

INSTALLATION INSTRUCTIONS

WALL MOUNTED PACKAGE AIR CONDITIONERS

MODELS

WA181

WA241

MANUAL 2100-200 REV.
SUPERSEDES REV.
FILE VOL. III, TAB 16

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BARD MANUFACTURING COMPANY
BRYAN, OHIO

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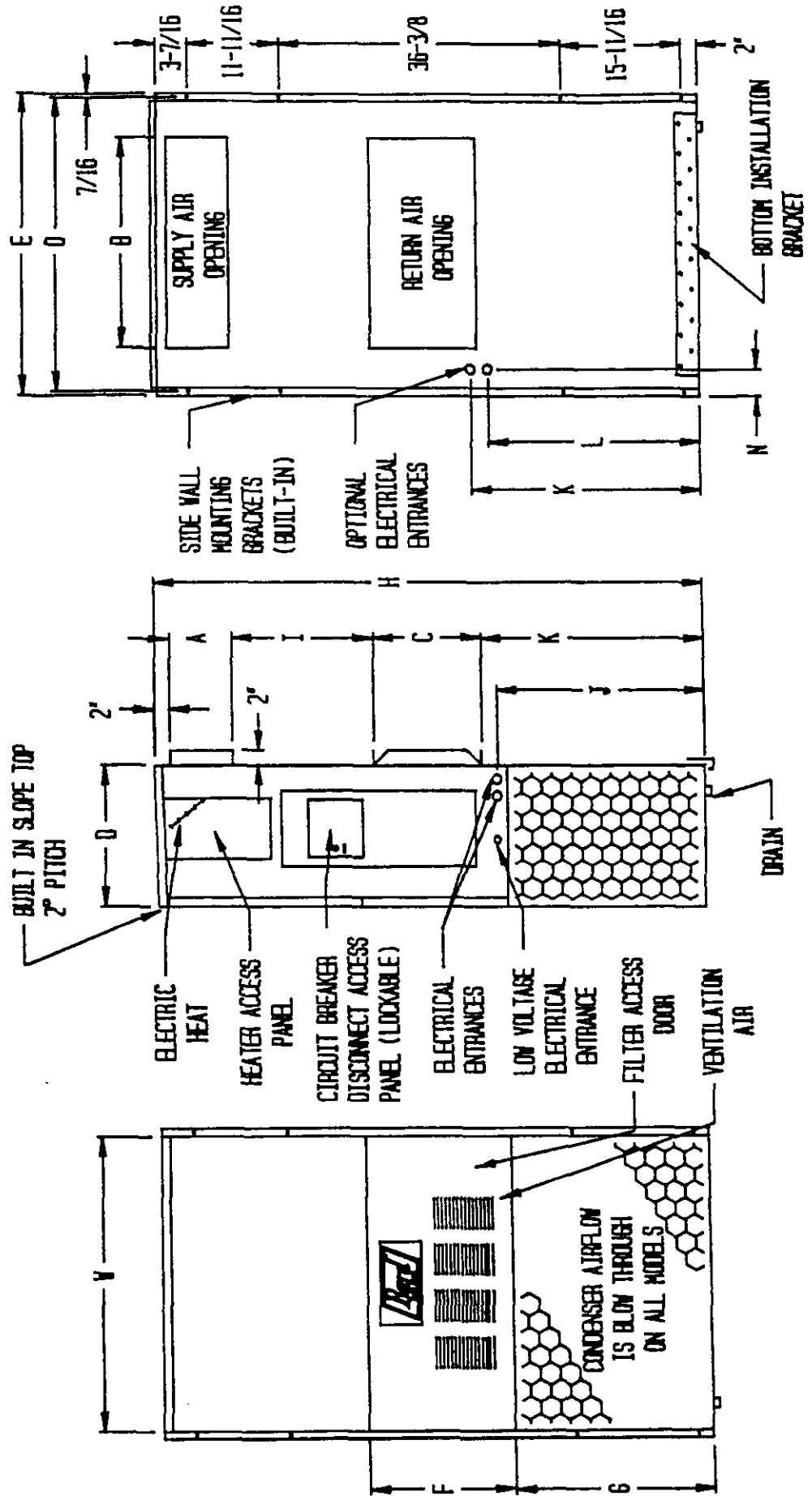
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FIGURE 1

