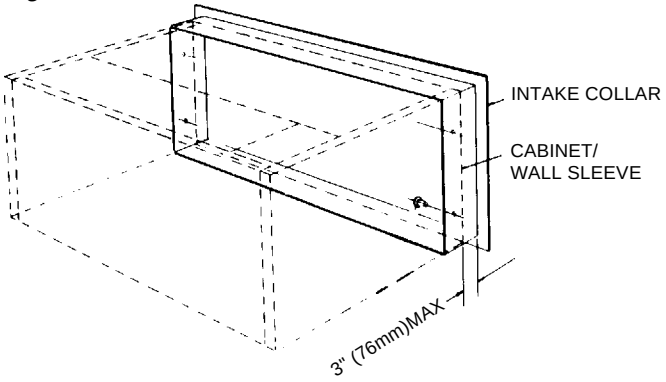
Installation Instructions

Louver Frame

When a louver frame is used, it must be installed prior to the room cabinet/ wall sleeve, and it must be level and square (see Figure 2). If the louver frame is to be installed in a panel wall, install it at the same time as the room cabinet/wall sleeve.

1. Apply caulking compound on the surfaces of the louver frame's four flanges which will come in contact with the wall. Add caulking as required for weather tight seal.

Figure 2. Louver frame installation



2. Place the louver frame in the wall opening from the exterior of the building, and apply firm pressure so that the caulked frame flanges are snug against the exterior of the building. Secure the louver frame to the wall if desired.

3. Secure the louver frame to the wall through the sides and top. **Never** secure the frame through the bottom as it can cause leaks.

4. Coordinate the remaining instructions with the room cabinet/ wall sleeve installation instructions.

5. Drill four (4) 1/8" (3mm) diameter holes through the sides of the wall sleeve and through the flange of the louver frame. Attach the collar with four (4) #8x$^{3}/_{8}$ self-tapping screws provided. **Do not** drill holes in the bottom of the wall sleeve.

6. Caulk the seam between the louver frame and the wall watertight.

Wall Sleeve Extension

1. When a wall sleeve extension is used, assemble it and the wall sleeve, then place them in the wall as a unit.

2. In cases where the louver is already installed in the cabinet/ wall sleeve, remove it from the wall sleeve before installing the extension.

3. Check the tagging of the wall sleeve extension to be sure it corresponds with the correct unit location.

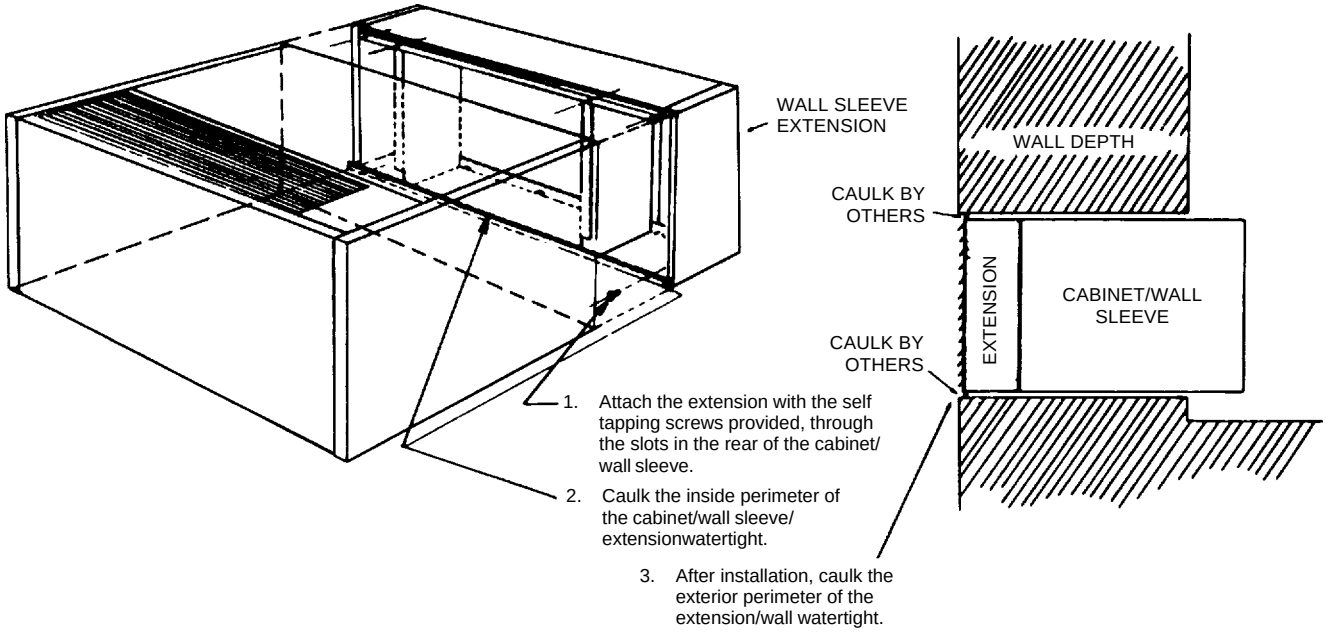
4. Before attaching the wall sleeve extension to the wall sleeve, run a bead of caulking around the outside flange of the wall sleeve where it attaches to the extension, making a watertight seal.

5. Align the predrilled mounting holes of the wall sleeve extension with those of the wall sleeve (the louver mounting holes), and firmly attach these two parts with the six (6) self-tapping screws provided with the wall sleeve extension.

6. Recheck caulking to ensure that all seams are watertight.

7. Refer to the wall sleeve installation instructions on page 8 for installation of the wall sleeve and extension into the wall.

Figure 3. Wall sleeve installation



Subbase

When a subbase is used, it must be installed prior to the room cabinet/wall sleeve. Consult the instructions shipped with the subbase for proper installation.

1. When removing the subbase from the shipping carton remove the two (2) shipping bolts and sheet metal nuts. Do not throw away the shipping bolts; they are used as subbase leveling bolts.

2. The electrical subbase assembly contains the unit receptacle and junction box. Therefore, before installing the subbase to the cabinet/wall sleeve, it will be necessary to run the power wiring from the stub-in and attach it to the subbase receptacle.

3. The subbase assembly comes in two (2) parts:

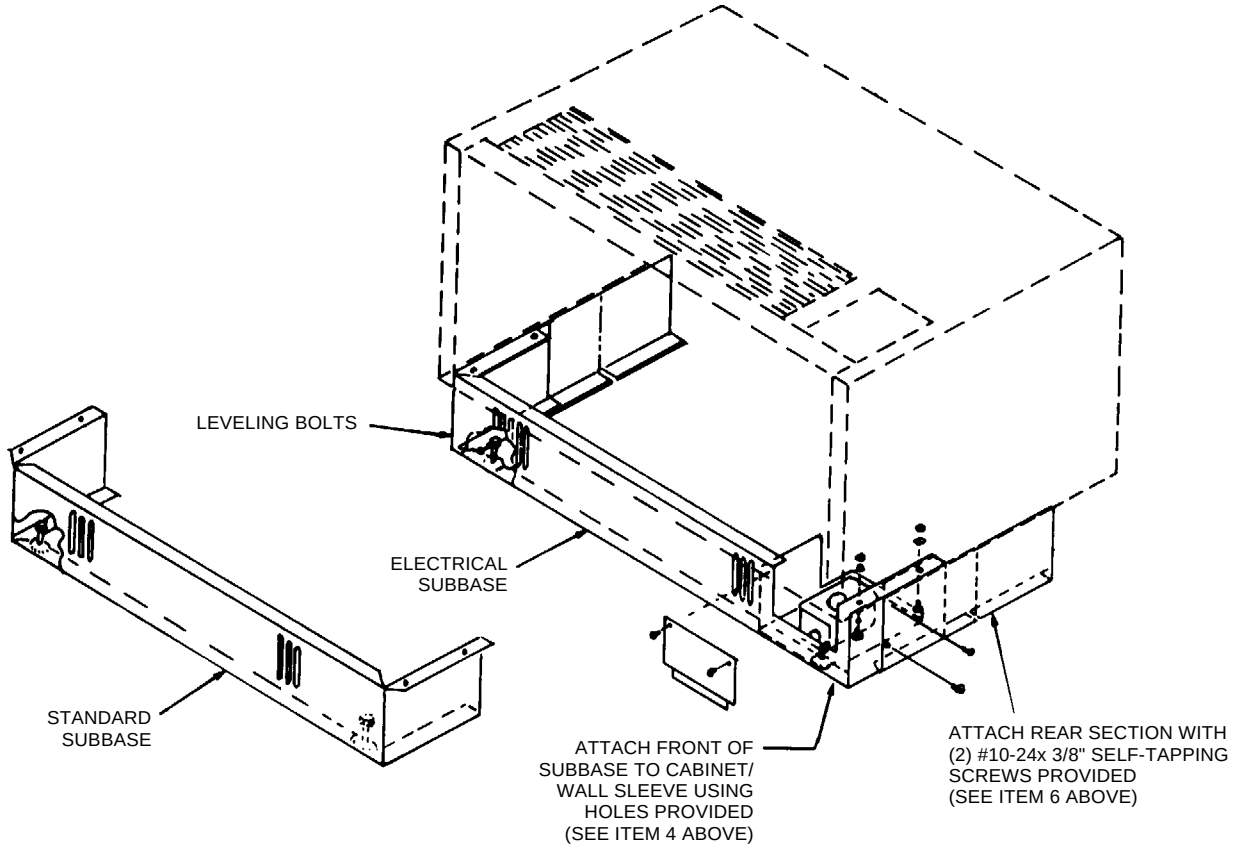
   a. A front section which bolts to the cabinet/wall sleeve.
   b. End filler pieces, which telescope to fit flush against the wall.

