



**MODELS
MH30 and MH36**

PACKAGED HEAT PUMP

INSTALLATION INSTRUCTIONS

**FOR RESIDENTIAL, COMMERCIAL,
OR MOBILE HOME
HEATING / COOLING APPLICATIONS**

BARD MANUFACTURING CO. • BRYAN, OHIO 43506

Dependable quality home equipment... since 1914

UNPACKING THE SELF-CONTAINED UNIT

It is recommended that the unit be unpacked at the installation site to minimize damage due to handling.

1. Cut and remove the metal band from around unit.
2. Remove the carton from the unit.
3. The installation manual is contained in an envelope shipped with the unit. Make sure that it does not get lost.
4. Carefully block up the unit and remove the shipping skid.
5. CAUTION - Do not tip the unit on its side. Oil may enter the compressor cylinders and cause starting or operating trouble. If unit has set on its side, restore to upright position and do not run for several hours. Also run intermittently for a few seconds. Do this three or four times with three minutes in between. Observe abnormal compressor noise.

INSTALLING THE SUPPLY AND RETURN FITTINGS ON THE SELF-CONTAINED UNIT

The Supply and Return Fittings are to be fastened with sheet metal screws on three sides. Seal with duct tape on all four sides.

LOCATING AND INSTALLING THE RETURN-AIR ASSEMBLY - MOBILE HOME APPLICATION

To avoid complications, locate and install the return-air assembly first. The return-air box with grille and filter can be located anywhere in the floor of the mobile home. Keep in mind that the closer to the cooling unit the better because less duct will be needed. Always use at least one 7' length of duct, however, a good spot is under the television set in a corner or under a table or davenport if a minimum two inch clearance is available. If desired, the return opening can be located inside a closet with louvered doors. The return-air grille can be placed in the wall of a closet and the air conducted into the filter box through a boxed-in area at the closet floor level. Make sure filter is readily accessible.

After determining the location of the return air opening, start the installation from under the home by cutting a small hole in the fiber under-board to determine how the floor joist location will affect the cutting of the opening needed for the box. Floor joists generally are located on 16" centers leaving 14-3/8" between joists. After measuring the return air box cut the hole so the box will fit between the floor joists. In most installations it will be necessary to cut a similar hole in the fiber-board directly under the one in the floor. However, if the floor is more than 10" deep, it will only be necessary to cut a round hole for the collar on the return air box or for the insulated duct.

Finally, set the box into the opening and fasten with screws or nails. Put the filter and the return air grille in place.

LOCATING AND INSTALLING THE SUPPLY DUCT CONNECTORS - MOBILE HOME APPLICATION

When locating the supply duct connector, check carefully for floor joists, axles, wheels and frame members that could interfere with the installation of the connector or with the running of the flexible duct. Ideally, the supply duct connector should be located in the bottom of the main duct, forward of center of the mobile home BUT NOT UNDER A REGISTER.

To locate the center of the duct, first cut a 6" hole in the fiberboard below the duct at the desired location. After locating the duct center, increase the hole in the fiberboard to approximately the size of the connector to be used. Next cut an opening in the bottom of the duct 1/8" larger than the actual dimension of the connector being used. After inserting the connector, bend the tabs flat inside the duct.

It is a good practice to seal all connections with duct tape. Seal the opening in the fiberboard around the duct connector.

For double wide homes or for special applications, these connectors are fed by two flexible ducts.

CONNECTING THE INSULATED RETURN-AIR AND SUPPLY FLEXIBLE DUCTING

All flexible ducts are furnished with a male and female metal end. The ducts can be connected to the corresponding fitting and sheet metal screwed in place. Slide the insulation and outer jacket over the end and use duct tape to seal joints.

If the flexible ducts are long enough, it will be easier to connect them to the fittings on the unit before sliding the unit into place.

RECOMMENDED REGISTER TYPE

Satisfactory heating/cooling of a mobile home will depend greatly on what type register is used. A very open type with no deflection (allowing the air to move straight up) is best. If these are not available, straighten the fins of the present registers as much as possible.

DUCT REQUIREMENTS

THE SUPPLY DUCT SYSTEM, INCLUDING THE NUMBER AND TYPE OF REGISTERS, WILL HAVE MUCH MORE EFFECT ON THE PERFORMANCE OF AN AIR CONDITIONING SYSTEM THAN ANY OTHER FACTOR! The duct must be sufficiently large to conduct an adequate amount of air to each register. The registers must be designed to throw the cooled air up to the ceiling. The duct must be built tightly enough to prevent loss of cooled air to the outside.

The output delivery of the system will not cool the home if the air is lost to the outside through leaks in the duct system. Also, the duct can be large enough in dimension but too small because it is collapsed or restricted with a foreign object. See page 2 for airflow and static pressure capabilities.

For rooftop or permanent structure applications, either round pipe or rectangular ductwork can be used, following standard duct sizing and layout techniques.

