

INSTALLATION INSTRUCTIONS

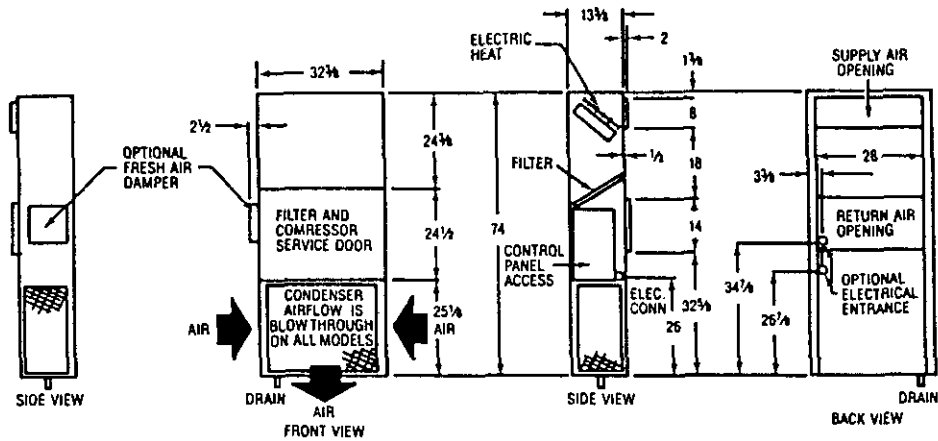
**MODULAR MASTER
WALL MOUNTED
PACKAGE HEAT PUMPS**

MODELS

MHP30A-A05CD05A

MHP36A-A05CD05A

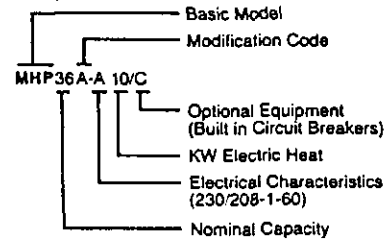
*LOW VOLTAGE
OPTION*



If fresh air is required, an optional fresh air assembly (8620-020) must be ordered separately.

Nomenclature Explanation

Example:



| MODEL | MHP30A-A05CD05A | MHP36A-A05CD05A |
|--|-----------------|-----------------|
| Cooling Capacity Btuh | 28,000 | 33,600 |
| Hi Temperature Htg. Btuh (47°) | 30,600 | 36,000 |
| Supplemental Heat Strip Kw | 5 | 5 |
| Supplemental Heat Strip Btuh | 17,065/12,800 | 17,065/12,800 |
| Electrical Rating — 60 Hz | 230/208-1 | 230/208-1 |
| Operating Voltage Range | 197-253 | 197-253 |
| ***Minimum Circuit Ampacity | 31 | 31 |
| No. Field Power Ckts. | 1 | 1 |
| *Field Wire Size | #8 | #8 |
| Ground Wire Size | #10 | #10 |
| **Required Max. External Fuses | 40 | 50 |
| Total Unit Amps 240/208 | 24.7/22.0 | 24.7/25.8 |
| Internal Fuses (Standard) | None | None |
| Internal Circuit Breakers (Option C) | 40 | 50 |
| Compressor — Circuit A | | |
| Volts | 230/208 | 230/208 |
| Rated Load Amps 230/208 | 13/15.5 | 18/20.5 |
| Branch Circuit Selection Current | 15.5 | 20.5 |
| Lock Rotor Amps | 76/76 | 97/97 |
| Fan Motor & Condenser | | |
| Fan Motor — HP/RPM | 1/5/1050 | 1/5/1050 |
| Fan Motor — AMPS | 1.4 | 1.4 |
| Fan Motor — DIA/CFM | 20"/1800 | 20"/1800 |
| Face Area Sq.Ft. /Row /Fins per in. | 4.7/2/12 | 4.7/2/12 |
| Motor and Evaporator | | |
| Blower Motor — HP/RPM | 1/2/1600 | 1/2/1600 |
| Blower Motor — AMPS | 3.9 | 3.9 |
| CFM Cooling & E.S.P. w/Filter (Rated) (HI) | 1000/.30 | 1060/.15 |
| Face Area Sq.Ft. /Row /Fins per in. | 2.7 | 2.7 |
| Filter Sizes (Inches) | 14x25x1 | 14x25x1 |
| Refrigerant 22 — Oz. | 88 | 83 |
| Shipping Weight — Lbs. | 330 | 330 |

*60°C copper wire size.

**Maximum time delay fuse or HACR type circuit breaker.

***This equipment incorporates a special control circuit for the supplementary electric heat strip. This circuit permits electric heat operation only when the thermostat is in the emergency heat position.

IMPORTANT

The equipment covered in this manual is to be installed by trained, experienced service and installation technicians. Any heat pump is more critical of proper operating, charge and an adequate duct system than a straight air conditioning unit. All duct work supply and return, must be properly sized for the design air flow requirement of the equipment. ACCA is an excellent guide to proper sizing. All duct work or portions thereof not in the conditioned space should be properly insulated in order to both conserve energy and prevent condensation or moisture damage.

SHIPPING DAMAGE

Upon receipt of equipment, the carton should be checked for external signs of shipping damage. If damage is found, the receiving party must contact the last carrier immediately, preferably in writing, requesting inspection by the carrier's agent.

GENERAL

The refrigerant system is completely assembled and charged. All internal wiring is complete.

The unit is designed for use with or without duct work. Flanges are provided for attaching the supply and return ducts.

These instructions explain the recommended method to install the air cooled self-contained unit and the electrical wiring connections to the unit.

These instructions and any instructions packaged with any separate equipment required to make up the entire air conditioning system should be carefully read before beginning the installation. Note particularly "Starting Procedure" and any tags and/or labels attached to the equipment.

While these instructions are intended as a general recommended guide, they do not supersede any national and/or local codes in any way. Authorities having jurisdiction should be consulted before the installation is made.

INSTALLATION

Size of unit for a proposed installation should be based on heat loss calculation made according to methods of Air Conditioning Contractors of America (ACCA). The air duct should be installed in accordance with the Standards of the National Fire Protection Association for the Installation of Air Conditioning and Ventilating systems of Other Than Residence Type, NFPA No. 90A, and Residence Type Warm Air Heating and Air Conditioning Systems, NFPA No. 90B. Where local regulations are at a variance with instructions, installer should adhere to local codes.

DUCT WORK

Design the duct work according to methods given by the Air Conditioning Contractors of America. When duct runs through unheated spaces, it should be insulated with a minimum of one inch of insulation. Use insulation with a vapor barrier on the outside of the insulation. Flexible joints should be used to connect the duct work to the equipment in order to keep the noise transmission to a minimum.

A one-inch clearance to combustible material for the first three feet of duct attached to the outlet air frame is required. See page 5 for further details.

FILTER

A one inch throwaway filter is supplied with each unit. The filter slides into position making it easy to service. This filter can be serviced from the outside by removing the service door.

FRESH AIR INTAKE

All units are built with a fresh air inlet opening punched in the left unit side. This opening is covered by a factory installed blank off plate, model BOP20.

A fresh air damper assembly, model FAD20, may be ordered separately to accommodate the variety of state and local codes requiring fresh air capability.

All capacity, efficiency and cost of operation information as required for Department of Energy "EnergyGuide" fact sheets is based on the fresh air blank off plate being in place and is recommended for maximum energy efficiency.