SIZE SPECS FOR HIS-278

UNIT	WIDTH (W)	DEPTH (D)	HEIGHT (H)	SUPPLY		RETURN		E	F	G	I	J	K	L	M	N	O
				A	B	C	B										
18 & 24	32-7/8	15-7/8	70	7-7/8	20	11-7/8	20	39-7/8	18-1/4	25-3/4	20-1/2	26-3/4	28-3/4	29-1/4	27	2-9/16	39



BACK VIEW

SIDE VIEW

FRONT VIEW

ELECTRICAL SPECIFICATIONS TABLE 1

SINGLE CIRCUIT						
Model	Rated Volts and Phase	No. Field Power Ckts.	Minimum Circuit Ampacity	(1) Maximum External Fuse Or Circuit Breaker	(2) Field Power Wire Size	(2) Ground Wire Size
WA181-A00	230/208-1	1	14	20	14	12
A05		1	28	30	10	10
A08		1	44	45	8	10
A10		1	54	60	6	10
WA241-A00	230/208-1	1	15	20	14	12
A05		1	28	30	10	10
A08		1	44	45	8	10
A10		1	54	60	6	10
WA241-B00	230/208-3	1	11	15	14	12
B06		1	20	20	12	12
<p>(1) Maximum size of the time delay fuse or HACR type circuit breaker for protection of field wiring conductors.</p> <p>(2) Based on 75°C copper wire.</p>						

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.

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. A 1-inch washable filter and 2-inch pleated filter are also available as optional accessories. The internal filter brackets are adjustable to accommodate the 2-inch filter.

FRESH AIR INTAKE

All units are built with a fresh air inlet hole punched in the service panel.

The fresh air damper assembly is standard equipment with the unit because of the variety of state or local codes requiring fresh air capability. It is shipped already attached to each unit.

All capacity, efficiency and cost of operation information as required for Department of Energy "Energyguide" Fact Sheets is based upon the fresh air blank-off plate in place and is recommended for maximum energy efficiency.

The blank-off plate is available upon request from the factory and is installed in place of the fresh air damper shipped with each unit.