SPECIFICATIONS/Bard Packaged Heat Pumps

PERFORMANCE DATA AND DIMENSIONS

MODEL	MH30	MH36
Cooling Capacity BTU	28,500	35,500
Hi-Temp Heating BTU*	29,000	37,000
Lo-Temp Heating BTU*	17,000	22,500
CFM @ ARI Rating	1,100	1,100
Electrical — Less KW	1-Ph 60Hz	1-Ph 60Hz
Cooling Watts	3,650	4,950
Hi-Temp Heating Watts	3,200	4,400
Low-Temp Heating Watts	2,700	3,800
Operating Voltage Range	207-253	197-253
Compressor Volts	208/230	208/230
Nameplate Amps	14	21
Lock Rotor Amps	68	110
Outdoor Motor — H.P.	1/3	1/3
Fan Motor — Amps	1.5	1.5
Indoor Motor — H.P.	1/3	1/3
Blower Motor — Amps	2.5	2.5
Connections (Inches)		
Supply Air Duct Diameter	12"	12"
Return Air Duct Diameter	14"	14"
Cabinet Electrical Openings (Inches)		
24V	7/8	7/8
230V	1 1/8	1 3/8
Refrigerant 22	69 oz	74 oz
Shipping Weight — Pounds	315	330

*For additional heating capacity, add KW from Table 1

SUPPLEMENTAL ELECTRIC HEAT TABLE NO. 1

Model	MH30	MH36
Standard KW	10	10
Maximum Installed KW	20	20

EER AND COP PERFORMANCE

Model	EER	COP	
	Cooling 95°F	Hi-Temp Heating 47°F	Lo-Temp Heating 17°F
MH30	7.8	2.7	1.8
MH36	7.2	2.5	1.7

EER — Energy Efficiency Ratio = Btuh

Unit Wattage

COP — Coefficient of Performance = Btuh

Unit Wattage x 3.413

ELECTRIC HEAT TABLE NO. 2

MODEL	240V	
	BTUH	AMP
5KW	17,065	20.8
10KW	34,130	41.7
15KW	51,195	62.5
20KW	68,260	83.3

IMPORTANT: The AMP values listed in this Table No. 2 are for electric heating elements only

INDOOR BLOWER PERFORMANCE

ESP†† In. H ₂ O	CFM — Dry Coil Models MH30, MH36**		
	Hi	Med	Lo
.00	1,370	1,200	1,075
.05	1,340	1,180	1,060
.10	1,315	1,160	1,050
.15	1,290	1,140	1,035
.20	1,260	1,120	1,020
.25	1,230	1,100	1,005†
.30	1,200	1,075	
.35	1,175	1,055	
.40	1,150	1,035	
.45	1,125	1,000†	
*.50	1,100		
.55	1,060		
.60	1,025†		

*Rated CFM 1,100.

**CFM with 20 KW heaters installed.

†Maximum E.S.P. on heating.

††With 20 x 20 Permanent Filter and Return Air Filter Box Installed.

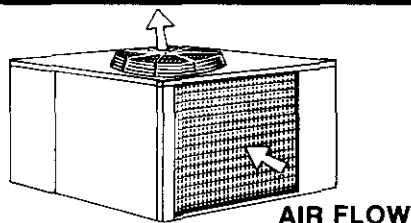
NOMINAL DIMENSIONS

Models	A	B	C
MH30	24 1/8"	46 3/4"	35 3/8"
MH36			

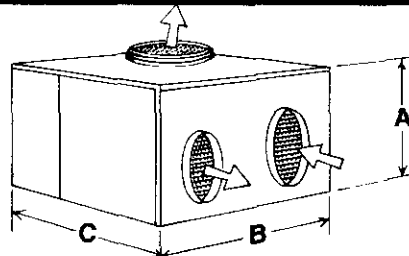
IMPORTANT: While the above data is presented as a guide, it is important to electrically connect, properly size fuses and conductor wires in accordance with the National Electrical Code and all existing local codes.

Underwriters' Listed for outdoor installation

Specifications subject to change without notice.



AIR FLOW



ELECTRICAL INFORMATION							WIRING INFORMATION		
Model	Volts/Ph	Heater Kw @ 240V	Max. Unit Amps	Heater Amps	Internal Fuses Ckt. A	Req'd Maximum External Fuses Ckt. A	Min. Ckt. Ampacity Ckt. A	Power Ckt. Wiring Ckt. A	Ground Wire Size Ckt. A
MH30	230/1	0	17			30	20	12	12
		5	37.8	20.8		50	46	6	10
		10	58.6	41.6	60/30	80	72	3	8
		15 Δ	65	62.5	60/60	90	81	2	8
		20 Δ	85.7	83.2	60/60	110	107	1	6
MH36	208/230/1	0	25			50	30	10	10
		5	45.8	20.8		60	56	4	10
		10	66.6	41.6	60/30	90	82	2	8
		15 Δ	66.6	62.5	60/60	90	82	2	8
		20 Δ	85.7	83.2	60/60	110	107	1	6

Δ Based upon the use of 60°C copper wiring material.

Δ Based upon Table 250-95 of N.E.C. 1978.

Δ Max. of 10Kw operates with heat pump, extra 5 or 10Kw operates during emergency heat operation.

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.

CRANKCASE HEATERS

All units are provided with some form of compressor crankcase heat. 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.

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

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.

INSTALLER NOTE: Optimum unit performance will occur with a refrigerant charge resulting in a suction line temperature (near the compressor) of 53° to 58°F with 95°F outdoor temperature and 80°F dry bulb/67°F wet bulb (50% R.H.) indoor temperatures and rated airflow across the indoor coil.

DEFROST CYCLE

The defrost cycle is controlled by time and temperature. The 240V timer motor runs all the time the compressor is in operation. Then 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 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 contact 3-4 and defrost relay contact 7-9 in series.

During the defrost mode, the refrigerant cycle switches back to the cooling cycle, 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 is a manual advance knob located on the top of the timer, with access through a punched hole in sheet metal barrier just above 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.