WALL MOUNTING

1. Two holes, the size of the supply and return air openings must be cut through the wall as shown in Figure 1.
2. On wood-frame walls, the wall construction must be strong and rigid enough to carry the weight of the unit without transmitting any unit vibration.
3. Concrete block walls must be thoroughly inspected to insure that they are capable of carrying the weight of the installing unit.
4. Ducts through the walls must be insulated and all joints taped or sealed to prevent air or moisture entering the wall cavity.
5. Some installations may not require any return air duct. It is recommended that on this type of installation that a filter grille be located in the wall. Filters must be of sufficient size to allow a maximum velocity of 400 FPM.

NOTE: If no return air duct is used, applicable installation codes may limit this cabinet to installation only in a single story structure.

WIRING - MAIN POWER

Refer to the unit rating plate for wire sizing information and maximum fuse or "HACR Type" circuit breaker size. Each outdoor unit is marked with a "Minimum Circuit Ampacity." This means that the field wiring used must be sized to carry that amount of current. Depending on the installed Kw of electric heat, there may be two field power circuits required. If this is the case, the unit serial plate will so indicate. Some models are suitable only for connection with copper wire, while others can be wired with either copper or aluminum wire. Each unit and/or wiring diagram will be marked "Use Copper Conductors Only" or "Use Copper or Aluminum Conductors." These instructions MUST BE adhered to. Refer to the National Electrical Code for complete current carrying capacity data on the various insulation grades of wiring material.

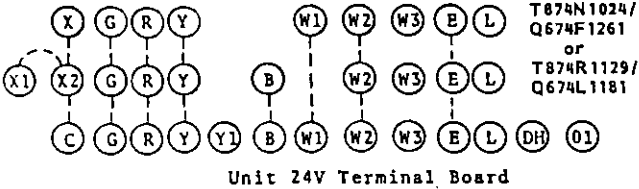
The electrical data lists fuse and wire sizes (60°C copper) for all models, including the most commonly used heater sizes. Also shown are the number of field power circuits required for the various models with heaters.

Field conduit connections must be to the control box and not terminate at the cabinet.

The unit rating plate lists a "Maximum Time Delay Relay Fuse" or "HACR Type" circuit breaker that is to be used with the equipment. The correct size must be used for proper circuit protection and also to assure that there will be no nuisance tripping due to the momentary high starting current of the compressor motor.

WIRING - 24V CONTROL CIRCUIT

Seven (7) wires should be run from thermostat subbase to the 24V terminal board in the unit. An 18 gauge copper, color-coded thermostat cable is recommended. The connection points are shown on most of the wiring diagrams and are also shown below.



Unit 24V Terminal Board

This equipment incorporates a special control circuit for the supplementary electric heat strip. This circuit permits electric heat operation only when the thermostat is in the emergency heat position.

IMPORTANT NOTE: Only the thermostat and subbase combinations as shown above will work with this equipment. The stat and subbase MUST be matched, and correct operation can be assured only by proper selection and application of these parts.

CONDENSATE DRAIN

A plastic drain hose extends from the drain pan at the top of the unit down to the unit base. There are openings in the unit base for the drain hose to pass through. In the event the drain hose is connected to a drain system of some type, it must be an open or vented type system to assure proper drainage.

PRESSURE SERVICE PORTS

High and low pressure service ports are installed on all units so that the system operating pressures can be observed. Pressure curves can be found later in the manual covering all models on both cooling and heating cycles. It is imperative to match the correct pressure curve to the unit by model number.

SEQUENCE OF OPERATION

Cooling - Circuit R-Y makes at thermostat pulling in compressor contactor, starting the compressor and outdoor motor. The G (indoor motor) circuit is automatically completed on any call for cooling operation, or can be energized by manual fan switch on subbase for constant air circulation.

Heating - A 24V solenoid coil on reversing valve controls heating cycle operation. Two thermostat options, one allowing "Auto" changeover from cycle to cycle and the other constantly energizing solenoid coil during heating season and thus eliminating pressure equalization noise except during defrost, are to be used. On "Auto" option, a circuit is completed from R-W1 and R-Y on each heating "on" cycle, energizing reversing valve solenoid and pulling in compressor contactor starting compressor and outdoor motor. R-G also make starting indoor blower motor. Heat pump heating cycle now in operation. The second option has no "Auto" changeover position, but instead energizes the reversing valve solenoid constantly whenever the system switch on subbase is placed in "Heat" position, the "B" terminal being constantly energized from R. A thermostat demand for heat completes R-Y circuit, pulling in compressor contactor starting compressor and outdoor motor. R-G also make starting indoor blower motor.

COMPRESSOR CUT-OFF THERMOSTAT & OUTDOOR THERMOSTATS

Heat pump compressor operation at outdoor temperatures below 0°F are neither desirable nor advantageous in terms of efficiency. Since most equipment at time of manufacture is not designated for any specific destination of the country, and most of the equipment is installed in areas not approaching the lower outdoor temperature range, the compressor cut-offs are not factory installed.

Outdoor thermostats are available to hold off various banks of electric heat until needed as determined by outdoor temperature. The set point of either type of thermostat is variable with geographic region and sizing of the heating equipment to the structure. Utilization of the Heating Application Data and the heat loss calculation of the building are useful in determining the correct set points.

COMPRESSOR CUT-OFF AND OUTDOOR THERMOSTAT WIRING

See specific wiring information on page 6.

HEAT ANTICIPATION

Both of the thermostats shown below have a fixed heat anticipator for stage 1 with no adjustment required. Stage 2 has an adjustable anticipator for the W2 connection and fixed for the W3 connection. Both the W2 and W3 circuits are controlled by the stage 2 bulb. The only heat anticipator that needs to be checked in stage 2 and it should be set to match the load carried by the W2 circuit. The normal factory wiring provides for only one electric heat contactor to be controlled by W2, and the anticipator should be set at .40A. If special field wiring is done, it is best to actually measure the load but a good rule is .40A for each heat contactor controlled by W2.

| WALL THERMOSTAT AND SUBBASE COMBINATIONS | | | |
|--|-------------------------|-------------------------|---|
| Group | Thermostat | Subbase | Predominant Feature |
| A | 8403-017 (T874R1129) | 8404-009 (Q674L1181) | Heat or Cool No Auto ① |
| B | 8403-018 (T874N1024) | 8404-010 (Q674F1261) | Automatic Heat-Cool Changeover Position ② |

① No automatic changeover position--must manually place in heat or cool. Reversing valve remains energized at all times system switch is in heat position (except during defrost cycle). No pressure equalization noise when thermostat is satisfied on either heating or cooling.

② Allows thermostat to control both heating and cooling operation when set in "AUTO" position. Reversing valve de-energizes at end of each "ON" heating cycle.

IMPORTANT NOTE: Both thermostat and subbase combinations shown above incorporate the following features: Man-Auto fan switch, Off-Heat-Cool-Em. Heat Switch, and two (2) indicator lamps—one for emergency heat and one for compressor malfunction.

THERMOSTAT INDICATOR LAMP

The red lamp marked "EM.HT." comes on and stays on whenever the system switch is placed in the emergency heat position.

EMERGENCY HEAT POSITION

The operator of the equipment must manually place the system switch in this position. This is done when there is a known problem with the indoor section, or when the green "check" lamp comes on indicating a problem.