WALL MOUNTING

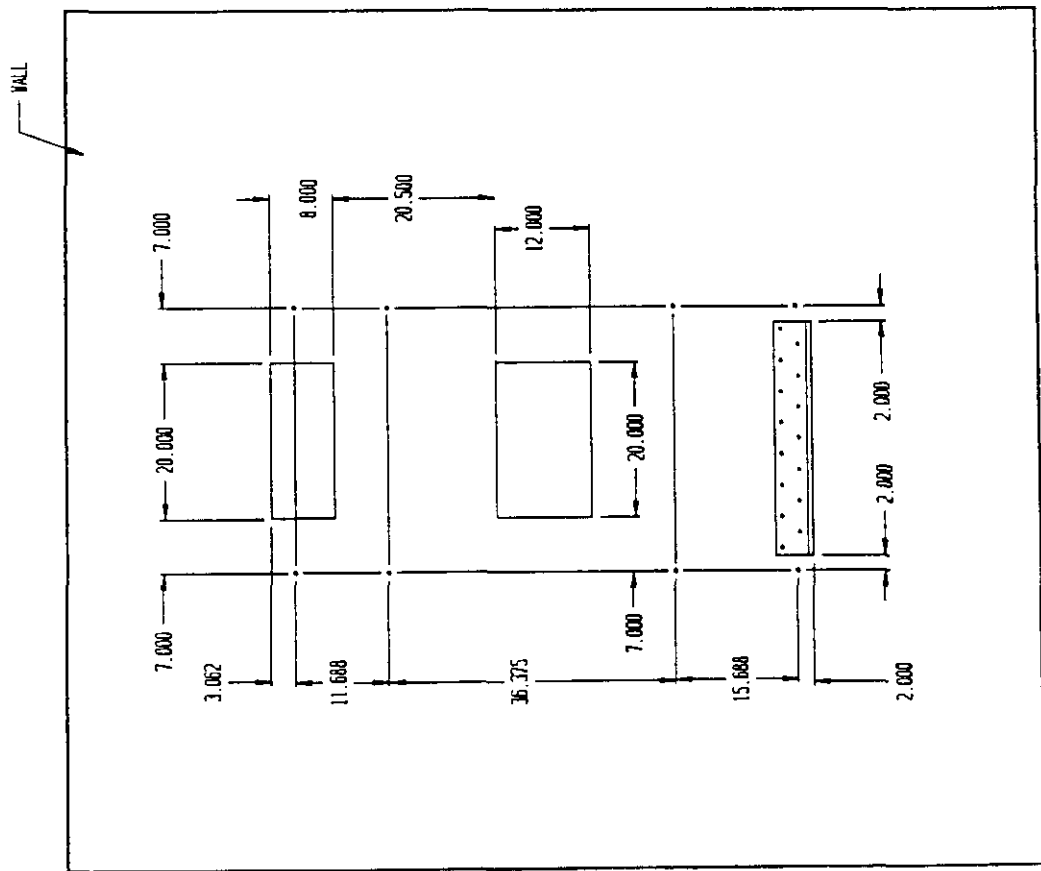
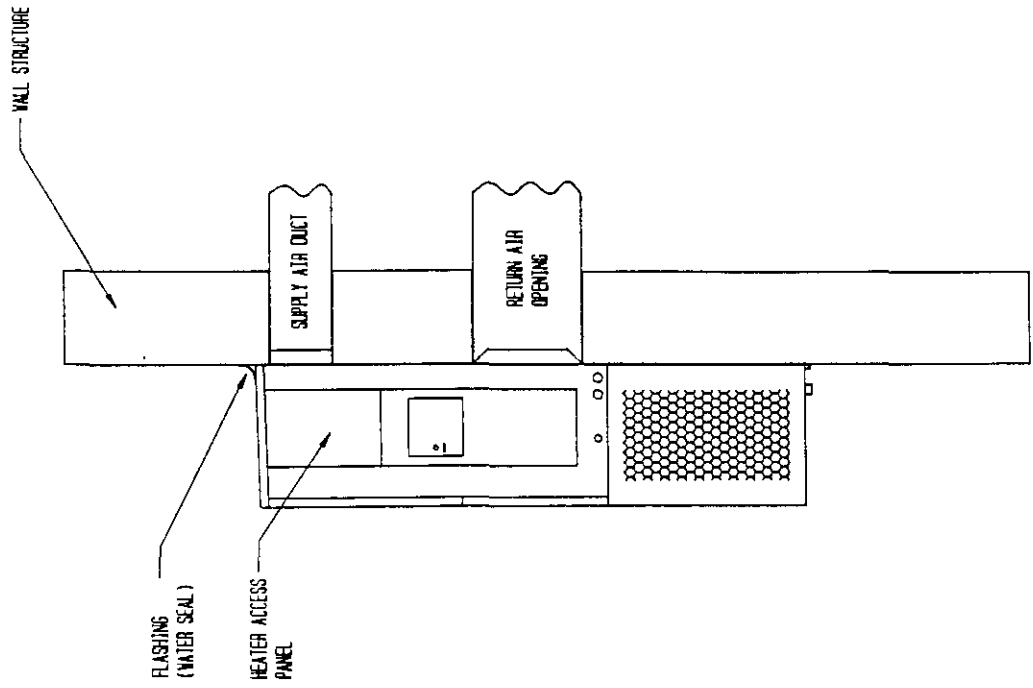
1. Two holes, for the supply and return air openings must be cut through the wall as shown in Figure 2.
2. On wood-frame walls, the wall construction must be strong and rigid enough to carry the weight of the unit without transmitting any unit vibration.
3. Concrete block walls must be thoroughly inspected 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.