SERVICE HINTS

1. Caution homeowner to maintain clean air filters at all times. Also, not to needlessly close supply and return air registers. This reduces airflow 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 to be sure that they are the correct rating and are the time-delay type.
5. Periodic cleaning of the outdoor coil to permit full and unrestricted airflow circulation is essential.
6. System operating pressures may be checked against the appropriate pressure curves. These are included with the indoor coil section installation instructions.

WALL THERMOSTAT AND SUB-BASE COMBINATIONS

Group	Thermostat	Subbase	Predominant Feature
A	8403-012 (T872R1164)	8404-007 (Q672L1185)	Heat or Cool - No Auto ¹
B	8403-015 (T872N1036)	8404-008 (Q672F1299)	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 sub-base combinations shown above incorporate the following features: Man-auto fan switch, Off-Heat-Cool-Em. Ht. Switch, and two (2) indicator lamps—one for Em. Ht. and one for compressor malfunction.

THERMOSTAT INDICATOR LAMPS

The red lamp marked "Em. Ht." comes on and stays on whenever the system switch is placed in the Em. Ht. position. The green lamp marked "check" will come on if there is any problem that prevents the compressor from running when it is supposed to be.

EMERGENCY HEAT POSITION

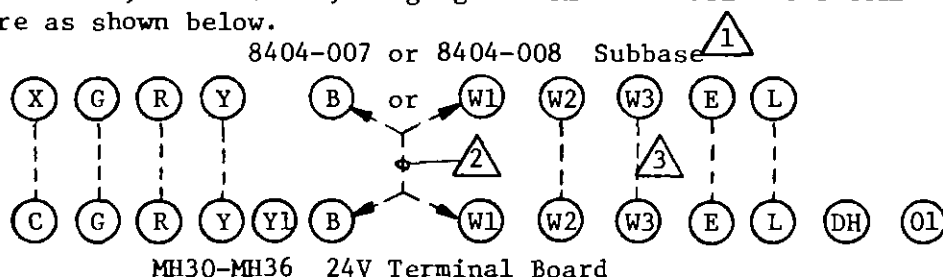
The operator of the equipment must manually place the system switch in this position. This is done when there is a known problem with the outdoor section, or when the green "check" lamp comes on indicating a problem.

COMPRESSOR MALFUNCTION RELAY

Actuation of the green "check" lamp is accomplished by a voltage type relay which is factory installed. Any condition such as loss of charge, defective capacitor, defective contactor, etc., that will prevent compressor from operating will cause green lamp to activate. This is a signal to the operator of the equipment to place system in emergency heat position.

24V WIRING

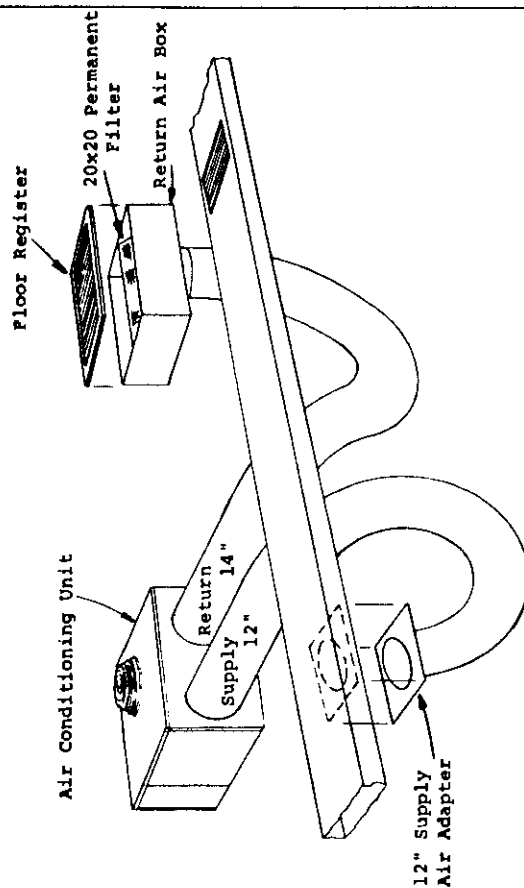
Nine (9) wires should be run from thermostat subbase to 24V terminal board in unit. A nine conductor, color-coded, 18 gauge thermostat cable is recommended. The connection points are as shown below.



- ¹ See description above for selection of thermostat/subbase combination.
- ² "B" terminals only are used for Group A 8403-012 Stat and 8404-007 Subbase.
- ³ "W1" terminals only are used for Group B 8403-015 Stat and 8404-008 Subbase.
- ⁴ W3 connections required only on 15 and 20Kw models.

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.