4. Attach the front section of the subbase to the cabinet/wall sleeve with the furnished nuts, screws and lock washers using holes provided as attachment points. Install the two (2) star washers provided as shown in the illustration to provide a ground path between the cabinet/wall sleeve and the subbase.

5. Coordinate the remaining instructions with the room cabinet/ wall sleeve installation instructions.

6. After the cabinet/wall sleeve is fastened in the wall, position the end filler pieces so they are tight against the wall. Then, using the two (2) holes as a template, drill two (2) $^{11}/_{64}$" (4.4mm) diameter holes into the front section of the subbase. Attach the two end fillers, using the self-tapping screws provided.

Figure 4. Subbase installation



Wall Guard Flange

1. The wall guard flange is shipped disassembled and is normally taped to the inside of the cabinet/wall sleeve.

2. Mounting the wall guard flange **before** the cabinet/wall sleeve is installed:

a. Locate the rear edge of the wall guard flange at the position that corresponds to the inside finished wall line.

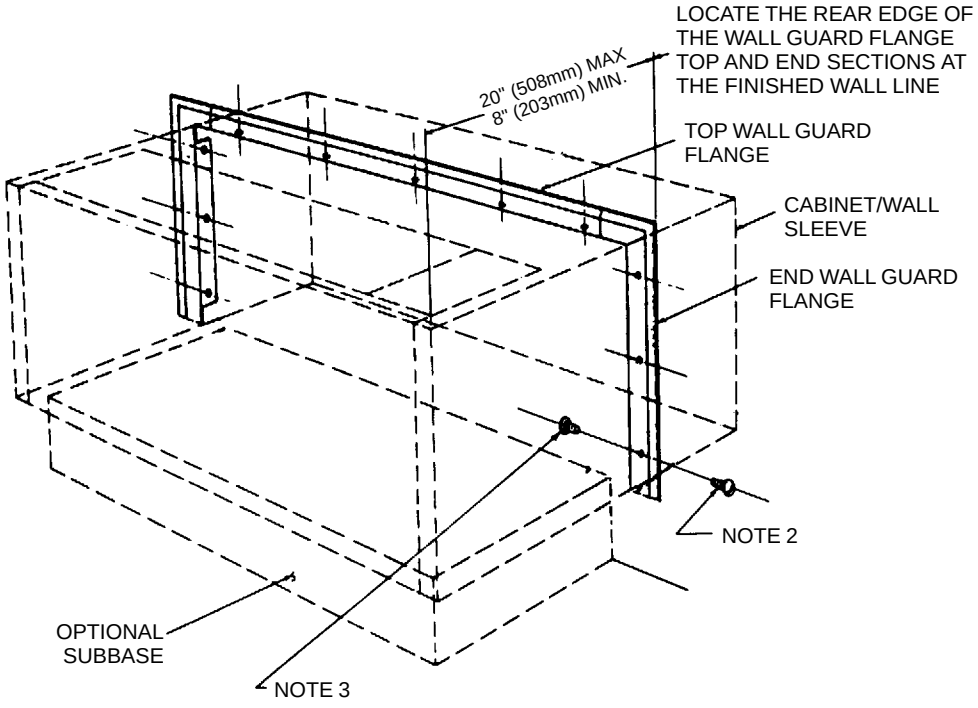
b. Using the holes in the wall guard flange as a template, drill eleven (11) $^{1}/_{8}$" (3mm) diameter holes in the cabinet wall sleeve and attach the wall guard flange to the cabinet/wall sleeve with the eleven (11) #8x$^{3}/_{8}$ self-tapping screws furnished.

3. Mounting the wall guard flange **after** the cabinet/wall sleeve is installed:

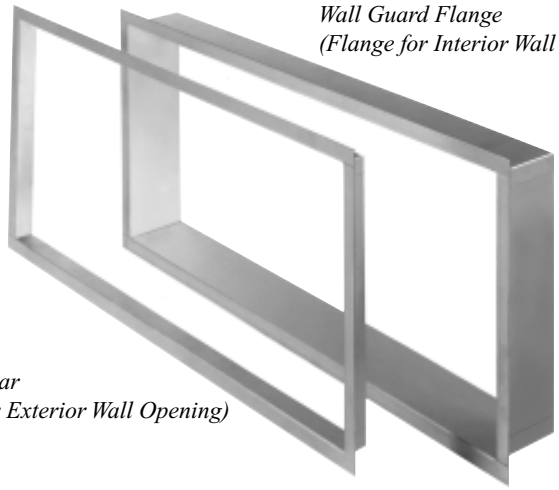
a. Position the wall guard flange so that the rear edge is tight against the inside finished wall surface.

b. Measure the distance from the front of the cabinet/wall sleeve to the front edge of the wall guard flange and add $^{1}/_{2}$" (13mm). At this dimension from the front of the cabinet/wall sleeve, drill eleven (11) $^{1}/_{8}$" (3mm) diameter holes from the inside of the cabinet/wall sleeve through the angle of the wall guard flange spacing them approximately 6" to 8" (153mm to 203mm) as shown. Attach the wall guard flange to the cabinet/wall sleeve with the eleven (11) #8 x $^{3}/_{8}$ self-tapping screws provided.

Figure 5. Wall guard flange installation



Wall Guard Flange
(Flange for Interior Wall Finish)



Intake Collar
(Flange for Exterior Wall Opening)

Hydronic Piping

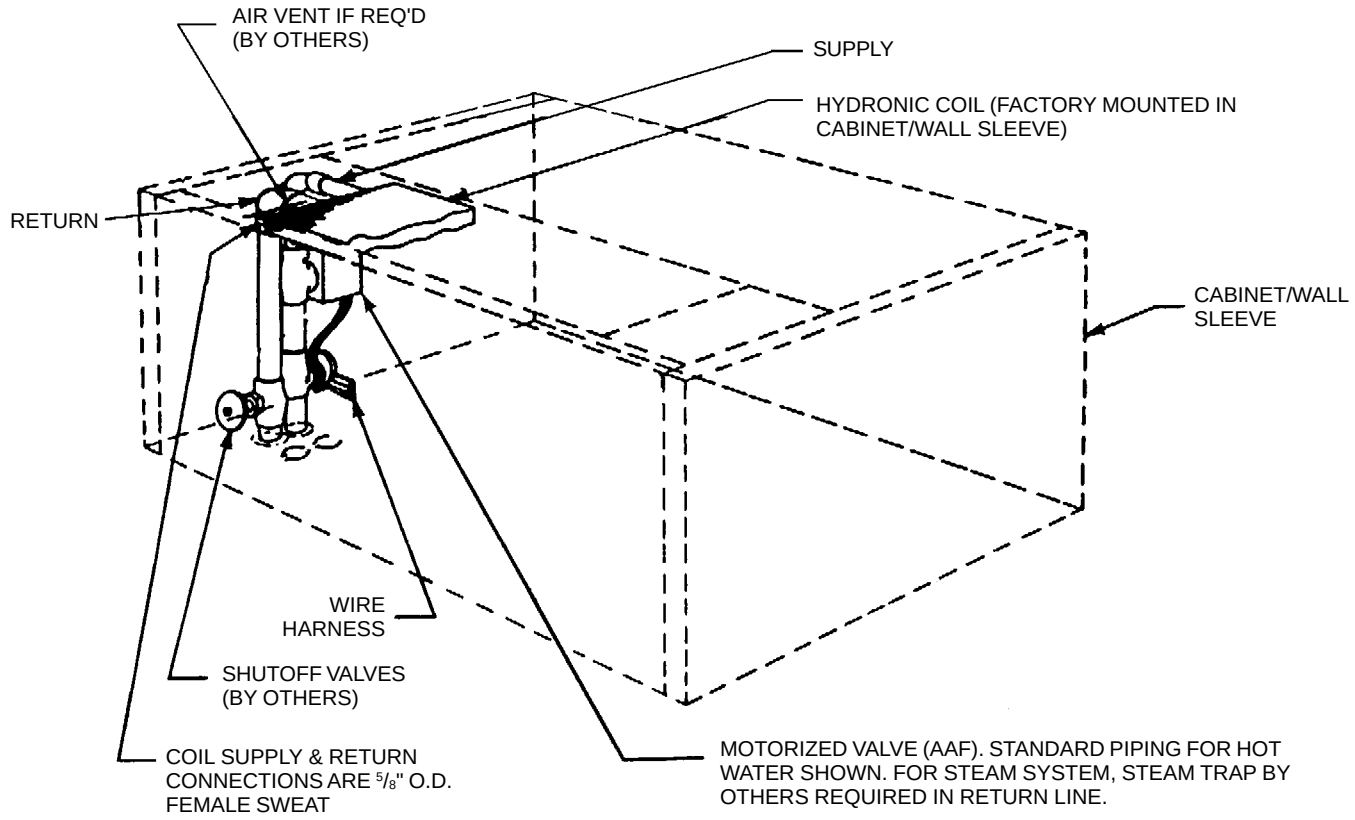
1. Stub hot water or steam piping through floor prior to installation of room cabinet/wall sleeve.

2. After the room cabinet/wall sleeve is installed, complete the piping. Piping must not extend to the right beyond the chassis guide rail in the bottom of the cabinet/wall sleeve.