MOUNTING INSTRUCTIONS

1. These units are secured by wall mounting brackets which secure the unit to the outside wall surface at both sides. A bottom mounting brackets is provided for ease of installation, but are not required.
2. Locate and mark lag bolt locations and bottom mounting bracket location, if desired.
3. Mount bottom mounting bracket, if used.
4. Position unit in opening and secure with 5/16 lag bolts; use flat washers on the lag bolts.
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.

FIGURE 2



WIRING

LOW VOLTAGE WIRING

A 24 volt terminal block is located in the lower left hand corner of the control panel. All low voltage thermostat connections should be made at these terminals. Wire size for the class 2 thermostat wire can be determined from the chart below.

TABLE 2

<u>Transformer VA</u>	<u>FLA @ 240</u>	<u>Wire Size</u>	<u>Maximum Distance In Feet</u>
40	1.6	20 Gauge	65
		18 "	90
		16 "	145
		14 "	230

See Figure 4 for applicable thermostat and subbase combinations and low voltage wiring information.

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. All models are suitable only for connection with copper wire. Each unit and/or wiring diagram will be marked "Use Copper Conductors Only". 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 (75°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.

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.

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 the blade adjusted in or out on the motor shaft accordingly.

FIGURE 3

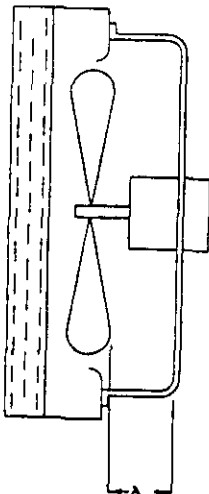
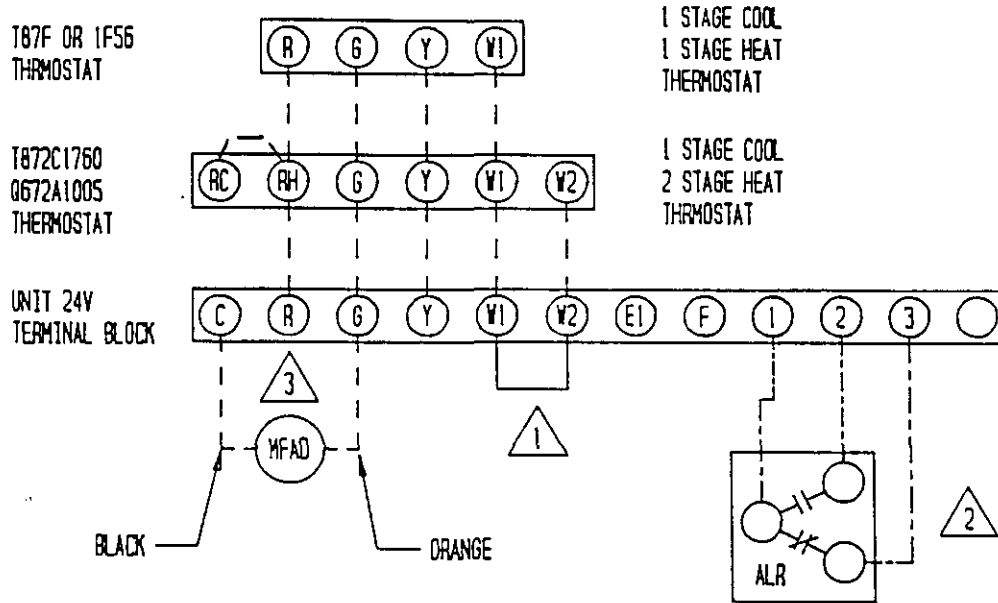