DEFROST CYCLE

The defrost cycle is controlled by time and temperature. The 24 volt timer motor runs all the time the compressor is in operation. When the outdoor temperature is in the lower 40°F temperature range or colder, the outdoor coil temperature is 32°F or below. This temperature is sensed by the defrost thermostat mounted near the bottom of the outdoor coil on a return bend. The defrost thermostat closes at approximately 32°F. Every 60 (or 30) minutes that the compressor is running, contacts 3-5 close for 7 minutes, with contacts 3-4 closed for the first 40 seconds of that 7 minutes. If the defrost thermostat is closed, the defrost relay energizes and places the system in defrost mode. An interlocking circuit is created with timer contacts 3-5 and defrost relay contacts 7-9 in series.

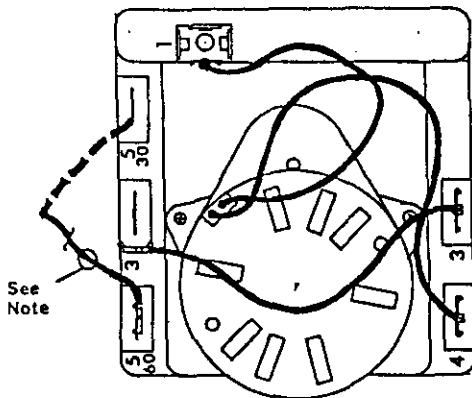
During the defrost mode, the refrigerant cycle switches back to the cooling cycle, the outdoor motor stops, electric heaters are energized, and hot gas passing through the outdoor coil melts any accumulated frost. When the temperature rises to approximately 57°F, the defrost thermostat opens, de-energizing the defrost relay and returning the system to heating operation.

If some abnormal or temporary condition such as a high wind causes the heat pump to have a prolonged defrost cycle, contacts 3-5 of the defrost timer will open after 7 minutes and restore the system to heating operations automatically.

There are two time settings on the defrost timer--30 minutes and 60 minutes. Most models are shipped wired on the 60 minute setting for greatest operating economy. If special circumstances require a change to the shorter time, remove wire connected to terminal 5/60 and reconnect to terminal 5/30.

There is a manual advance knob located on the timer. This can be used to advance timer to contact closure point if it is desired to check out defrost cycle operation, without waiting for time to elapse.

DEFROST TIMER WIRING



NOTE: All models are connected to 5/60 terminal (60 minute). Any model can be changed from 60 minutes to 30 minutes by unplugging from 5/60 terminal and reconnecting to 5/30 terminal as shown by dotted line.

SERVICE HINTS

1. Caution homeowner to maintain clean air filters at all times. Also, not to needlessly close off supply and return air registers. This reduces air flow through the system, which shortens equipment service life as well as increasing operating costs.
2. Switching to heating cycle at 75°F or higher outside temperature may cause a nuisance trip of the manual reset high pressure switch.
3. The heat pump wall thermostats perform multiple functions. Be sure that all function switches are correctly set for the desired operating mode before trying to diagnose any reported service problems.

4. Check all power fuses or circuit breakers to be sure that they are the correct rating.
5. Periodic cleaning of the outdoor coil to permit full and unrestricted airflow circulation is essential.

IMPORTANT INSTALLER NOTE

For Improved start-up performance wash the indoor coil with a dishwasher detergent.

CRANKCASE HEATERS

All units are provided with some form of compressor crankcase heat. Some single phase units utilize the compressor motor start winding in series with a portion of the run capacitor to generate heat within the compressor shell to prevent liquid refrigerant migration.

Some three phase units utilize a wraparound type of crankcase heater that warms the compressor oil from the outside.

Some single and three phase models have an insertion well-type heater located in the lower section of the compressor housing. This is a self-regulating type heater that draws only enough power to maintain the compressor at a safe temperature.

Some form of crankcase heat is essential to prevent liquid refrigerant from migrating to the compressor, causing oil pump out on compressor start-up and possible valve failure due to compressing a liquid.

Refer to unit wiring diagram to find exact type of crankcase heater used.

The following decal is affixed to all outdoor units detailing start-up procedure. This is very important. Please read carefully.

IMPORTANT

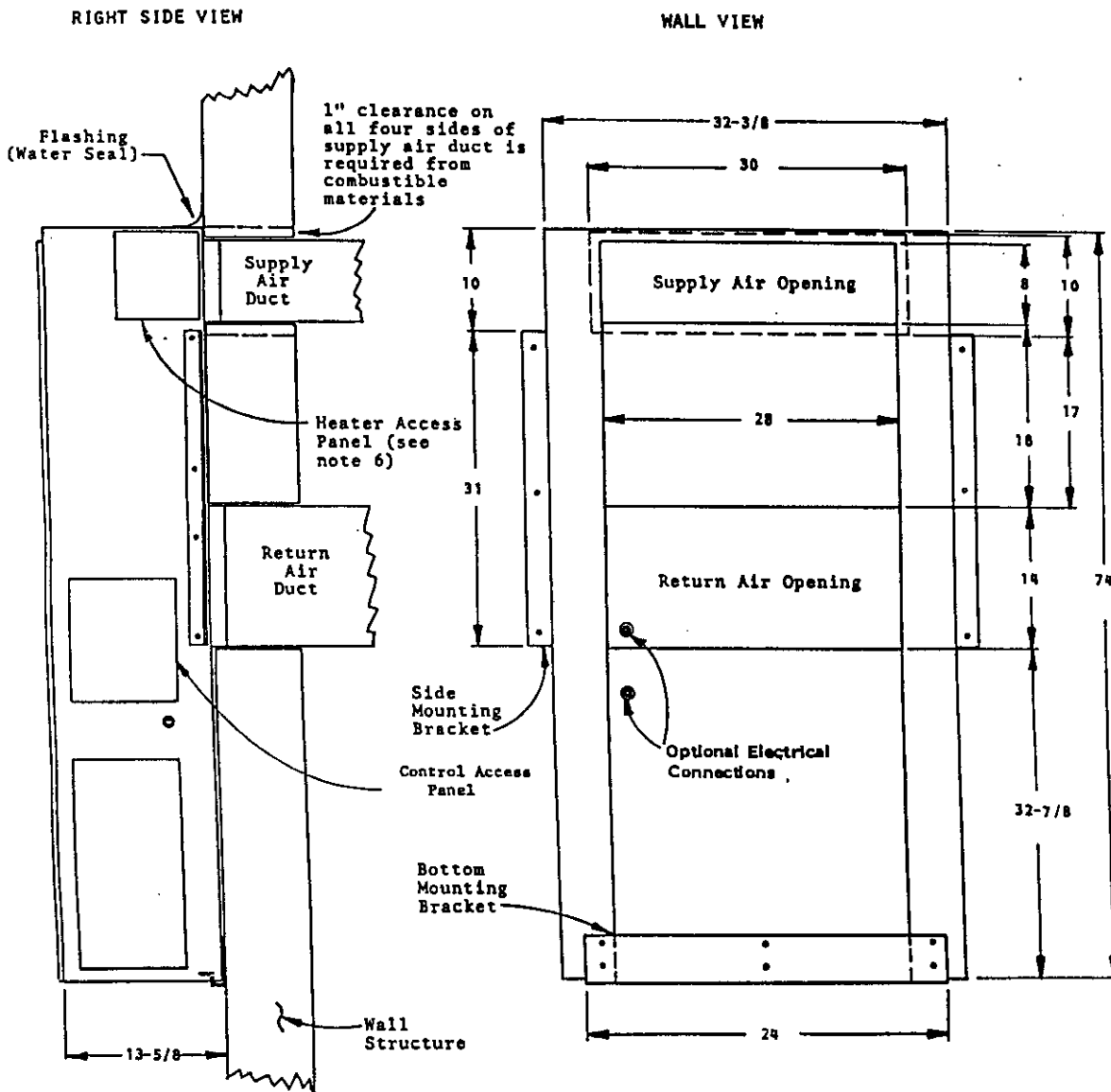
THESE PROCEDURES MUST BE FOLLOWED AT INITIAL START-UP AND AT ANY TIME POWER HAS BEEN REMOVED FOR 12 HOURS OR LONGER.