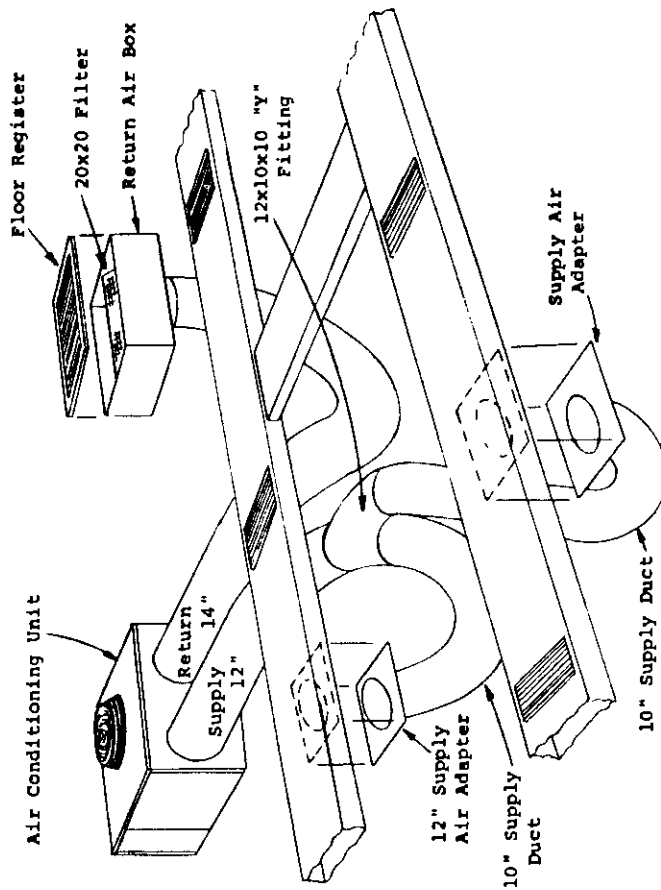
SINGLE SUPPLY DUCT SYSTEM
MODELS
MH30 and MH36



- Qty. 1** 7001-014 Fitting Pack
(1) 12 $\frac{1}{4}$ x 20 x 10 $\frac{1}{4}$ Return Air Box
(1) 20 x 20 Permanent Filter
(1) 12 x 20 Floor Register
(1) 12" Supply Air Adapter

- Qty. 1** 7001-018 Flex Duct Pack
(1) 14" Dia. x 7' Insulated Duct
(1) 12" Dia. x 7' Insulated Duct

DOUBLE SUPPLY DUCT SYSTEM
MODELS
MH30 and MH36

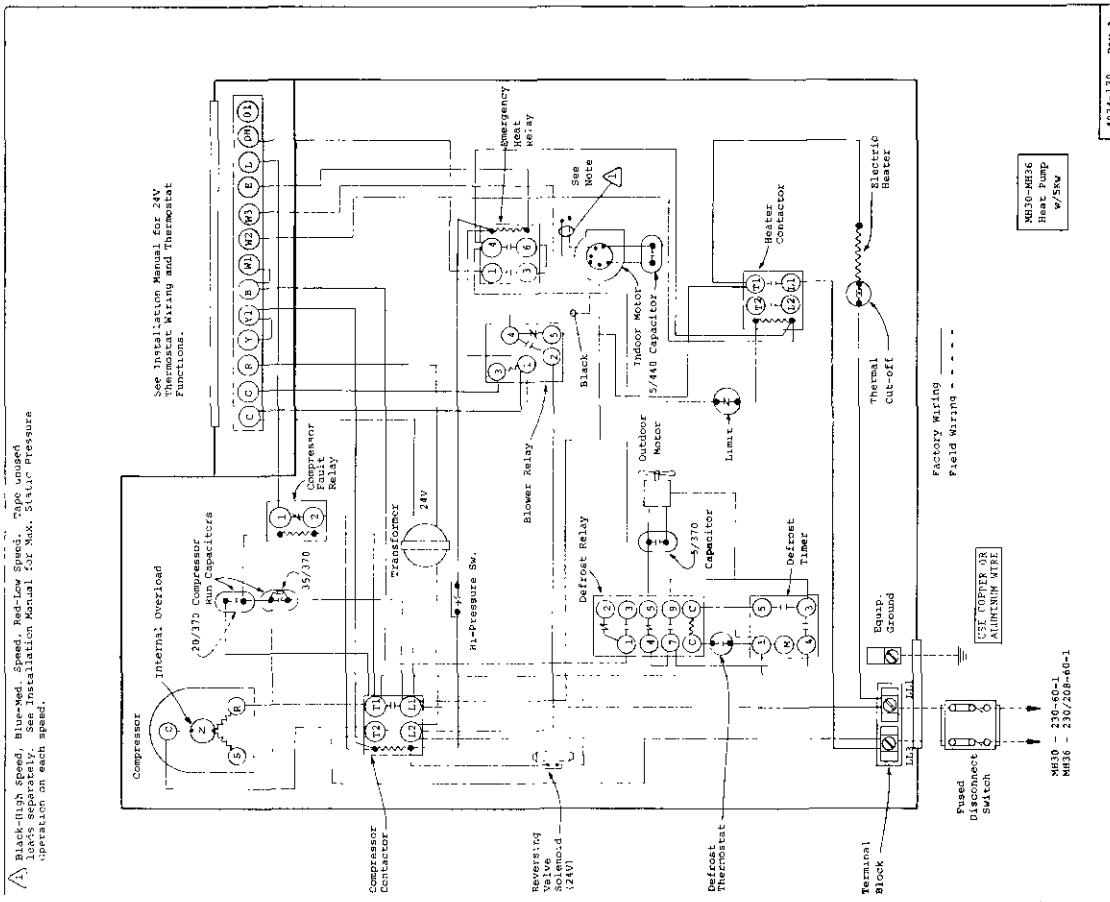


- Qty. 1** 7001-014 Fitting Pack
(1) 12 $\frac{1}{4}$ x 20 x 10 $\frac{1}{4}$ Return Air Box
(1) 20 x 20 Permanent Filter
(1) 12 x 20 Floor Register
(1) 12" Supply Air Adapter