3. Install valve. Use soft solder only. Refer to the installation instructions packed with each valve.

4. After all piping is complete and chassis is installed, connect wiring to the valve. Plug connection is provided on wiring which hangs from the left side of the chassis.

Figure 6. Hydronic piping installation



Room Cabinet/ Wall Sleeve

1. Where applicable, install the louver frame, wall sleeve extension, subbase, and/or wall guard flange as per prior installation instructions.

2. For masonry installations, set the room cabinet/wall sleeve in soft mortar.

3. Position the room cabinet/wall sleeve in the wall opening. Where applicable, align with louver frame. See Figures 7 through 11 and associated notes for various installations.

4. Where applicable, level the subbase with the leveling bolts provided.

5. After the room cabinet/wall sleeve is installed and leveled, secure the louver frame to the wall with screws driven through the sides and top of the room cabinet/wall sleeve outward through the louver frame. Never secure the frame through the bottom, as it can cause leaks.

6. Caulk the outdoor joint between the room cabinet/wall sleeve and the louver frame: top, bottom, and both sides. Do not permit caulking to block the weep holes.

7. Install the outdoor louver. Holding the louver with a wire loop, or other similar means, push the louver out through the rear opening in the room cabinet/wall sleeve and pull the louver back to the rear face so that the louver studs pass through the holes in the room cabinet/wall sleeve flange. Attach the louver with the washers and nuts provided, and securely tighten the louver in place.

Figure 7. Panel construction, bottom inlet, extruded louver

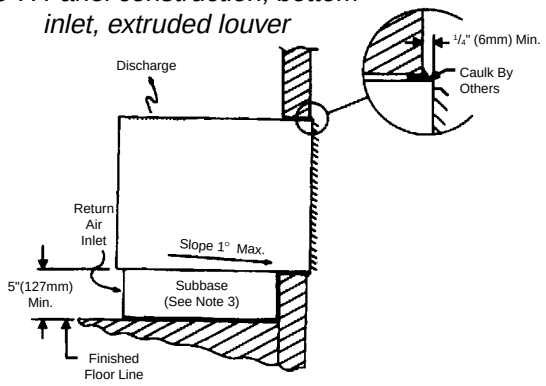


Figure 8. Masonry construction, bottom inlet, extruded louver

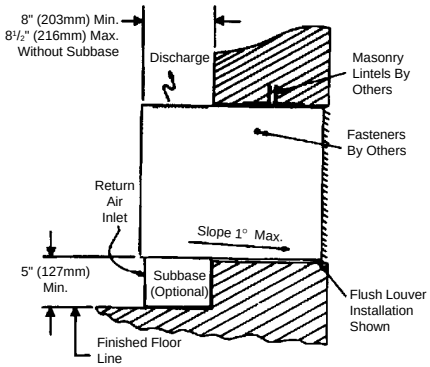


Figure 9. Masonry construction, front inlet, extruded louver

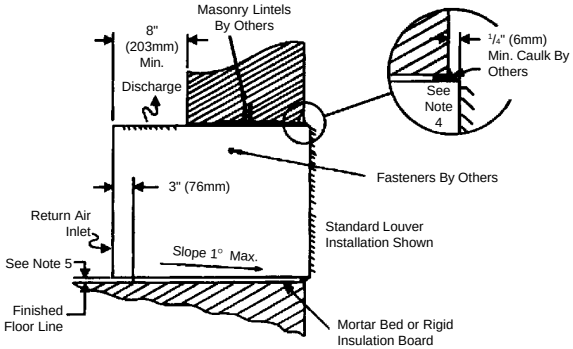


Figure 9. Masonry construction, front inlet, stamped flanged louver

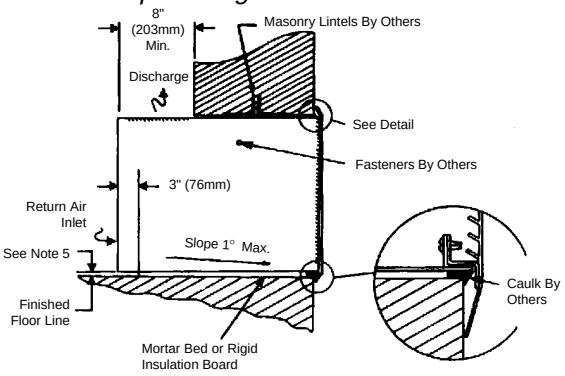
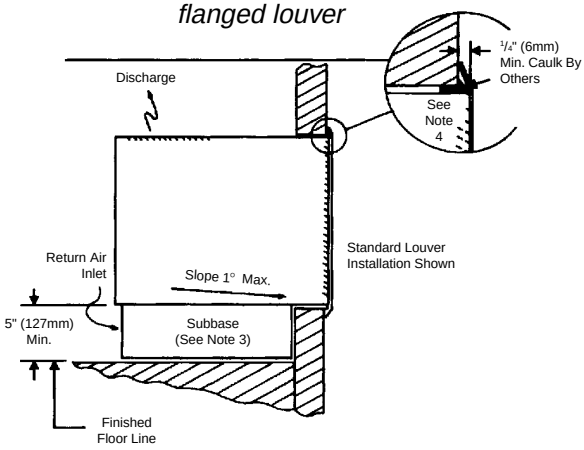


Figure 10. Panel construction, bottom inlet, stamped flanged louver



Notes:

1. Recommended wall openings are 16 1/2" x 38" (419mm x 965mm) for short cabinets and 16 1/2" x 42" (419mm x 1067mm) for long cabinets.

2. Set the cabinet level side to side and level to no more than 1° slope downward toward outside, front to back.

3. Fasten the cabinet/wall sleeve to the wall when possible. Do not fasten the cabinet/wall sleeve through its bottom.

4. Regardless of the type of wall construction, the cabinet/wall sleeve must be field caulked to the wall around the top, bottom, and both sides, to form an airtight and watertight weather seal. For flush louver installation, if the wall material at the opening is not watertight, framing or flashing must be provided around the wall opening (by others) to prevent penetration of water into the wall.

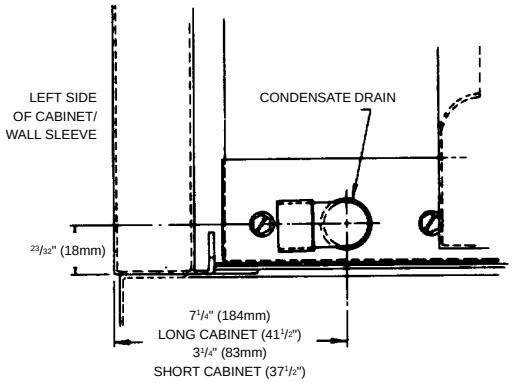
5. 1/2" (13mm) minimum for power cord (short cabinet only). **Caution:** If the conditioned space is carpeted, increase this dimension to 3/4" (19mm) minimum for long cabinets or to 1 1/4" (38mm) minimum for short cabinets.

Heat Pump Condensate Drain Kit (P/N 105542401)

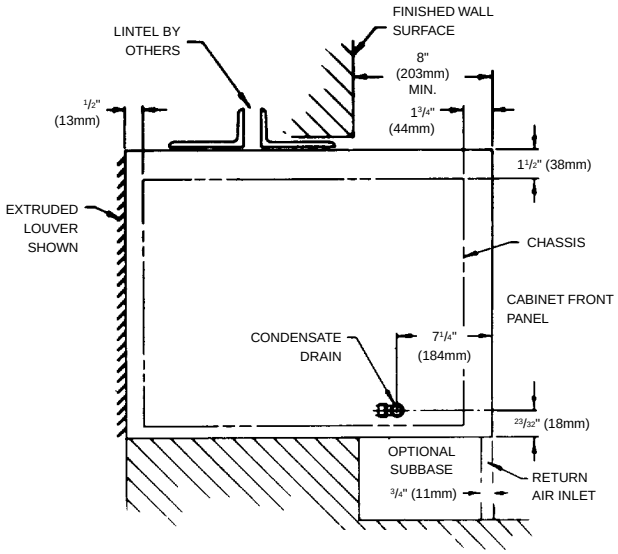
Install the condensate drain kit at the same time as the chassis is being installed.

1. If the application requires a drain exit through the bottom of the wall sleeve, punch through the knockout provided.
2. Holes in the cabinet/wall sleeve, other than the knockout, must be provided by others.
3. Slip the 5/8" (16mm) rubber tube over the end of the drain tube elbow, locate the drain tube in the desired position, and slip the open end of the rubber tube over the chassis drain pan elbow. The rubber tube must engage the copper elbows a minimum of 1/2" (13mm). Installation of the drain piping must allow clearance for the filter which fits under the drain connection.
4. Maintain a downward pitch in the drain line, away from the drain pan.
5. Connect drain pipe to condensate removal piping system or extend to exterior of building.
6. Test drain operation by pouring approximately (2) quarts of water into drain and assure proper removal.
7. The drain valve is thermostatically controlled: full open at 60°F (1600), full closed at 80°F (2700).