TO PREVENT COMPRESSOR DAMAGE WHICH MAY RESULT FROM THE PRESENCE OF LIQUID REFRIGERANT IN THE COMPRESSOR CRANKCASE

1. MAKE CERTAIN THE ROOM THERMOSTAT IS IN THE "OFF" POSITION (THE COMPRESSOR IS NOT TO OPERATE).
2. APPLY POWER BY CLOSING THE SYSTEM DISCONNECT SWITCH THIS ENERGIZES THE COMPRESSOR HEATER WHICH EVAPORATES THE LIQUID REFRIGERANT IN THE CRANKCASE.
3. ALLOW 4 HOURS OR 60 MINUTES PER POUND OF REFRIGERANT IN THE SYSTEM AS NOTED ON THE UNIT RATING PLATE, WHICHEVER IS GREATER.
4. AFTER PROPERLY ELAPSED TIME THE THERMOSTAT MAY BE SET TO OPERATE THE COMPRESSOR.
5. EXCEPT AS REQUIRED FOR SAFETY WHILE SERVICING — DO NOT OPEN SYSTEM DISCONNECT SWITCH.

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FIGURE 1.



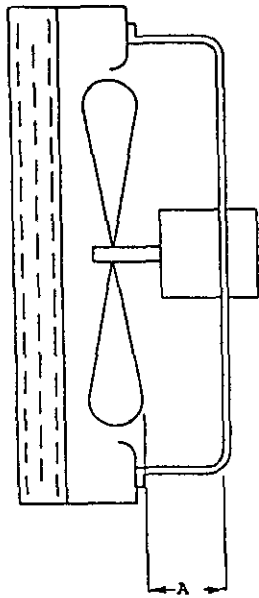
MOUNTING INSTRUCTIONS

1. These units are secured by wall mounting brackets which secure the unit to the outside wall surface at both sides and at the bottom.
2. The unit itself is suitable for "0" inch clearance, but the supply air duct flange and the first few feet of supply air duct require 1 inch clearance to combustible material. If combustible wall, use 30"x10" dimensions for sizing, if non-combustible, use 28"x8" dimensions.
3. After the wall opening positions have been selected, lay out the position for the bottom and side brackets. Fasten the brackets securely to the wall (type of fasteners will depend on wall construction).
4. Be sure to observe the 10" dimension when attaching the side brackets. This will assure that no screws are driven into the unit sides damaging any internal parts. One-half inch sheet metal screws are recommended.
5. For additional mounting rigidity, the return air and supply air (depending upon wall construction) frames or collars can be drilled and screwed or welded to the structural wall itself. Be sure to observe required clearance if combustible wall.
6. Maintain 30 inches minimum clearance on right side of unit to allow access to heat strip and control panel.

FAN BLADE SETTING DIMENSIONS

Shown in the drawing below are the correct fan blade setting dimensions for proper air delivery across the outdoor coil.

Any service work requiring removal or adjustment in the fan and/or motor area will require that the dimensions below be checked and blade adjusted in or out on the motor shaft accordingly.

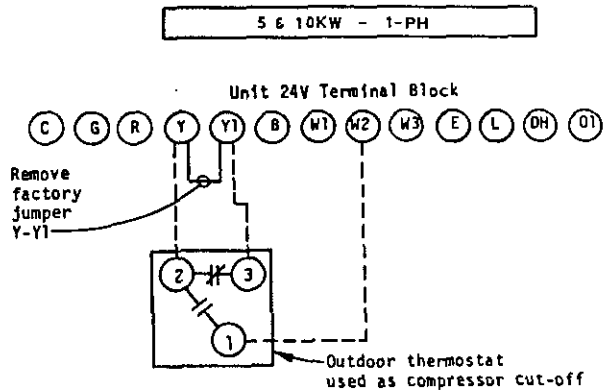


| MODEL | DIM. A |
|--------|--------|
| MHP30A | 2-1/4 |
| MHP36A | 2-1/4 |

| RATED CFM AND E.S.P. (WET COIL--COOLING) | | | |
|--|------------|---------------|---------------------------|
| Model | Rated* CFM | Rated* E.S.P. | Recommended Airflow Range |
| MHP30A | 1000 | .22 | 850 - 1100 |
| MHP36A | 1060 | .15 | 900 - 1160 |

*Rated CFM and E.S.P. on high speed tap.