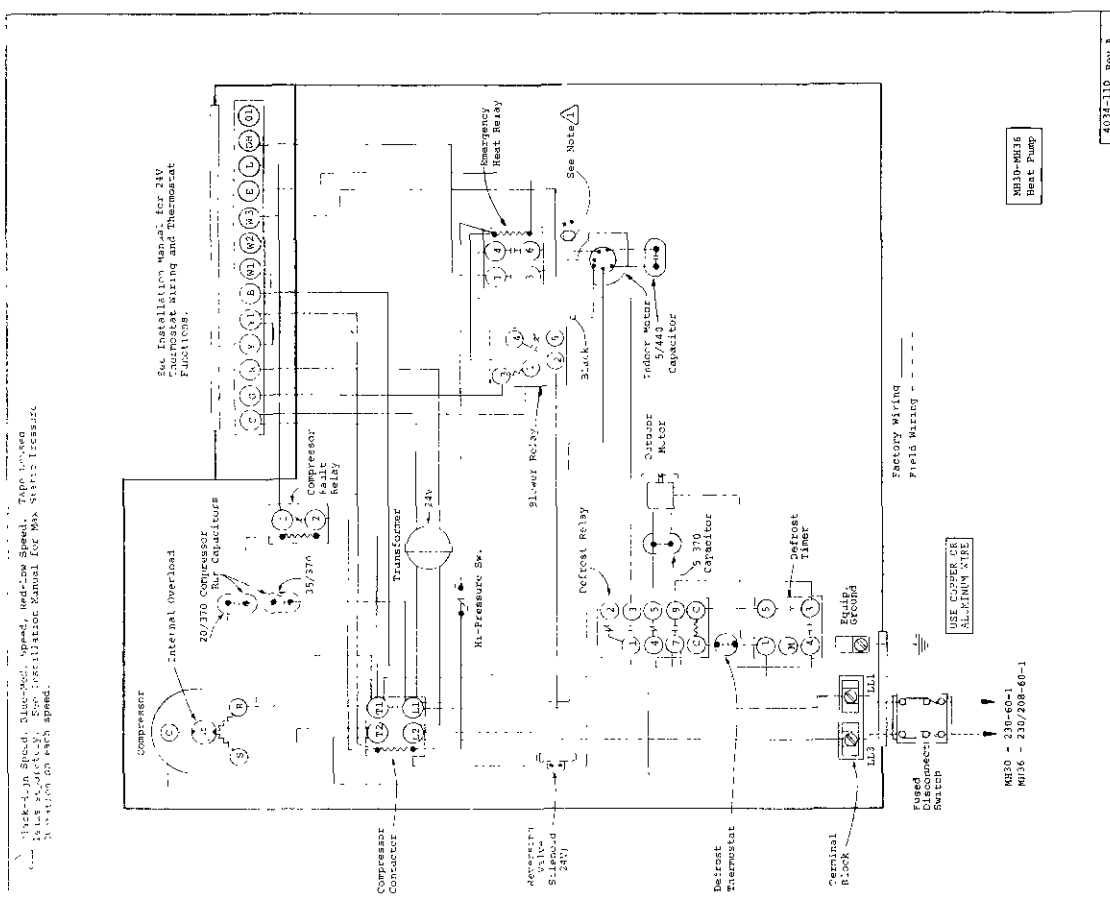
- Qty. 1** 7001-015 Fitting Pack
(1) 12 x 10 x 10 "Y" Fitting
(2) 10" Supply Air Adapter

- Qty. 1** 7001-018 Flex Duct Pack
(1) 14" Dia. x 7' Insulated Duct
(1) 12" Dia. x 7' Insulated Duct