TABLE 3

Model	Dimension A
WA181	1.00
WA241	

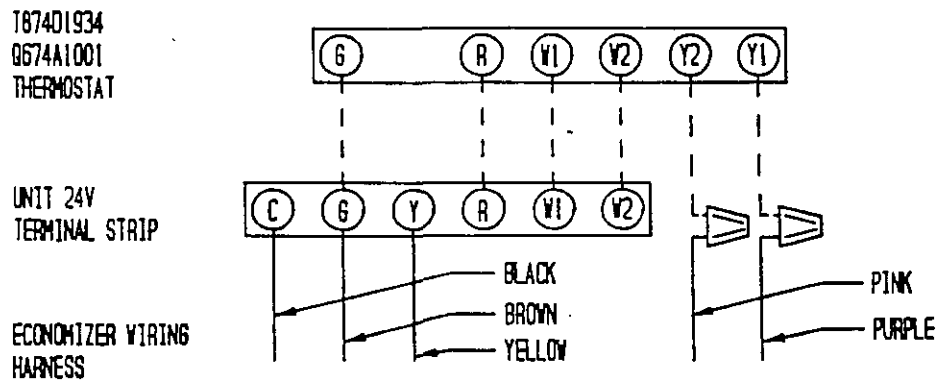
FIGURE 4

LOW VOLTAGE WIRING



- 1 REMOVE JUMPER FOR 2 STAGE ELECTRIC HEAT ON UNITS WITH 15 OR MORE KW
- 2 OPTIONAL ALARM RELAY PROVIDED ON UNITS WITH CMA-16 INSTALLED. CONTACT RATING 24VAC • 125VA
- 3 OPTIONAL MOTORIZED FRESH AIR DAMPER SUGGESTED HOOK UP

OPTIONAL ECONOMIZER LOW VOLTAGE 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:

TABLE 4

Model	Rated Airflow	95° F OD Temperature	82° F OD Temperature
WA181	650	51 - 53	63 - 65
WA241	800	61 - 63	63 - 65

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

TABLE 5 INDOOR BLOWER PERFORMANCE--CFM @ 230V

E.S.P. in H ₂ O	WA181, WA241 230V	
	Dry	Wet
.0	1060	1015
.1	1000	940
.2	935	865
.3	855	765
.4	765	675
.5	640	555

MAXIMUM ESP OF OPERATION

TABLE 6 ELECTRIC HEAT ONLY

Model	Low Speed	High Speed
A00	.50	.50
WA181 A05	.50	.50
WA241 A08	.50	.50
B00	.50	.50
WA241 B06	.50	.50

Values shown are for units equipped with STD 1" throw-away filter or 1" washable filter. Derate ESP by .15 for 2" pleated filters.

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.

TABLE 7

Model	Rated CFM*	Rated ESP*	Recommended Airflow Range
WA181	650	.40	575 - 725
WA241	800	.20	700 - 950

*Rated CFM and ESP on high speed tap.

IMPORTANT INSTALLER NOTE

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

CRANKCASE HEATERS

All units are provided with 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.

The decal in Figure 5 is affixed to all outdoor units detailing start-up procedure. This is very important. Please read carefully.

FIGURE 5

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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TABLE 8

COOLING

Air Temperature Entering Outdoor Coil °F

Model	Return Air Temperature	Pressure	°	°	°	°	°	°	°	°	°
			75	80	85	90	95	100	105	110	115
WA181	75 deg. DB	Low Side	71	73	75	77	79	81	82	84	85
	62 deg. WB	High Side	194	208	223	238	253	268	284	299	315
	80 deg. DB	Low Side	76	78	80	83	84	86	88	90	91
	67 deg. WB	High Side	199	214	229	244	259	275	291	307	323
	85 deg. DB	Low Side	81	84	86	89	91	93	95	96	98
	72 deg. WB	High Side	206	221	237	253	268	285	301	318	334
WA241	75 deg. DB	Low Side	72	75	78	80	82	84	86	87	89
	62 deg. WB	High Side	198	214	230	246	261	276	291	305	319
	80 deg. DB	Low Side	74	77	80	82	84	86	88	90	91
	67 deg. WB	High Side	211	229	246	263	280	295	311	326	341
	85 deg. DB	Low Side	77	80	83	85	87	89	91	93	94
	72 deg. WB	High Side	227	246	265	283	300	318	334	351	367