COMPRESSOR CUT-OFF WIRING



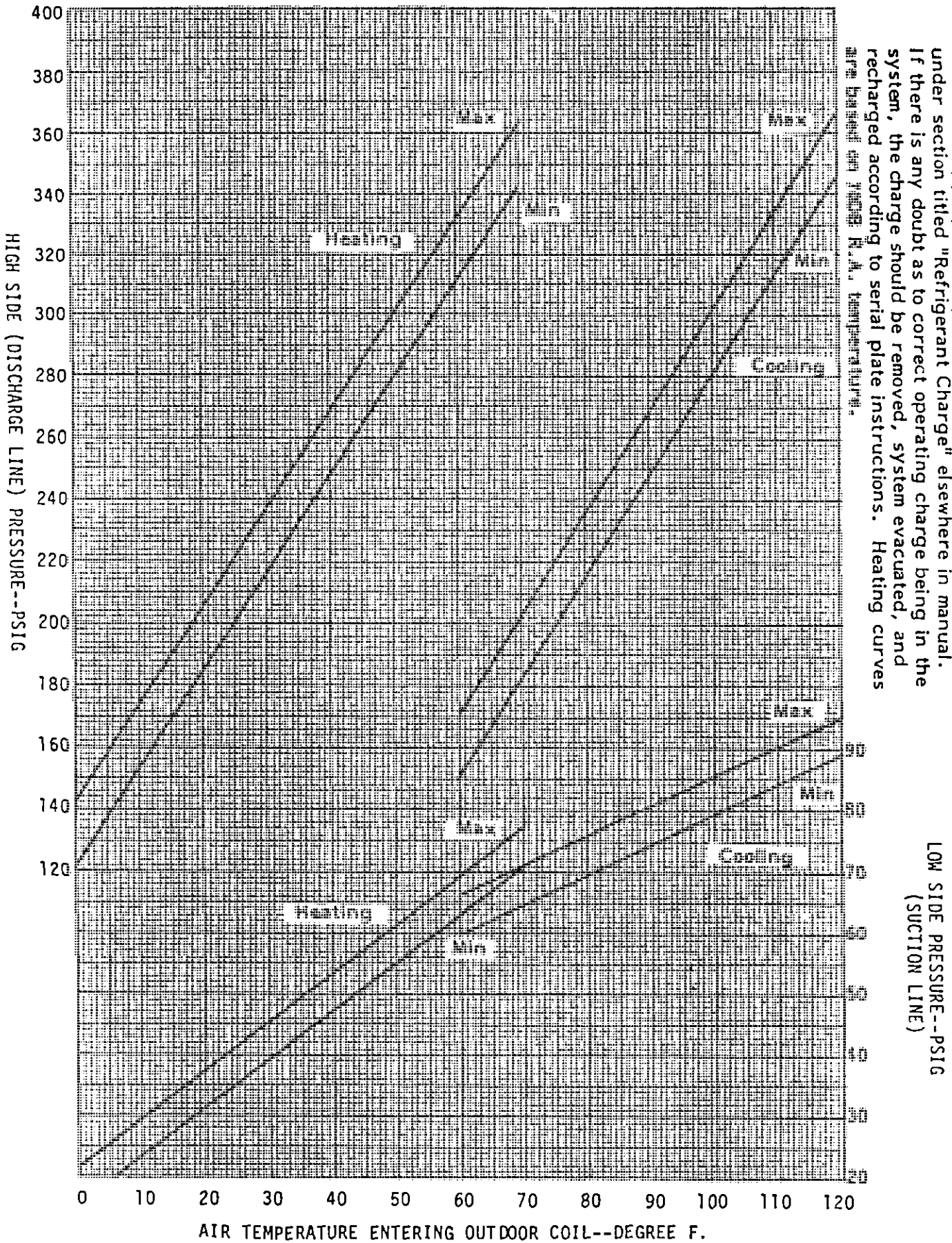
REFRIGERANT CHARGE

The correct system R-22 charge is shown on the unit rating plate. Optimum unit performance will occur with a refrigerant charge resulting in a suction line temperature (6" from compressor) as shown in the following table:

| Model | Rated Airflow | 95°F OD Temp. | 82°F OD Temp. |
|--------|---------------|---------------|---------------|
| MHP30A | 1000 | 59 - 61 | 71 - 73 |
| MHP36A | 1060 | 50 - 52 | 63 - 65 |

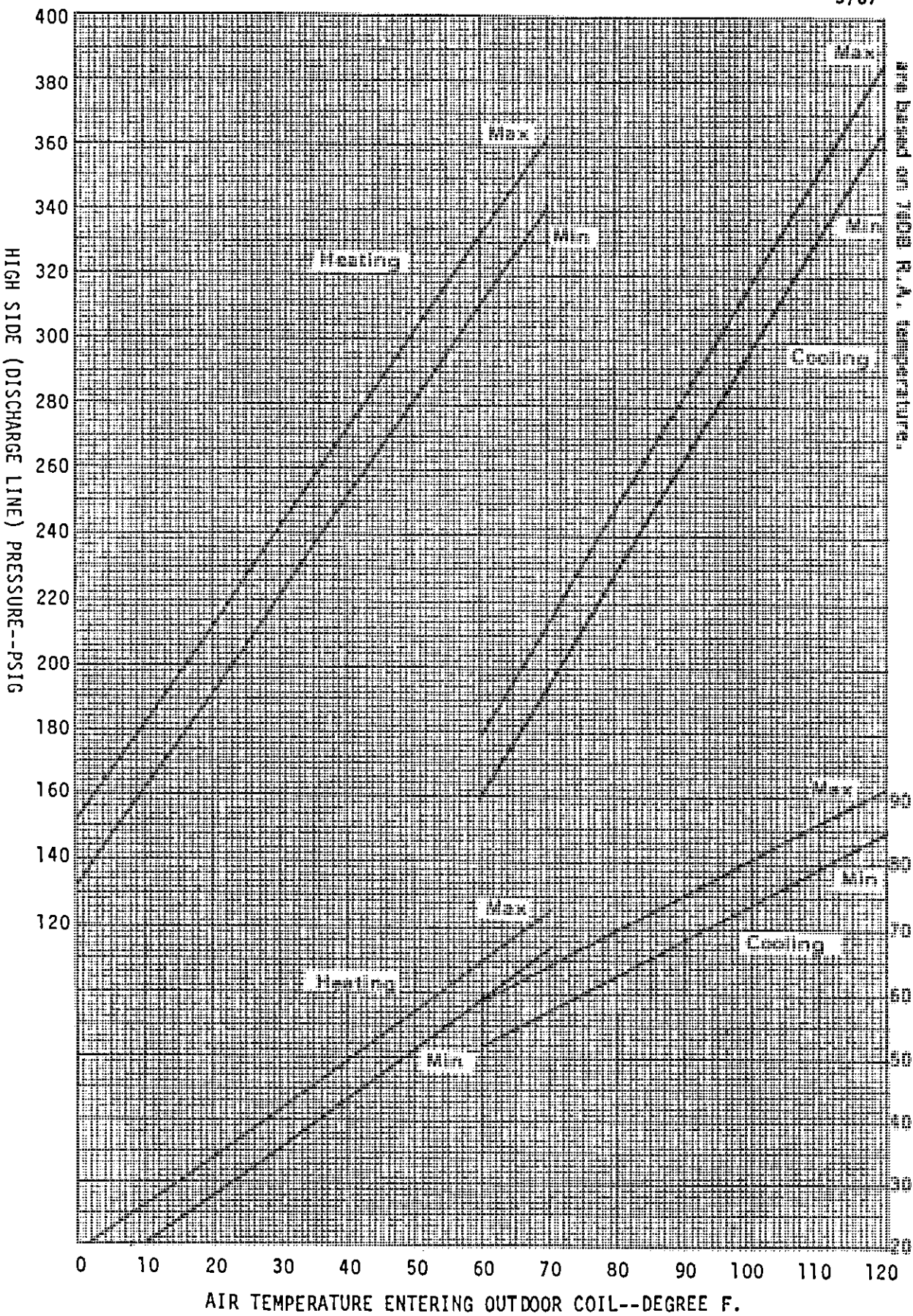
The above suction line temperatures are based upon 80°F dry bulb/67°F wet bulb (50% R.H.) temperature and rated airflow across the evaporator during cooling cycle.

| INDOOR BLOWER PERFORMANCE CFM--DRY COIL WITH FILTER | | |
|--|-------------------------|------|
| E.S.P. Inches H ₂ O | Models MHP30A-MHP36A | |
| | Low | High |
| .0 | 950 | 1200 |
| .1 | 910 | 1150 |
| .2 | 875 | 1115 |
| .3 | -- | 1065 |
| .4 | -- | 1015 |
| .5 | -- | 965 |



Cooling curves are based upon 80UB, 6/WB Temp. and rated CFM (airflow) across the evaporator coil and should be used for reference purposes only. Specific information can be found under section titled "Refrigerant Charge" elsewhere in manual. If there is any doubt as to correct operating charge being in the system, the charge should be removed, system evacuated, and recharged according to serial plate instructions. Heating curves

LOW SIDE PRESSURE--PSIG
(SUCTION LINE)



Cooling curves are based upon 80DB, 6/WR Temp. and rated CFM (airflow) across the evaporator coil and should be used for reference purposes only. Specific information can be found under section titled "Refrigerant Charge" elsewhere in manual. If there is any doubt as to correct operating charge being in the system, the charge should be removed, system evacuated, and recharged according to serial plate instructions. Heating curves are based on 70DB F.A. temperature.