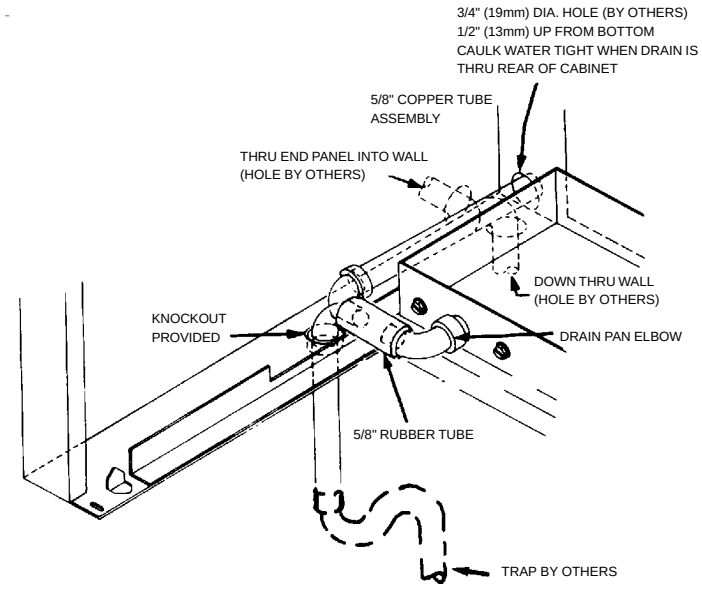
Figure 12. Heat pump condensates drain connection



Lower Left-Hand Front View
(Front Panel Removed)



Left End View



Notes:

1. Condensate drain piping must be connected to the condensate drain as shown in Figure 13.
2. A condensate piping kit is available from McQuay.
3. Condensate piping must be disconnected for removal of the chassis.
4. The drain valve is thermostatically controlled: full open at 60°F (16°C); full closed at 80°F (27°C).
5. The condensate line must be slightly pitched below the chassis for proper drainage.

Chassis

Important: The chassis must be fully seated to provide a proper weather seal. When properly installed, the front edge will line up with the front edge of the cabinet/wall sleeve

1. Remove the chassis from the carton and check for damage.

2. Compare the nameplate information to the job requirements and check the voltage supplied to the unit before installing the chassis.

3. Remove all debris from the cabinet/wall sleeve and check to see that the rear seal strip is securely attached.

4. Spin the condenser and room air fan wheels to make sure they rotate freely, and they are tight. Check the copper tubing in the compressor compartment. If required, bend carefully to eliminate contact with other tubing or the compressor shell.

5. Remove the two (2) hex nuts from the weld studs on the cabinet and remove the two (2) clips.

6. Install the chassis in the wall sleeve. Check the seal where the gasket on the discharge plenum seals against the flange on the wall sleeve. The seal should be in complete contact with the wall sleeve flange.

7. Attach the drain kit (if provided) or other suitable drain provisions to the fitting on the chassis. Required on heat pumps only. See condensate drain kit installation instructions.

8. **Test drain operation by pouring approximately (2) quarts of water into drain and assure proper removal.**

9. Connect the main power, the control wiring (if furnished), and the motorized valve wire harness (hydronic heat model only).

10. Install the clips removed in Step #5.

11. Install the filter before operating the unit. If the optional louvered front panel is furnished, install the filter in the brackets on the back of the front panel and install the bottom block off in the cabinet/wall sleeve.

12. If applicable, install Climate Director plenum system. See Climate Director installation instructions.

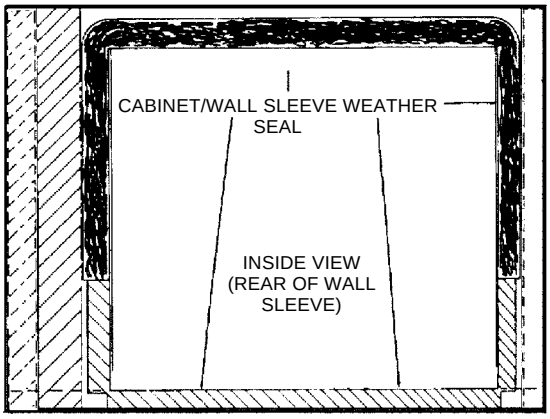
13. Install the front panel before operating the unit. Fasten the panel at the lower corners using the screws provided. See front panel installation instructions.

14. See Figure 14 to check the weather seal.

⚠ CAUTION

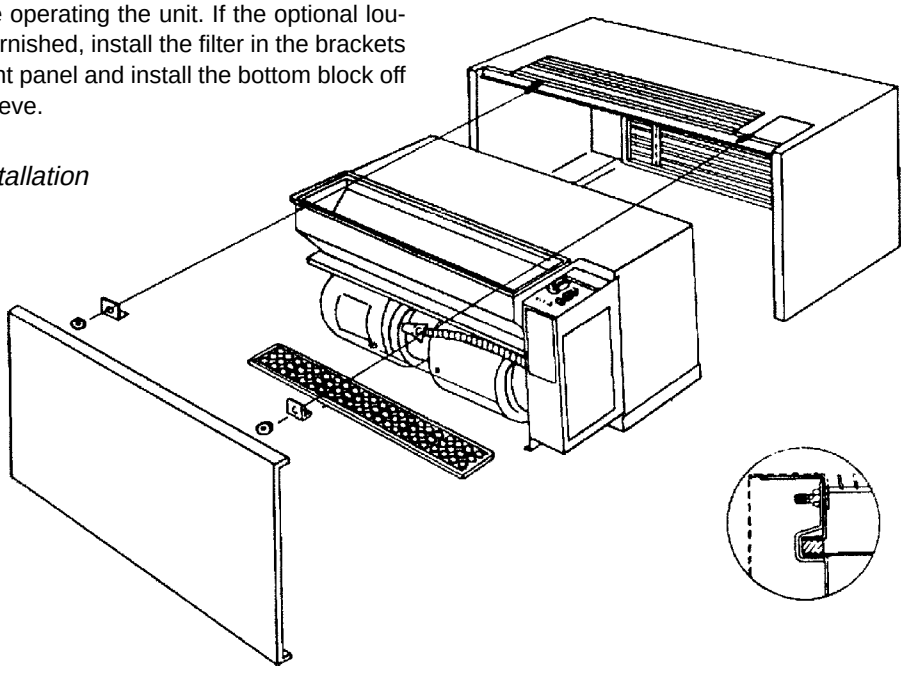
Cleaning compounds can permanently damage unit. Do not spray cleaning compounds onto the discharge grille, return air opening or unit controls. Clean unit by wiping with a damp cloth. When using cleaning compounds on carpets, floors or walls, turn the unit off to avoid drawing vapors into the packaged terminal unit.

Figure 14. Perimeter weather seal



Note: Check the weather seal around the entire perimeter for proper adhesion to the cabinet/wall sleeve.

Figure 15. Chassis installation



Front Panel

Install the front inlet block off as shown in Figure 16. Install the front panel on the cabinet/wall sleeve by placing the notches in the bottom of corners of the panel over the raised tabs on the cabinet (see Figure 17). Place the flange on the top inside of the panel in the slot on the cabinet and carefully push down until the cabinet and the front panel align. The panel may be secured in place by installing screws in each lower corner.

Figure 16. Front inlet block off installation

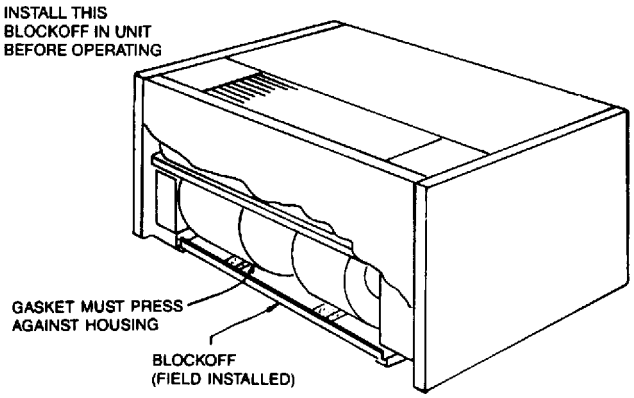


Figure 17. Front inlet block off detail

Climate Director Plenum

1. Visually inspect room cabinet/wall sleeve to ensure that it was ordered and delivered without the standard grille and access door.

2. For proper placement of the accessory discharge plenum, a minimum distance of 10 1/2" (267mm) must exist between the wall and the cabinet front panel.

3. Remove the discharge plenum from its carton and position 5/8" (16mm) from the front of the previously installed room cabinet. Discharge plenum must not interfere with removal of the front panel. See Figure 18.

4. Using the plenum as a template, mark the locations of the four mounting holes in each corner. Remove the plenum and drill holes in the top of the room cabinet for 1/4" fastening bolts.

5. Replace the discharge plenum and fasten to the room cabinet with the four (4)1/4" bolts and nuts provided.

6. Install end cap which clips into discharge plenum as required.

7. Optional duct sections are shipped in two-piece “L”-shaped sections. Pieces fit together using a locking seam method. Press pieces together to form a tight fit.