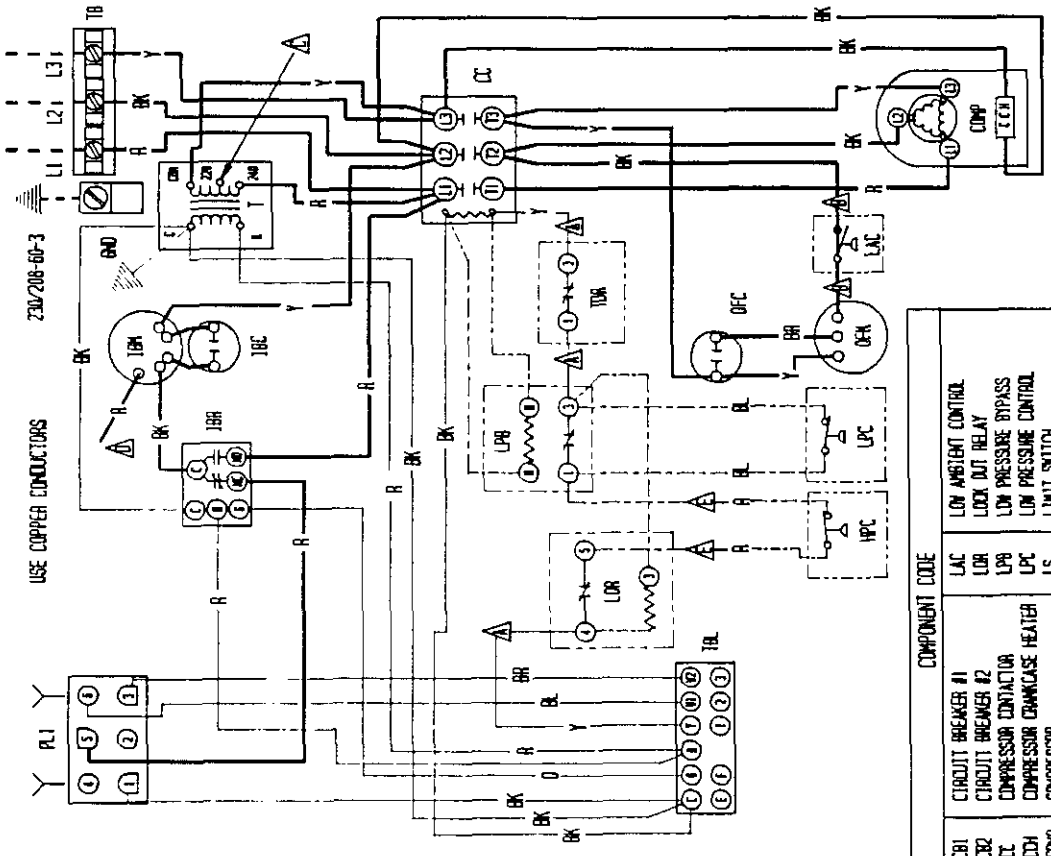
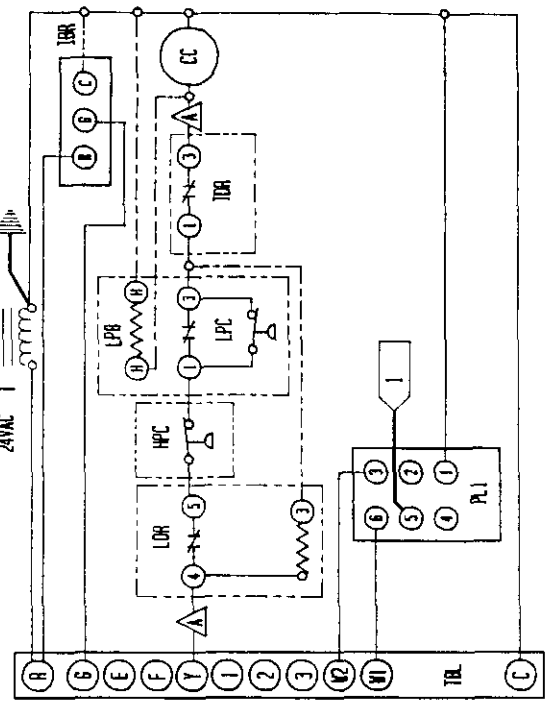
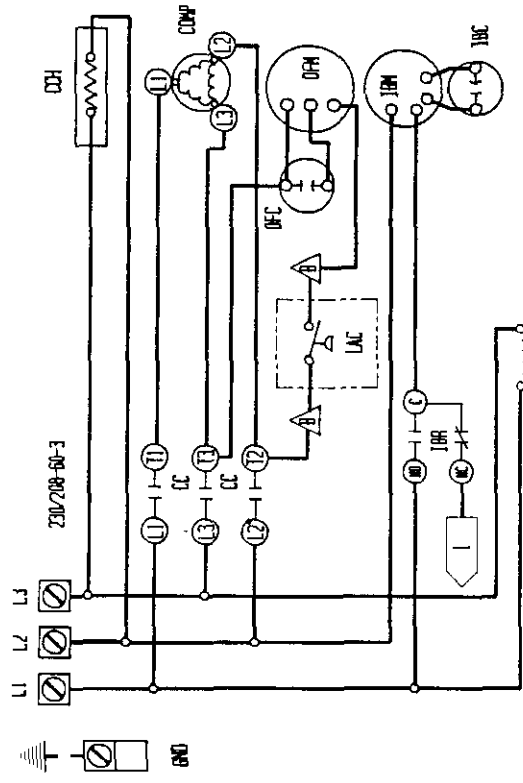
Low side pressure \pm 2 PSIGHigh side pressure \pm 5 PSIG