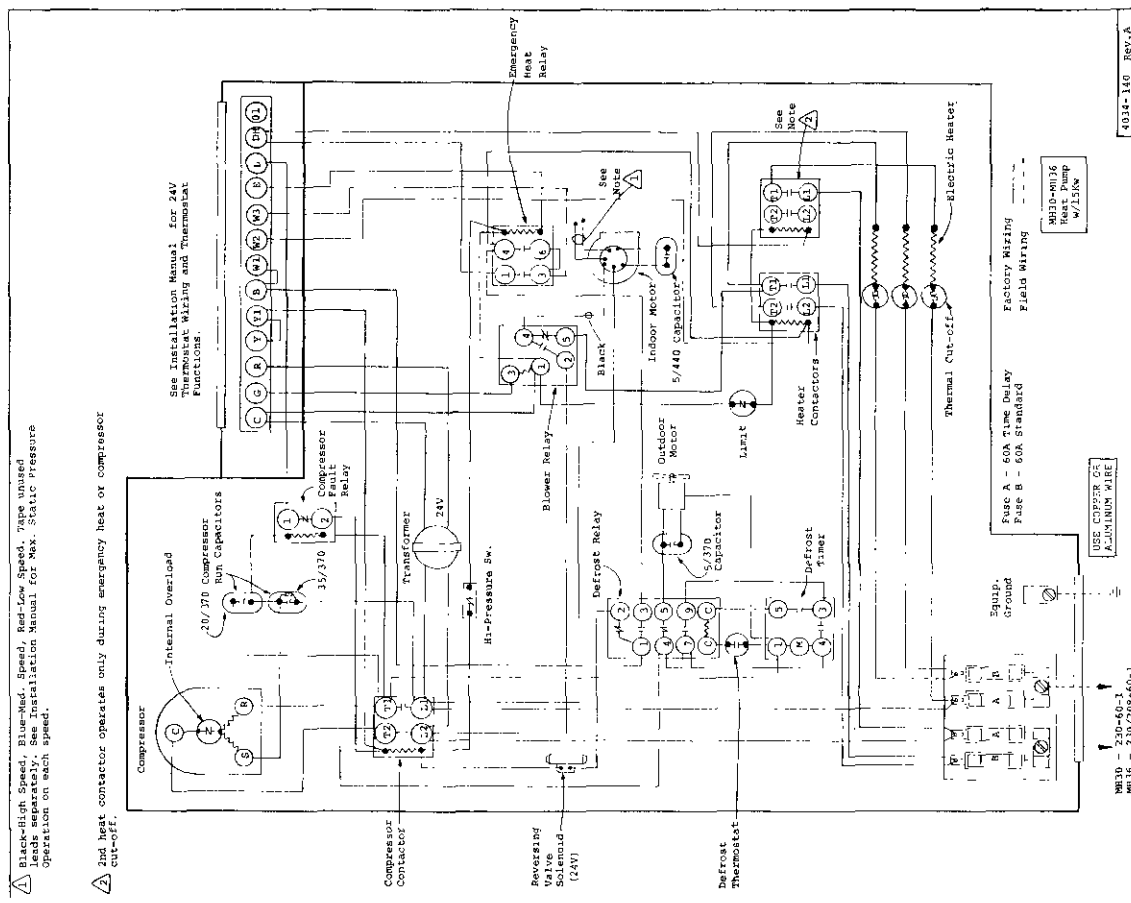
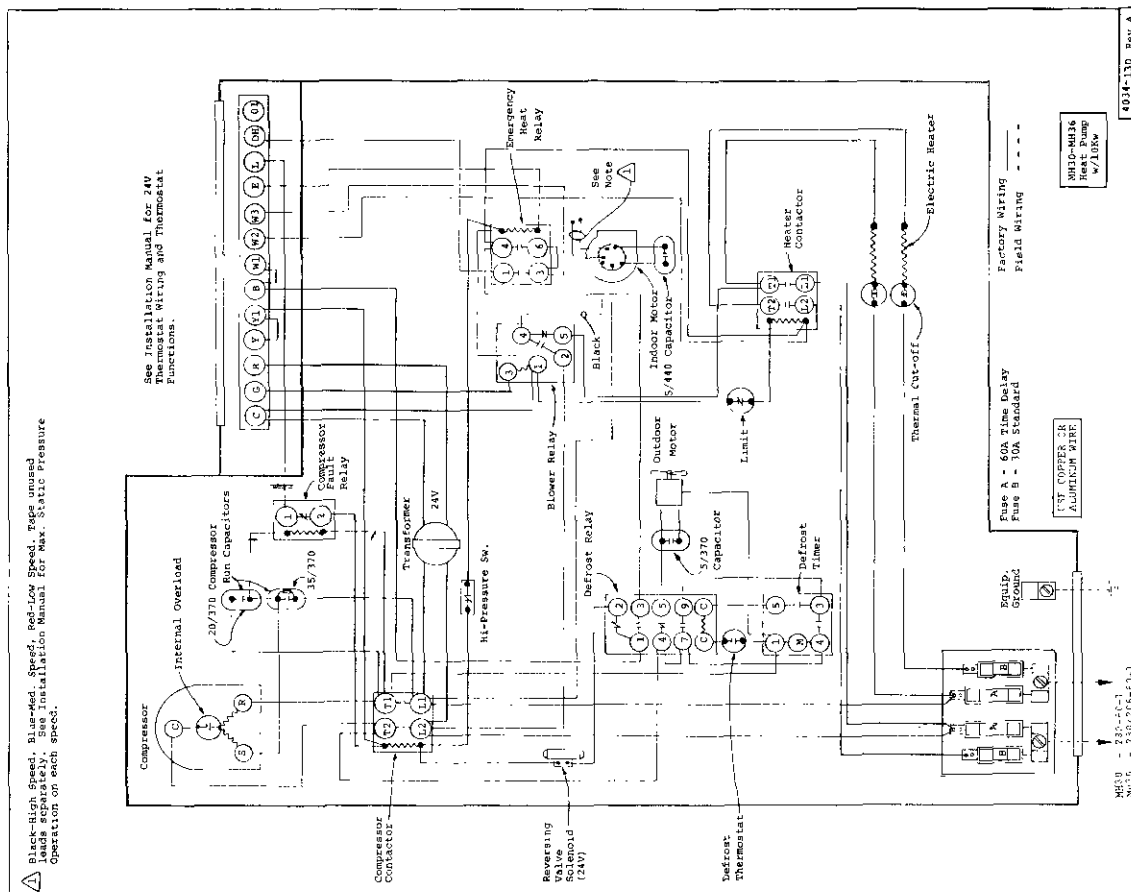
- Qty. 2** 7001-001 Flex Duct Pack
(1) 10" Dia. x 7' Insulated Duct