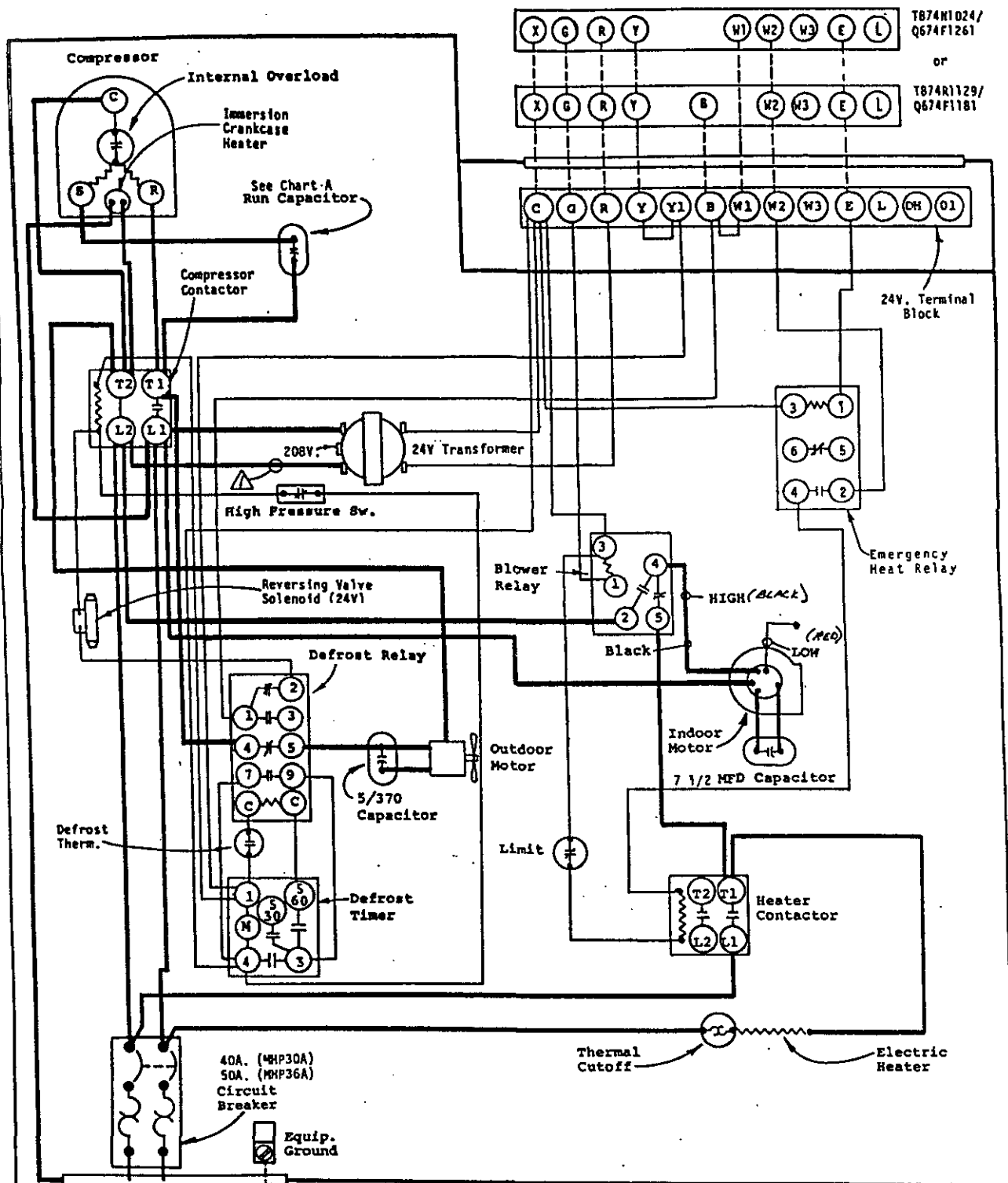
LOW SIDE PRESSURE--PSIG
(SUCTION LINE)

PARTS LIST
Single Package Heat Pumps

6/87

| Part No. | Description | MHP30A-A05CD05A | MHP36A-A05CD05A |
|----------|--------------------------|-----------------|-----------------|
| 5152-054 | Blower Housing | x | x |
| 5152-055 | Blower Wheel | x | x |
| 5152-056 | Blower Wheel | x | x |
| 8552-032 | Capacitor 35/370V | x | |
| 8552-028 | Capacitor 35/440V | | x |
| 8552-002 | Capacitor 5/370V | x | x |
| 8552-004 | Capacitor 7½/370V | x | x |
| 8000-099 | Compressor H23B283ABCA | x | |
| 8000-087 | Compressor H23A383ABCA | | x |
| 5051-049 | Condenser Coil | x | x |
| 8401-007 | Contactora | x | x |
| 8401-006 | Contactora | x | x |
| 8201-047 | Defrost Relay | x | x |
| 5060-049 | Evaporator Coil | x | x |
| 5151-032 | Fan Blade | x | x |
| 7004-006 | Filter 14x25x1 | x | x |
| 7051-021 | Grille - Condenser | x | x |
| 7051-022 | Grille - Inlet | x | x |
| 8604-042 | Heat Strip 5kw | x | x |
| 8408-016 | Defrost Thermostat | x | x |
| 8402-047 | Limit Control | x | x |
| 8106-022 | Motor - Evaporator | x | x |
| 8103-019 | Motor - Condenser | x | x |
| 8200-001 | Motor Mount (Fan) | x | x |
| 8200-032 | Motor Mount (Blower) | x | x |
| 8201-009 | Relay - Blower | x | x |
| 8607-019 | Terminal Board | x | x |
| 8402-025 | Thermal Cutoff | 1 | 1 |
| 8407-035 | Transformer | x | x |
| 8612-012 | Timer | x | x |
| 5651-036 | Check Valve | x | x |
| 5650-008 | Rev. Valve Solenoid Coil | x | x |
| 8406-010 | High Pressure Switch | x | x |
| 5650-013 | Reversing Valve | x | x |
| 5202-004 | Accumulator | x | x |
| 5811-001 | Capillary Tube 25 x .050 | 4 | |
| 5811-005 | Capillary Tube 38 x .059 | 2 | 4 |
| 5811-036 | Capillary Tube 28 x .059 | | 2 |
| 8605-008 | Crankcase Heater | | x |
| 8615-014 | Circuit Breaker | 1 | |
| 8615-015 | Circuit Breaker | | 1 |
| 4083-122 | Wiring Diagram | x | x |

Supersedes all previous lists. Subject to change without notice.



T874H1024/
Q674F1261
or
T874R1129/
Q674F1181

24V. Terminal Block

Emergency Heat Relay

HIGH (Black)

Black

(Red)

LOW

7 1/2 MFD Capacitor

Heater Contactor

Thermal Cutoff

Electric Heater

208V

24V Transformer

High Pressure Sv.

Reversing Valve Solenoid (24V)

Defrost Relay

Outdoor Motor

5/370 Capacitor

Defrost Timer

Defrost Therm.

40A. (MHP30A)
50A. (MHP36A)
Circuit Breaker

Equip. Ground

| | FACTORY WIRING | FIELD WIRING |
|--------------|----------------|--------------|
| Low Voltage | _____ | _____ |
| High Voltage | _____ | _____ |

⚠ For 208V operation move this wire to 208V transformer tap.