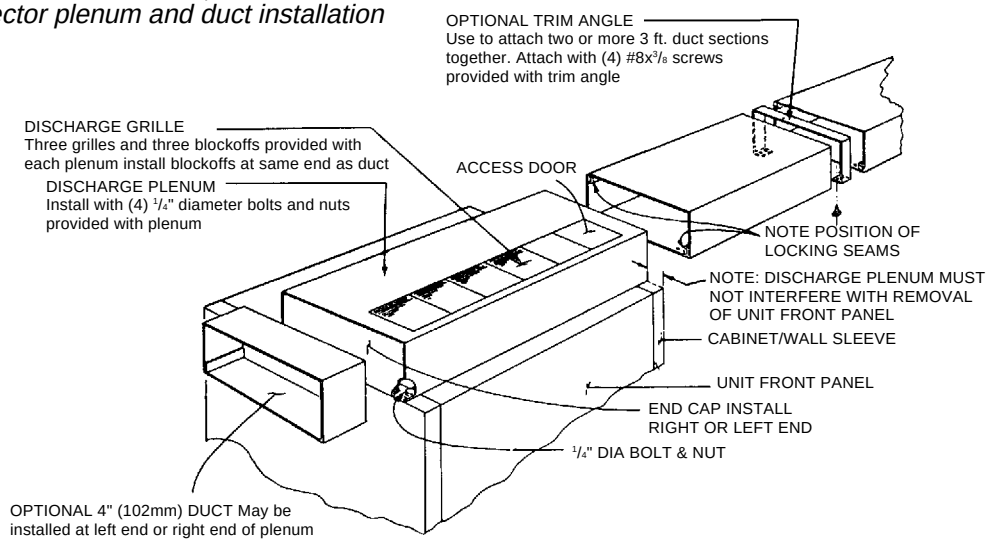
8. Attach 4-inch (102mm) or 3-foot (91.5cm) duct sections to discharge plenum. Duct sections clip onto plenum.

9. A maximum of five sections, 15 feet (4.56 meters), may be used on one unit in a straight run only. No elbow configurations of any type are acceptable. Sections may be field cut. Multiple sections must be supported every 3 feet (91.5cm) by the contractor. Multiple sections are attached with a trim angle at the connecting seam. Attach trim angle to both sections with the four (4) #8x3/8” screws provided.

10. Install grilles on ends of duct sections.

11. Install discharge grilles on discharge plenum. Three (3) grilles and three (3) block offs are provided with each plenum. Install block offs at same end as duct.

Figure 18. Climate Director plenum and duct installation



Unit Start-up

(Complete the, Check, Test and Start Form on page 13 and 14)

Electrical Connections

The 37$^1/_2$" short cabinet is used for applications that utilize electric resistance or reverse cycle/heat pump heating technologies. The EnerSaver chassis power cord is designed to plug directly into an electrical receptacle that is hard wired and concealed within the subbase of the room cabinet/wall sleeve (see Figure 19).

The 41$^1/_2$" long cabinet is used when the hydronic (hot water or steam) heat option is chosen. Included with this room cabinet is a junction box designed to house an electrical receptacle that is hard wired to the facilities respective circuit.

In all cases, the electric receptacle is supplied by either the factory or by others.

1. The electrical installation must be in accordance with the job wiring diagram and comply with the National Electrical Code and all local electrical codes.

Figure 19. Receptacle location for permanently connected units

2. Permanently connected units may utilize time delay fuses or HACR type circuit breakers (where applicable) for branch circuit protection. Cord connected units may utilize time delay fuses or circuit breakers for branch circuit protection.

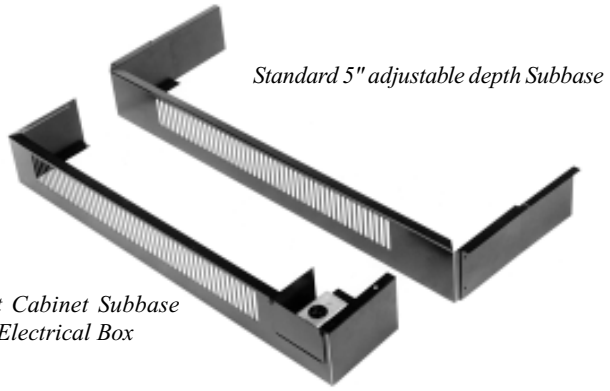
3. Optional factory mounted circuit breakers, when furnished, are not offered as branch protection.

4. Since all chassis have identical dimensions, regardless of heating and cooling capacities, pay careful attention to the branch circuit amperage requirement for each unit to avoid electrical mismatching of chassis and permanently connected branch circuits during field installation.

5. Unit supply voltage must be as follows:

Nameplate Voltage	Minimum	Maximum
120V	108	132
208V	187	228
240V	216	264
277V	249	304

Figure 20. Subbases



Condensate Drain

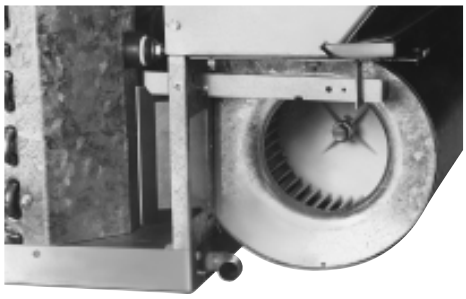
Test drain operation by pouring approximately (2) quarts of water into drain and assure proper removal.

Outside Air Damper

Three outside air damper arrangements are available: a manual damper, a motorized damper, and no damper.

The manual air damper is operated by removing the front panel and then placing the lever in the desired position. Pushing the lever opens the damper; pulling the lever closes it.

Figure 21. Manual outside air damper



Units equipped with motorized air dampers are controlled by removing the front panel and then placing the damper control switch in the auto or closed position. The concealed switch on the motorized damper is to help prevent unwanted tampering with damper control. When this switch is in the auto position, the damper will be open and remain open while the unit is on. If the unit is turned off, the damper will automatically close. Placing the damper control switch in the closed position will keep the damper closed at all times.

Figure 22. Motorized damper

McQuay International

PTAC Check, Test & Start Report — Audit

Date _____

Job Name _____ City _____ State _____

Installer _____ ISO#/GO# _____ Total No. of Units _____

Date of Final CTS Start-up _____

Manufacturers' Representative Name _____

UNIT TYPE(S)

☐ SuiteII ☐ Type K
☐ Type EA ☐ Type J
☐ Enersaver

Other _____

ESSENTIAL ITEMS CHECK

A. Voltage Check _____ Volts (measured)

B.

Yes	No	Condition	Yes	No	Condition
☐	☐	Filters Clean	☐	☐	Operates in Heating
☐	☐	Evaporator Coils/Drain Pans Clean	☐	☐	Operates in Cooling
☐	☐	Wall Boxes Sealed To Wall, No Leaks	☐	☐	Operates in Fan Only (if so equipped)
☐	☐	Wall Box Pitch Satisfactory	☐	☐	Hi-Lo Fan Speed Operational (if so equipped)
☐	☐	Chassis Installed Completely into Wall Box	☐	☐	Fans Rotate Freely
☐	☐	Condensate Drains Installed	☐	☐	Damper Working Properly (Manual or Automatic)
☐	☐	Air Discharge Free of Obstruction	☐	☐	Test Drain Pan Operation

NOTE: *"No"* answers above require notice to installer by memorandum (attached copy).

Please include any suggestions or comments: _____

_____

_____

_____

_____

Above System is in Proper Working Order

_____
DATE

_____
SIGNATURE FOR SALES REPRESENTATIVE

_____
SIGNATURE FOR CUSTOMER

NOTE: This form must be completed and returned to the Warranty Administrator before any CTS, first year monies can be released for payment. Failure to complete this form may cause unnecessary interruption in job site warranty.

FOR INTERNAL USE

Release:

SM _____

CTS _____

T _____

SERVICE MANAGER APPROVAL

_____
DATE

FORM No. PT-CTS-1206

PTAC Check, Test and Start Worksheet

(For additional units copy this page) Page _____ of _____

	Model	Serial #	Room #	Installation OK	Cooling Check	Heating Check	Damper Working	High Fan	Low Fan	Amp Check
1.										
2.										
3.										
4.										
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6.										
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Unit Maintenance and Operation

With today's high energy and labor rates, a sound preventive maintenance policy is a very good investment. Clogged and restricted air filters and coils can impede the flow of air through the unit and can cause inefficient operation. Such conditions only increase operating costs.

Poorly maintained equipment is an open invitation to short unit life and frequent repair charges.

Filters — EnerSaver units are available with either a permanent filter or a disposable charcoal filter. Clean filters are essential to proper airflow through the unit. Utilities are currently recommending filter inspection and replacement at least once per month.

Vacuum permanent filters to remove loose dust. Then wash the filter in a warm, mild soap solution to remove trapped material. Rinse the filter and allow it to dry. Do not operate the unit without both the filter and the unit front panel in place.

Evaporator Fan Motor — All Fan Motors are permanently lubricated by the manufacturer. They do not require further oiling.

Condenser Fan Motor — All Fan Motors are permanently lubricated by the manufacturer. They do not require further oiling.

Coil Surfaces — Clean coil surfaces are essential to efficient heat transfer. A dirty coil can severely impede the operation of a unit.

Visually inspect and clean the condenser and evaporator coil surfaces annually. Inspect and vacuum the hydronic heating coils before the beginning of each heating season.

Condensate Removal System — Condensate forms on the evaporator coil during normal operation of the unit. An internal system is provided to dispose of this condensate. **It is necessary to keep the drain pan and condensate line clean to keep the system functioning correctly.** Cleaning the condensate pan is most convenient when it is done at the same time as the annual coil inspection. See Figure 23 for the location and removal of the drain pan and line.

Gaskets and Seals — **It is extremely important** that all gaskets and seals be in place and intact. A loose or missing gasket will prevent correct seating of the chassis in the cabinet/wall sleeve, allowing infiltration of outside air and water into the room space. See Figure 24 for gasket and seal location and arrangement.

Removing Chassis — It is not necessary to remove the chassis to perform most of the general maintenance procedures just outlined. However, if the chassis requires removal, use the following procedure:

Figure 23. Evaporator drain pan cover removal

1. Remove front panel by lifting upward from bottom.

2. Disconnect power to the unit by unplugging the control box power cord from the unit receptacle/junction box (or room receptacle on cord-connected units).