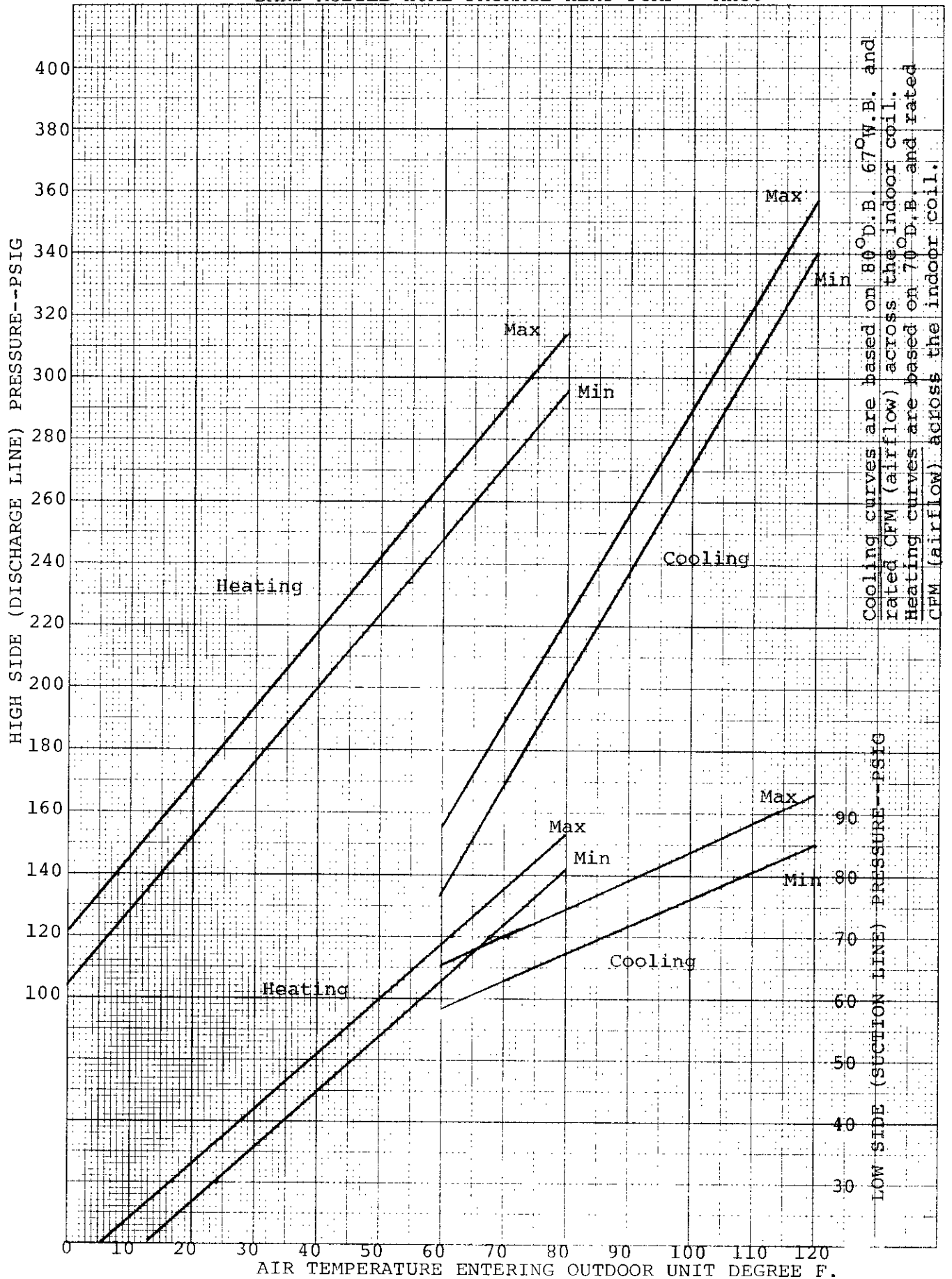
4034-120 Rev. A



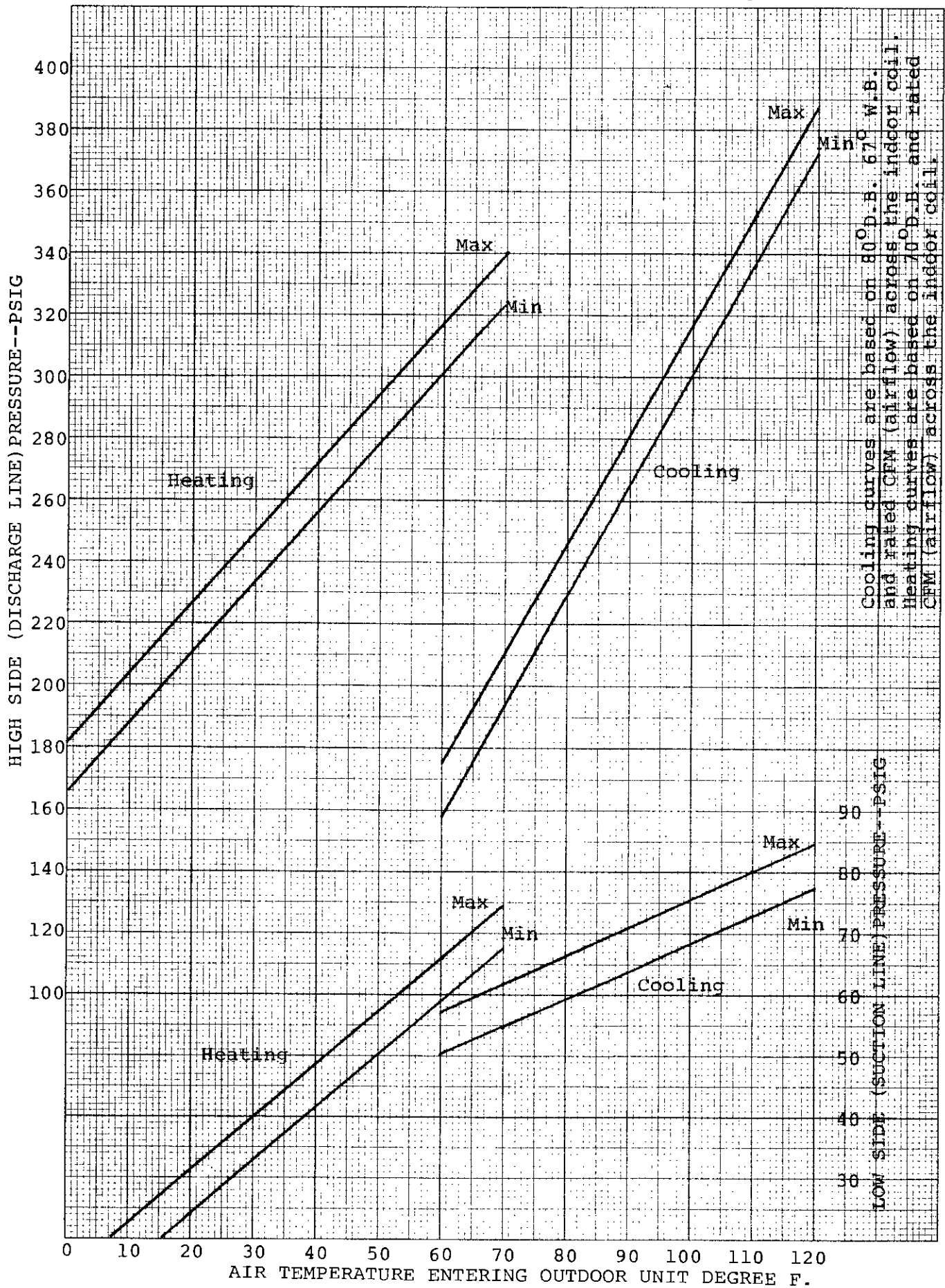
4034-110 Rev. A



BARD MOBILE HOME PACKAGE HEAT PUMP - MH30



BARD MOBILE HOME PACKAGE HEAT PUMP - MH36



ALPHABETICAL PARTS LIST
SINGLE PACKAGE HEAT PUMPS

PART NO.	DESCRIPTION	MH30	MH36
5202-003	Accumulator	x	
5202-004	Accumulator		x
5152-026	Blower Housing 10-8	x	x
5152-013	Blower Wheel DD10-8A	x	x
8552-020	Capacitor 35/370V	x	x
8552-022	Capacitor 20/370V	x	x
8552-019	Capacitor 5/440V	x	x
8552-002	Capacitor 5/370V	x	x
5811-010	Capillary Tube - Cool	(3)	(3)
5811-021	Capillary Tube - Heat	x	x
5651-006	Check Valve	(2)	(2)
5051-003	Condenser Coil	x	x
8000-042	Compressor H2EA293AB	x	
8000-045	Compressor H2EA413AB		x
8401-007	Contactor 1P25A	x	
8401-003	Contactor 1P30A		x
8401-006	Contactor 2P20	x	x
8408-004	Defrost Mounting Plate	x	x
8408-002	Defrost Thermostat	x	x
5060-015	Evaporator Coil	x	x
5151-001	Fan Blade TF1839 ccw	x	x
7051-008	Fan Guard	x	x
8614-006	Fuse OT30	x	x
8614-007	Fuse OT60	x	x
8614-022	Fuse TR60	x	x
8614-017	Fuse Block 10Kw	x	x
8614-018	Fuse Block 15-20Kw	x	x
8604-023	Heat Strip 5Kw	x	x
8604-024	Heat Strip 10Kw	x	x
8604-025	Heat Strip 15Kw	x	x
8406-011	Hi Pressure Switch	x	x
8402-011	Limit Switch 140°-125°	x	x
8105-010	Motor - Blower 1/3 PSC	x	x
8103-007	Motor - Fan 1/5 PSC	x	x
8200-003	Motor Mount - Blower	x	x
8200-019	Motor Mount - Fan	x	x
5451-011	Motor Mounting Parts	x	x
5451-009	Motor Mounting Parts (Fan)	x	x
8201-009	Relay - Blower SPDT	x	x