USE COPPER OR ALUMINUM WIRE

| CHART A | |
|-----------|----------|
| MODEL NO. | RUN CAP. |
| MHP30A | 35/370 |
| MHP36A | 35/440 |

230/208-60-1

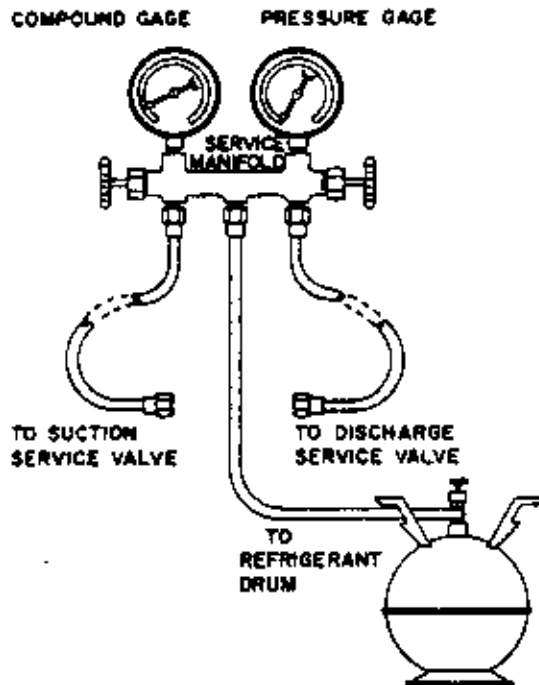
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PROCEDURE FOR LEAK TEST-EVACUATION-CHARGING

GAUGE MANIFOLD

A necessary instrument in checking and servicing air conditioning and heat pump equipment is the gauge manifold. Its purpose is to determine the operating refrigerant pressures in order for the serviceman to analyze the condition of the system.

The valving on the manifold is so arranged that when the valves are closed (front-seated) the center port on the manifold is closed to the gauges and gauge ports. With the valves in the closed position, the gauge ports are still open to the gauges, permitting the gauges to register system pressures. Opening either valve opens the center port to that side of the manifold and system.



ATTACHING GAUGE MANIFOLD

For leak testing, purging, checking charge, charging liquid or evacuating, connect high pressure side of gauge manifold to Schrader valve on liquid or discharge line. Connect suction side of gauge manifold to Schrader valve on suction line. On heat pumps the suction line is between compressor and reversing valve.

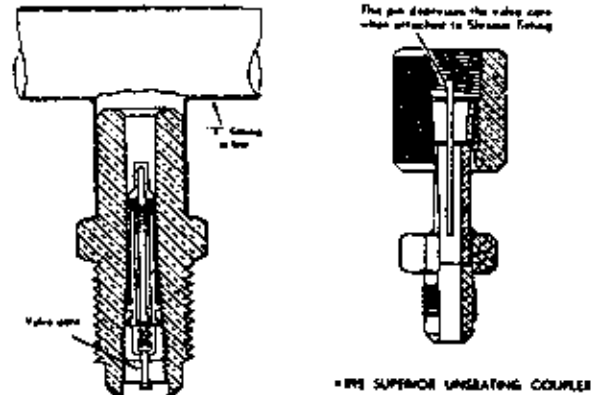
ATTACHING MANIFOLD HOSE TO SCHRADER VALVE

WARNING

As a safety measure, it is wise to attach refrigerant hoses at the lowest pressure readings on the system. To do this:

- (a) Put High pressure hose (B) on first. (Unit should not be running).
- (b) Put low pressure hose (A) on second. (Unit should be running).

1. Remove cap from valve.
2. Make sure gauge manifold valves are closed.
3. If hose does not have an unseating pin, a number 395 Superior or equivalent unseating coupler must be used.



4. Make sure coupler is lined up straight with Schrader valve. Screw coupler on to valve.
5. Open gauge manifold valve slightly and purge air from hose with refrigerant.
6. Read the suction pressure on compound gauge and heat pressure on pressure gauge.
7. To remove, push end of hose tight against end of Schrader valve and hold in place while quickly unscrewing coupler nut from Schrader valve.
8. Remove coupler from Schrader valve. Replace caps on valve.

WARNING

As a safety measure, it is wise to detach refrigerant hoses at the lowest pressure readings on the system. To do this:

- (a) Remove the suction pressure hose (A) first. (Unit is running).
- (b) Remove the High pressure hose (B) next. (Unit is not running).

LEAK TEST

1. Remove gauge port cap from suction and liquid service valve ports and attach manifold gauge hoses. Connect an upright R12 drum to center port of gauge manifold. Open refrigerant drum valve and manifold high pressure gauge valve to pressurize system. Pressurize the complete system with R12 until the pressure reaches 100 psig. DO NOT exceed 150 psig.
2. Close manifold high pressure gauge valve. Check all soldered joints, including those on the evaporator coil with an Electronic Leak Detector. If a leak is found which requires soldering, pressure in the system must be bled off since it is impossible to solder with unit pressurized. Be sure all leaks are located and marked before bleeding pressure from system.
3. Close drum valve and disconnect from center port. Release refrigerant into the atmosphere through suction line of gauge manifold.
4. Correct any leaks and recheck. When leaks, if any have been repaired, system is ready to be evacuated and charged. Relieve all pressure from the system down to 0 psig.

EVACUATION

1. Evacuate the system to less than 1000 microns, using a good vacuum pump and an accurate high vacuum gauge. Operate the pump below 1000 microns for 60 minutes and then close valve to the vacuum pump. Allow the system to stand for 30 additional minutes to be sure a 1000 micron vacuum or less is maintained.
2. An alternate method of removing moisture and noncondensables from the system is:
 - a) Evacuate system to 29 inches vacuum for ten minutes per ton of system. Break vacuum with refrigerant to be used for final charging of system and vapor charge to 35-50 lbs. gauge pressure. Leave vapor charge in system for a minimum of five minutes. Reduce pressure to five to zero gauge pressure.
 - b) Repeat step (a) two more times.
 - c) Evacuate system to 30 inches vacuum for twenty minutes per ton. Charge system with the specified kind and quantity of refrigerant (charge into vacuum).

WARNING

At no time use the compressor to evacuate the system or any part of it.

3. Disconnect charging line at vacuum pump and connect to refrigerant supply. (Dial-A-Charge Cylinder) crack valve and purge charging line at center on manifold. Then close valve.
4. The system is now ready for the correct operating charge of Refrigerant 22.