Figure 24. Gasket and seal location

3. For units with remote controls, disconnect low voltage lines connecting the control box with the wall thermostat.

4. For hydronic heating units, disconnect the motorized valve from the control circuit. To do so, disconnect the plastic connector at the left side of the chassis.

5. Remove chassis support brackets.

6. For PTHP units, disconnect the condensate drain kit rubber tube from the chassis drain connection.

7. After all wiring has been disconnected, place fingertips under chassis removal flange and slowly pull chassis out of the cabinet/wall sleeve. See Figure 25. **Take care not to allow the back of the chassis to "fall out" of the sleeve.** Damage can result if this happens. Some drain pans can contain a small amount of water. Take care (i.e., drop cloth, etc.) to prevent spills from staining carpet or floors.

Figure 25. Chassis removal flange

Specific Operating Conditions

Familiarity with the correct operation of the units will allow you to spot potential problems before they become serious. The following list details specific operating conditions which you should be aware of to help identify a unit malfunction.

1. Units with low ambient lockout should not operate on cooling below 40°F (4°C) outside air temperature.

2. Frequent cycling of the compressor can reduce life expectancy of your unit. This could be caused by an oversized unit, poor location of the wall thermostat (when used), low supply voltage to the unit, low refrigerant charge, or outside air infiltration.

3. Compressor failures are sometimes related to condenser fan motor failures. If the condenser fan motor fails, the compressor will continue to run and will operate at high head pressures and temperatures which will eventually cause the compressor to fail. To help prevent this, check for proper operation of the condenser fan motor whenever routine maintenance is scheduled.

4. Operating the units during low voltage periods can damage the unit. If a brownout occurs, or local utilities warn of voltage cutbacks, it is best to turn off the units. The compressor is protected against voltage variations and phase loss to the extent covered by U.L. Standard 484 for Room Air Conditioners.

5. Keep the discharge and return air grilles clean and unobstructed. Do not use the cabinet/wall sleeve as a shelf or table, since this restricts the flow of air from the unit.

6. During building construction periods, units should not be used as temporary heating or cooling sources.

7. Remove any paper and other foreign material from the unit before operating it.

8. Test drain operation by pouring approximately (2) quarts of water into drain and assure proper removal.

Typical Schematics

Figure 26. Enersaver PTAC with unit mounted thermostat, electric heat, no setback, manual change over

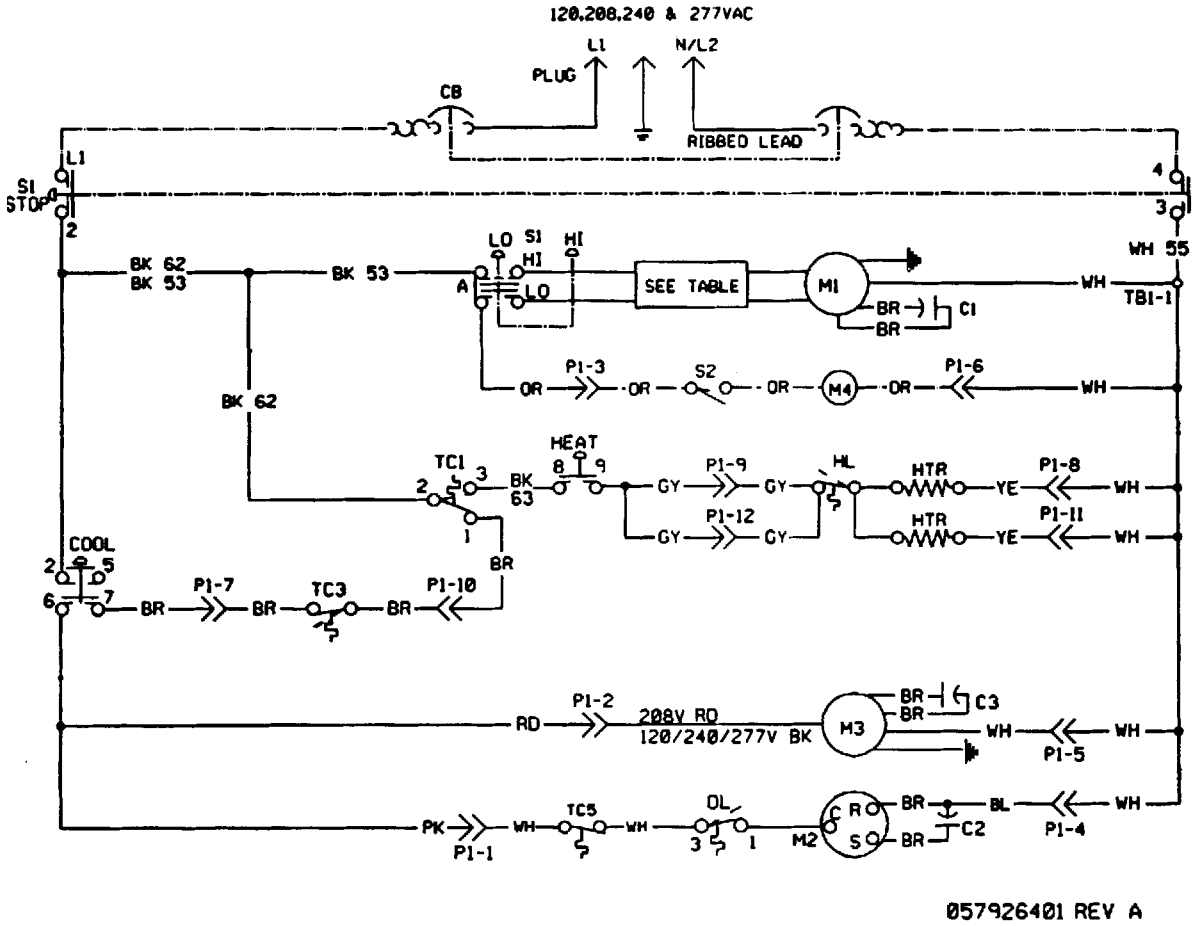
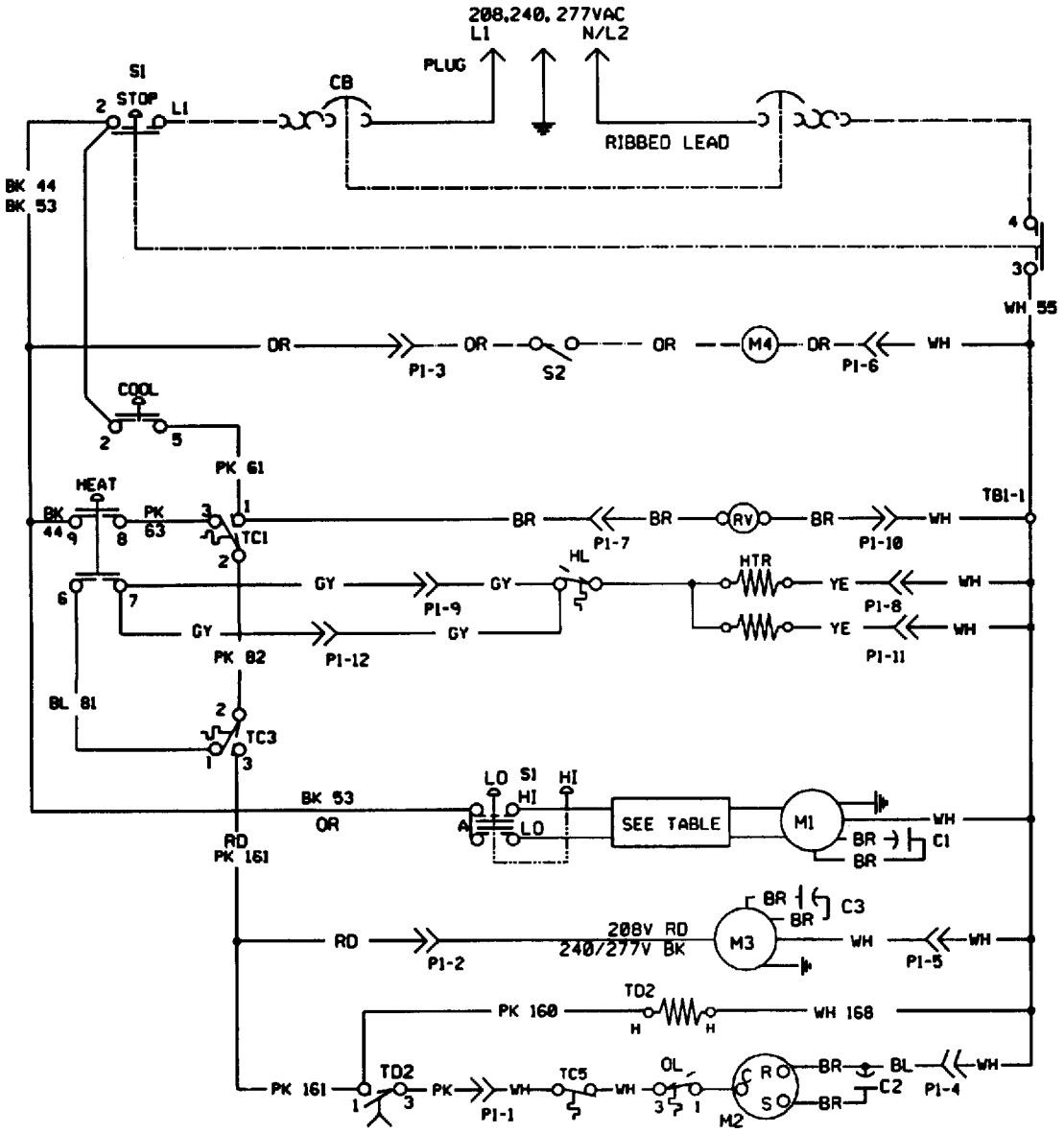