8201-031	Relay - Compressor Fault	x	
8201-024	Relay - Compressor Fault		x
8201-023	Relay - Defrost	x	x
8201-013	Relay - Emergency Heat	x	x
5650-005	Reversing Valve	x	
5650-006	Reversing Valve		x
5650-008	Solenoid Coil	x	x
5210-003	Strainer	x	x
5210-002	Strainer	x	x
8607-001	Terminal Block	x	x
8607-010	Terminal Board	x	x
8402-030	Thermal Cut-off	x	x
8612-010	Timer	x	x
8407-015	Transformer 55VA	x	x
5153-022	Rain Shield	x	x

Minimum Net Billing \$15.00. Supersedes all previous lists.
Subject to change without notice. F.O.B. Bryan, Ohio

IMPORTANT

PURCHASER'S RESPONSIBILITIES

Below are the responsibilities of the purchaser and these items cannot be considered as defects in workmanship or material.

1. Air filter cleaning or replacement.
2. Failure to operate due to improper air distribution over indoor and outdoor equipment sections.
3. Failure to start due to voltage conditions, blown fuses or other damage due to inadequacy or interruption of electrical service.
4. Damage caused directly or indirectly by improper installation.
5. Damage due to lack of proper and periodic maintenance.
6. Damage resulting from transportation, moving or storage of unit.
7. Unit must be readily accessible for servicing and/or repair at all times.
8. Any adjustment or service to the unit should be made by qualified service personnel.
9. Misapplication of product.

MODEL NO. _____ SERIAL NO. _____ DATE
INSTALLED _____

INSTALLER: Please fill in above blanks and leave
this manual with equipment owner/operator.