CHARGING

1. **SINGLE PACKAGE UNITS** - Refer to the unit serial plate for the full operating charge.
2. **SPLIT SYSTEMS** - The outdoor unit factory charge is shown on the unit serial plate. The total system charge required to recharge the system after service repairs should be marked on the serial plate under TOTAL R22 CHARGE. This is normally marked by the installer and is determined from the R22 System Charge Table located on the inside of the outdoor unit access panel.
3. **CTO ADAPTER KITS** - When using CTO adapters and field tubing, use the procedure outlined on the bottom of page 3, Manual 2100-002. This determines the correct ounces of R22 for the tubing only.
4. **FILTER-DRIER CHARGES** - If a liquid line filter-drier is used, either in conjunction with field tubing and a CTO adapter kit, or as part of procedure for system clean-up after a compressor burn-out, additional R22 must be added to the system when recharging. This is in addition to the amount determined from the R22 System Charge Table.

| PART NO. | MODEL NO. | OZ. of R22 |
|----------|-----------|------------|
| 5202-001 | C-093S | 8 |
| 5202-002 | C-163S | 10 |
| 5201-009 | BFK-093S | 7 |
| 5201-010 | BFK-163S | 13 |

PRELIMINARY CHARGING STEPS

If the system has been open to the atmosphere, it should be first evacuated. Then proceed as follows:

1. Attach a drum of proper, clean refrigerant to the center part of the charging manifold with one of the charging hoses.
2. Attach a second charging hose to the suction gauge (low pressure) side of the gauge manifold.
3. Remove the cap from the suction line valve.
4. Loosely attach the suction gauge hose to the line valve. Open the valve on the refrigerant drum and the suction valve on the charging manifold slightly to purge the air from the manifold and hoses before tightening the fitting.
5. Attach the third hose to the high pressure side of the manifold and the liquid line valve. Repeat steps 3 and 4 above.

CHARGING THE SYSTEM BY WEIGHT*

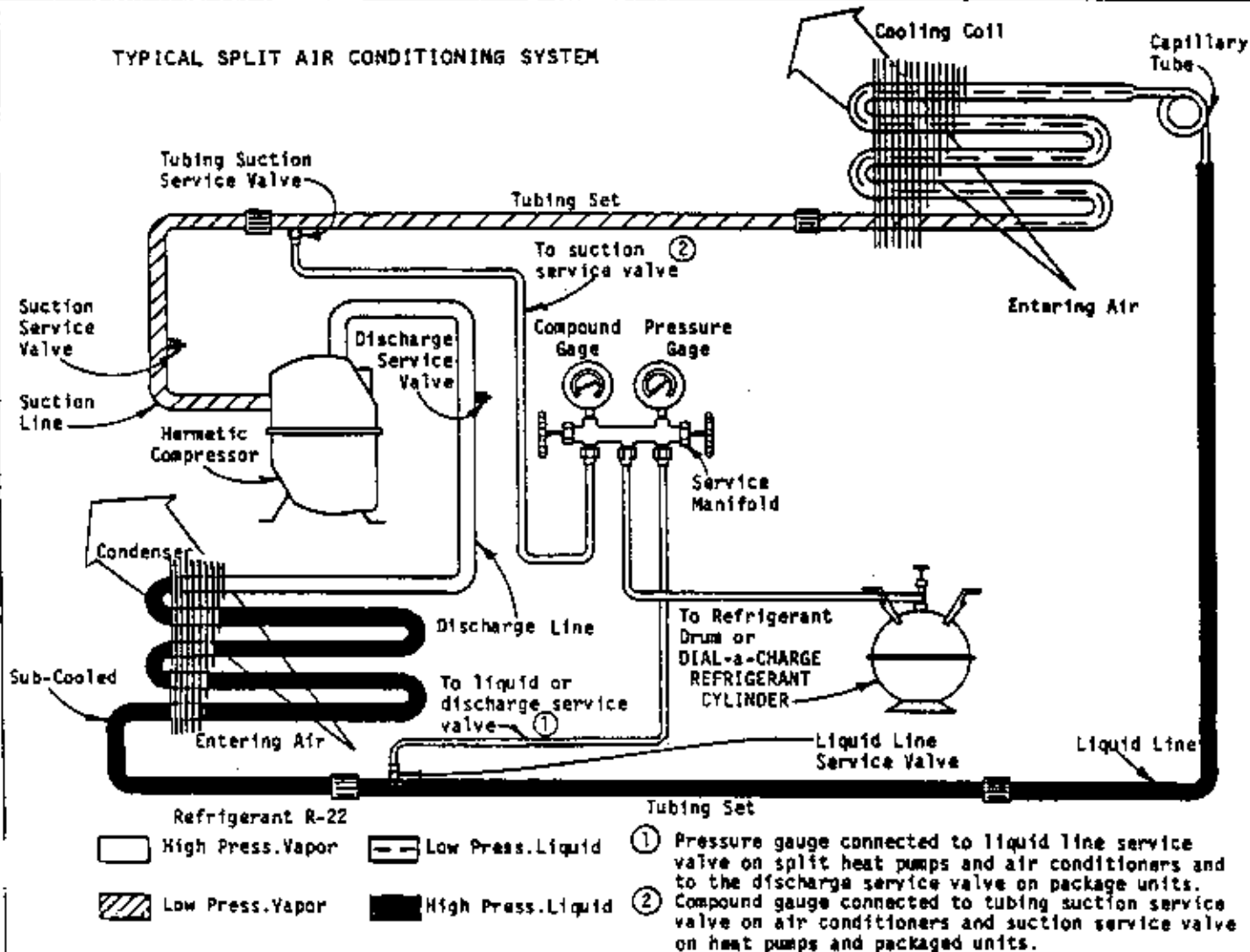
1. Connect manifold as instructed.
2. Place refrigerant drum upright on scale and determine exact weight of the refrigerant and cylinder or use a Dial-A-Charge cylinder.
3. With manifold suction valve closed and manifold discharge valve open, open refrigerant cylinder valve and allow pressure in system to balance with pressure of cylinder. For charging in the liquid phase, drum is placed upside down (valve down).
4. When there is approximately a full charge, front seat (close) the discharge manifold valve and let the system stabilize for about five minutes.
5. Start compressor by setting thermostat.
6. Finish charging with vapor by placing drum upright (valve up). Open drum valve and manifold low pressure valve to allow refrigerant to flow into the system. Throttle refrigerant drum valve to keep pressure about 100 psig for R22.
7. When the correct weight of refrigerant has been added to the unit, close refrigerant cylinder valve and allow unit to run for 30 minutes. Refer to Start-Up Procedure and Check List for further start-up details. Check the charge against the allowable head pressure as shown in the Head Pressure Chart and correct if needed.
8. Front seat gauge manifold valves, disconnect charging and gauge hoses and replace all valve caps.

WARNING

To speed refrigerant flow, it may be necessary to place refrigerant drum in a pan of warm water (not greater than 130°F). Remember to either consider the total weight of the pan of water or remove the drum for weighing frequently to keep track of the charging process.

*This charging method requires the scales or Dial-A-Charge cylinder to be extremely accurate since the charge in this type of system is quite critical.

TYPICAL SPLIT AIR CONDITIONING SYSTEM



AIR CONDITIONING AND HEAT PUMP ON COOLING CYCLE

TROUBLESHOOTING — SYSTEM PRESSURE CHECK

Low Suction — Low Head Pressure

1. Restricted air flow over indoor coil.
2. Defective indoor fan motor.
3. Low indoor and outdoor temperature.
4. Iced indoor coil.
5. Restricted liquid line, drier, or capillary tube.
6. Low charge.

High Suction — Low Head Pressure

1. Defective or broken valves.
2. IPRV valve open.

Low Suction — High Head Pressure

1. Partial restriction and then overcharged.

Note: On a split heat pump the vapor line should be within 10 psig of the pressure in liquid line on heating mode and within 10 psig of suction line on cooling mode. If not, check for sticking, check valves.

High Suction — High Head Pressure

1. High ambient.
2. Low outdoor air flow
3. Overcharged.
4. Air in system.
5. Restricted condenser.