Figure 27. Enersaver heat pump with unit mounted thermostat, electric heat, no setback, manual change over



LEGEND

	DESIGNATION	SYMBOL	DESIGNATION
—◎—	FIELD CONNECTION	R2	RELAY-COOLING
———	OPTION WIRE	R3	RELAY-HEATING
— — -	FIELD WIRE	R4	RELAY-FAN
—⋖—	QUICK CONNECT	R5	RELAY-SETBACK
C1/3	CAPACITOR	R6	RELAY-INTERLOCK
CB	CIRCUIT BREAKER (OPT.)	RV	VALVE-REVERSING
	(120/277V-1 POLE)	S1	SWITCH-PUSH BUTTON
	(208/240V-2 POLE)	S2	SWITCH-DAMPER
HL	HI LIMIT	T	TRANSFORMER-CLASS 2
HTR	ELECTRIC HEATER	TB1	TERMINAL BLOCK
M1	MOTOR-ROOM AIR	TC1	THERMOSTAT - ROOM AIR
M2	COMPRESSOR	TC2	THERMOSTAT-SETBACK
M3	MOTOR-OUTDOOR AIR FAN	TC3	THERMOSTAT-LOW AMBIENT LOCKOUT
M4	MOTOR-VENT (OPT.)	TC4	THERMOSTAT-LOW LIMIT
OL	COMPRESSOR OVERLOAD	TC5	THERMOSTAT-FREEZE
P1	PLUG-CHASSIS	TD1	RELAY-REMOTE SETBACK (OPT.)
P2	PLUG-LOW VOLTAGE	TD2	RELAY-TIME DELAY

ROOM AIR MOTOR WIRES		
UNIT SIZE	HI	LO
007B		
009B (120/277V)	BLK	RED
009B (208V)	BLK	BLU
009B (230V)	ORG	RED
012B	BLU	RED
015B	BLK	BLU

Wall Thermostat Adjustment

The wall thermostats used on EnerSaver units have a built-in anticipator. In order to obtain even, comfortable heating in a conditioned space, it is absolutely essential that the thermostat anticipator is properly adjusted.

The anticipator is a small, adjustable resistor through which the low voltage control current passes. On heating demand, the thermostat closes and the unit operates on heating; the anticipator heats up, giving the thermostat a false signal. If the thermostat has to wait for the heat from the heating unit to reach it, the room would have a tendency to overheat. The anticipator prevents this by raising the temperature at the thermostat and stopping the unit early.

There are two ways to set the anticipator. Take the control circuit current draw, if it is known, and adjust the anticipator to this value. This method will work satisfactorily in the majority of cases. If the control wiring is oversized, the control voltage low, or additional components are operated from the control circuit, then the anticipator must be calibrated for each thermostat. Remove the thermostat exposing the subbase, connect an ammeter between the hot 24 volt terminals and the heating lead terminal. The ammeter should be capable of reading accurately from 0.1 to 4.0 ampere. Record the value and adjust the anticipator to the value recorded.

Typical recommended thermostat heat anticipator settings are shown in the table below.

UNIT TYPE	ANTICIPATOR SETTINGS
Cooling Heat — Wet Heat — All Voltages	.13
Cooling Heat — Electric Heat — All Voltages	.15
Heat Pump — All Unit Types & Voltages	.37

The anticipator should now be properly adjusted and very little fluctuation in room temperature should be noticed. The room should be allowed to stabilize for 48 hours before checking the effect of the anticipator adjustment. If complaints are still received, small readjustments may be required due to the configuration of the space.

The adjustment of the anticipator is a field adjustment which must be made by the installing contractor. In all cases, when there are complaints of uneven heating in a space, ensure that all anticipators are properly set. Optimum performance and comfort cannot be expected unless anticipators are set correctly.

AC Retrofit With HP Chassis

EnerSaver Heat Pump units are an excellent replacement for Air Conditioning units. The chassis dimensions are identical, allowing the H/P chassis to fit into the A/C wall sleeve. The major addition required is that of a condensate removal system. On single-story applications, the condensate drain line may be routed through the rear of the cabinet/wall sleeve allowing the line to project out of the unit. Caulking around this notch will prevent entrance of water into the sleeve. Multistory buildings should utilize a more sophisticated condensate removal system to prevent excessive drainage down exterior walls.

NOTE: Check cabinet/wall sleeve level of installation. For condensate to drain properly, the sleeve must be set and leveled from side to side. Then level the unit front to back with no more than 1° slope downward toward the outside. A final consideration when retrofitting an A/C wall sleeve with an H/P chassis is branch circuit ampacity. The units must be the same voltage, and have an ampacity equal to or less than the A/C unit it is replacing.

Troubleshooting

The following troubleshooting guide should aid in detecting unit malfunctions.

⚠ WARNING

Troubleshooting can present risks of equipment damage, severe personal injury or death. Troubleshooting must be done by trained experienced technicians only.

COMPLAINT	PROBABLE CAUSE	CHECKS AND CORRECTIONS
Entire unit does not operate.	1. Power failure.	1. Check for blown fuses or tripped circuit breaker. Check fuse sizes. Check wiring connections and check for both high and low voltage.
	2. Push button.	2. Check for push button operation. Check for loose terminals, broken wires, or defective push button. Replace if necessary.
Electric shock from equipment.	1. Improper grounding of electric circuit.	1. Provide proper ground. Check for short circuits.
Evaporator blower assembly operates, but is noisy.	1. Motor mounts.	1. Check motor mounts; they might be loose. If so tighten. They could have become bent in transit. Reposition and retighten.
	2. Fan wheel.	2. Check for proper alignment in fan housing. Check for tightness on motor shaft. Check for foreign material in fan wheel or housing; e.g., construction debris, paper, plaster. Clean and retest. Check the electrical flexible conduit; it may be rubbing against fan assembly or unit front panel.
	3. Motor bearings.	3. Check motor bearings. Replace if necessary.
Evaporator blower assembly operates, but compressor does not start.	1. Power.	1. Check for proper voltage at compressor terminals. See page 12 for compressor voltage range. At the power source check for proper wire size.
	2. Unit mounted manual change over thermostat.	2. Turn unit temperature control knob to normal. Then push “High Speed” button and push “Cool” button. The unit should turn on. If not, move the thermostat knob clockwise to the end of its travel. If no contact is made, hold thermostat bulb firmly in hand for a few minutes. If no reaction, check wiring and continuity at terminals 1 and 2 at back of thermostat. If open circuit when bulb is warm, remove and replace thermostat.
	3. Unit mounted automatic change over thermostat.	3. Turn unit temperature control knob as above. Press “High” or “Low” button. The unit should turn on provided the setting on the thermostat is lower than actual room temperature. If not, move thermostat setting to the coldest point; it no contact, hold thermostat bulb firmly in hand for a few minutes. If no reaction, check wiring and continuity at terminals 4 and 5 on back of thermostat, If no continuity, remove and replace.
	4. Wall mounted manual change over thermostat.	4. Set unit on “High” or “Low” speed push button. Then push on cool switch on wall stat. Turn temperature lower than actual room temperature. Cooling relay should energize and compressor should start. If cooling relay is chattering or humming, check for 24 volts supply at relay (should not be lower than 18 volts). Caution should be exercised in the length of the 24V wire run from the unit to the stat. If run is excessive for gauge of wire used, there may be a natural voltage drop. If compressor not running, place jumper wire at subbase between terminal “Y” and “R”. If no voltage at relay, check wiring at transformer.
	5. Wall mounted automatic change over thermostat.	5. Make sure jumper wire between RH and RC (On subbase) has been field wired. Set unit on “High” or “Low” speed. Then move lever (cooling) at thermostat to temperature lower than actual room temperature. Cooling relay should become energized. If compressor is not running, check for wiring at transformer.
	6. Unit control panel.	6. On unit using 24 volt transformer, check for low voltage open circuit; check 24 volt transformer for burnout, check contacts (relays may be dirty or binding); check for loose wires if below 18 volts. Caution should be exercised in the length of the 24V wire run from the unit to the stat. If run is excessive for gauge of wire used, there may be a natural voltage drop. Disconnect and replace providing the primary voltage is within specified limit (10%). Check for loose terminals or connections. They will change color indicating the presence of heat. If so, change terminal.
	7. Low ambient lockout.	7. If outside temperature at time of complaint was below 40°F (4°C), unit was probably okay but was locked out on low ambient protection. If not, apply heat by palm of hand to lock out control and warm up to a minimum of 60°F (16°C). and check for continuity. If open, remove and replace.
	8. Run capacitor defective.	8. Check for overvoltage and light load. Reduce line voltage to value given on page 12. In general, voltage should not exceed 10% over and above nameplate voltage, If capacitor is suspected to be defective, test it with an ohmmeter Check for water dripping over terminal, or for terminals shorting together causing a dead short, If water dripping is suspected, find traces of water or condensation and make correction.
	9. Stuck compressor.	9. Before attempting this next checkout, ensure that the run capacitor is not defective. Try an auxiliary capacitor momentarily, If the compressor starts but the problem reoccurs on starting, install an auxiliary hard start kit (referred to as PTC, Positive Temperature Coefficient Resistor) and a correctly sized capacitor.

COMPLAINT	PROBABLE CAUSE	CHECKS AND CORRECTIONS
Evaporator blower assembly operates, but compressor does not start (cont'd).	10. Compressor motor grounded or has an open winding.	10. If the compressor temperature is above 130°F (54°C) the internal overloads may not have reset yet. Allow the compressor to cool down before checking the unit again (compressors cool slowly so cooling may take over an hour). If the compressor is cool and does not start, test the motor windings. Remove the electrical connections from the compressor and measure the resistance across the Run and Start windings and/or the Start winding alone. If no resistance is read, the windings are open and the compressor should be replaced.
Compressor starts, but does not switch "off" start winding.	1. Improperly wired.	1. Check against wiring diagram and correct if incorrectly wired.
	2. Low line voltage.	2. Check voltage at compressor. Place voltmeter leads at common and run terminals. Start compressor, read voltage. If below tolerance, check electrical installation for proper sizing of wires and length of run of wiring for extreme voltage drop.
Unit short cycling.	1. Thermostat.	1. If remote wall mounted thermostat check for proper heat anticipator setting as described on page 16.
	2. Wiring.	2. Check for loose terminal or connections in the electrical circuit. Trace and repair.
	3. Control contacts fluttering.	3. Check control contact points. If pitted or corroded, remove and replace. Do not file or clean with abrasive material.
	4. High amperage draw.	4. Check compressor amperage draw at full load condition. If abnormally high amperage, check condenser fan operation; fan should always be on when compressor is running. Also check for refrigerant overcharge as outlined in the next procedure.
	5. Refrigerant overcharge.	5. Since there is no access valve to the refrigeration circuit, the "Frost Back" method can be used, described as follows. While compressor is running, observe the suction line from evaporator to compressor shell. If heavy frost appears on the line, there is a possibility of an overcharge. To correct, use a piercing valve on compressors processing tube and bleed off refrigerant slowly until the frost line backs up 3" or 4" (76mm or 102mm) from compressor shell. **Caution:** This method of checking the refrigerant charge is acceptable for this situation. It is not acceptable for recharging a unit, in which case the amount charged must be determined by either a graduated charging cylinder or by weighing.
	6. Compressor runs hot and cuts on overload protection.	6. Check condenser coil in back of chassis. If there is excessive buildup of dirt, clean the coil. Check for condenser fan. Also, either a high amp draw condition (as described above) or this condition can be caused by short circuiting of the condenser discharge air into the inlet airstream.
Unit is running, but no air is being delivered to room.	1. Evaporator airflow restricted.	1. Dirty filter; change or clean. Obstruction in unit; remove. Dirty evaporator coil; clean.
	2. Evaporator coil iced up.	2. Check evaporator fan. If running, check expansion valve operation. If okay for first row of tubes at evaporator coil but frozen on remaining rows, clear off frost and measure actual superheat 3 or 4 inches away from compressor's shell (on suction line). If superheat exceeds +20°F (+11°C), low charge can be suspected and unit should be evacuated and recharged by weight to nameplate data.
Insufficient cooling.	1. Evaporator airflow restricted.	1. Dirty filter; change or clean. Obstruction in unit: remove. Dirty evaporator coil; clean. Evaporator fan motor not up to adequate speed; fan wheel slipping on shaft; tighten setscrews.
	2. Automatic expansion not functioning properly.	2. Check suction and/or proper opening at right pressure. Wrap expansion valve with hot damp cloth, If pressure is restored by this method, then there is indication of moisture in the refrigeration circuit. Discharge refrigerant. Dehydrate system with a deep vacuum pump and recharge according to procedure. If any indication of moisture in system or a burn out, a filter-drier should be installed, If problem still exists, remove expansion device and replace with new one.
	3. Compressor efficiency down.	3. Check for warm suction (high superheat) and slightly warm discharge. Check actual temperature and pressure. If discharge pressure low and suction pressure high, may be compressor. Check with factory for procedure.
	4. Outside air entering room.	4. Check for open doors, windows or other openings and improper unit caulking.
	5. Unit too small.	5. Recheck heat gain, add additional insulation, shading, etc., or add additional units.
Too much cooling.	1. Thermostat set low.	1. Turn to higher setting.
	2. Defective thermostat.	2. Replace.
Evaporator blower operates, but no heating (electric heat).	1. Power at heating element.	1. Check for proper voltage at heating element. Check for broken wires or loose terminals at element, If broken, do not try to repair. Remove and replace complete element.
	2. Overheat switch.	2. Overheat switch could be defective. Check continuity through switch when switch is cooled down to approximately 235°F (113°C) and lower, it should show continuity and should be open circuit at approximately 260°F (127°C) and higher.

COMPLAINT	PROBABLE CAUSE	CHECKS AND CORRECTIONS
Evaporator blower operates, but no heating (electric heat) (cont'd).	3. Push button device.	3. Check contacts through push button (selector switch). If no contact after switch has been pushed, check for loose wires or loose terminals, If all connections okay but still does not operate, remove push button switch and replace.
	4. Thermostat.	4. Move thermostat knob to highest setting. If unit still does not heat, check through thermostat contacts. If no continuity when above set point, remove and replace thermostat.
Evaporator blower operates, but no heating (hot water or steam).	1. Hot water valve or steam valve.	1. Check for proper water or steam circulating valve. Check water temperature. Check for continuity across valve motor. If defective, remove and replace.
Unit operates on cooling, but water is dripping from unit.	1. Chassis not properly installed in wall sleeve.	1. Cabinet should be set level side to side and level to no more than 1° slope downward toward outside, front to back. If not, reinstall wall sleeve. Check for proper gasketing between wall sleeve and chassis. Check that chassis firmly installed in sleeve so that gasketing on discharge is compressed.
	2. Condensate hose obstructed.	2. Check for dirt and foreign material in condensate hose running from evaporator drain pan to exterior pan in condensing section.
	3. Evaporator drain pan not draining.	3. Make sure access cover on drain pan is well placed on top of drain pan. If not, press firmly into position. If okay, check and clean drain pan and drain hole.
	4. Air bypass at top of unit.	4. Check for proper chassis installation in wall sleeve. Make sure that gasket around air discharge on chassis is well pressed against top of wall sleeve, and chassis support clips are in place. This will prevent cold air from evaporator cabinet outlet to hit the back of cabinet front panel, thus creating condensation.
Electric heating element operates, but room side fan does not operate.	1. Motor capacity.	1. Test capacitor with an ohmmeter; replace if necessary.
	2. Loose terminals or broken wire.	2. Check for loose connection or broken wire. Refer to page 14.
	3. Push button.	3. Check for continuity when push button is pressed. If defective, replace.
	4. Defective motor.	4. Check for continuity or ground at motor. If so, remove and replace.
PTHP unit only provides heating (no cooling).	1. Reversing valve not energizing.	1. Faulty solenoid or loose wiring at solenoid terminals.
	2. Defective thermostat.	2. Replace thermostat.
PTHP unit not heating below 4O°F (4°C) outdoor ambient.	1. Fault low temperature at stat.	1. Replace.
	2. Check auxiliary heat.	2. See electric, hot water or steam heat procedures above.
PTHP reversing valve not shifting from cool to heat or heat to cool.	1. Electric circuit: low solenoid coil voltage.	1. Check voltage at solenoid with voltmeter. Replace if necessary.
	2. Refrigerant charge: low charge.	2. Check for leaks. Recharge system.
	3. Defective compressor.	3. Replace.
PTHP reversing valve starts to shift, but does not complete reversal.	1. Insufficient pressure or both ports of pilot open.	1. Check unit operating pressure and charge. Raise head pressure, operate solenoid. If not shift, replace valve.
Noisy operation.	1. Evaporator fan motor bearings.	1. Check motor bearings. If loose or damaged, replace complete motor.
	2. Evaporator fan wheel hitting fan housing.	2. Relocate wheel in center of blower housing. Check for bent motor shaft.
	3. Loose blower wheel.	3. Tighten setscrews on blower wheel to shaft.
	4. Copper tube vibration or rattling.	4. Adjust by bending slightly to firm position.
	5. Contacts.	5. Contactor noise would be due to control voltage being less than 18 volts. Check for low voltage supply, low transformer output or extra long runs of thermostat wires. If the contactor contacts are pitted or corroded, replace contactor. Never file contacts. If holding coil is defective, replace.
	6. Compressor internal mounts distorted.	6. Often referred to as "compressor off mounting springs", which in most cases is highly improbable. If unit was rough handled in transit the internal mounts might have been distorted and compressor main casting is touching the dome or shell.
	7. Compressor internal damage.	7. Make sure the compressor is not in direct contact with the base or sides of chassis. The compressor should float free in its isolation mounts. Excessive noise will occur it the compressor has a broken valve or loose internal discharge tube. If so, replace compressor.
	8. Liquid refrigerant in compressor crankcase.	8. After a prolonged period of non-operation, compressor might produce abnormal noise on start-up. This could be due to liquid refrigerant being mixed with oil in compressor crankcase. After a short delay this noise should disappear.

Warranty

All McQuay equipment is sold pursuant to its standard terms and conditions of sale, including Limited Product Warranty. Consult your local McQuay Representative for warranty details. Refer to Form 933-43285Y. To find your local McQuay Representative, go to www.mcquay.com.

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McQuay International

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