Tables are based upon rated CFM (airflow) across the evaporator coil and should 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 to serial plate instructions.

TABLE 9

OPTIONAL ACCESSORIES

Model	Description	W	W	W
		A	A	A
		1	2	2
		8	4	4
		1	1	1
		-	-	-
		A	A	B
EHWA02-A05	Heater Packages	X	X	
EHWA02-A08	Heater Packages	X	X	
EHWA02-A10	Heater Packages	X	X	
EHWA24-B06	Heater Packages			X
BOP-2	Blank Off Plate	X	X	X
BFAD-2	Barometric Fresh Air Damper	X	X	X
MFAD-2	Motorized Fresh Air Damper	X	X	X
CRV-2	Classroom Ventilator With Exhaust	X	X	X
BIFM-2	Economizer With Exhaust	X	X	X
CMA-1	High Pressure Control (HPC)	X	X	X
CMA-2	Low Pressure Control (LPC)	X	X	X
CMA-4	Low and High Pressure Control	X	X	X
CMA-5	Time Delay Relay (TDR)	X	X	X
CMA-6	Low Ambient Control (LAC)	X	X	X
CMA-8	TDR + HPC	X	X	X
CMA-10	LPC + HPC + TDR	X	X	X
CMA-11	LPC + HPC + LAC	X	X	X
CMA-12	LAC + TDR	X	X	X
CMA-13	LPC + HPC + TDR + LAC	X	X	X
CMA-14	LPC + HPC + LAC + Start Kit	X	X	
CMA-15	LPC + HPC + TDR + Start Kit	X	X	
CMA-16	LPC + HPC + TDR + LAC + Start Kit	X	X	
CMA-17	LAC + TDR + Start Kit	X	X	
CMA-22	Start Kit	X	X	



USE COPPER CONDUCTORS

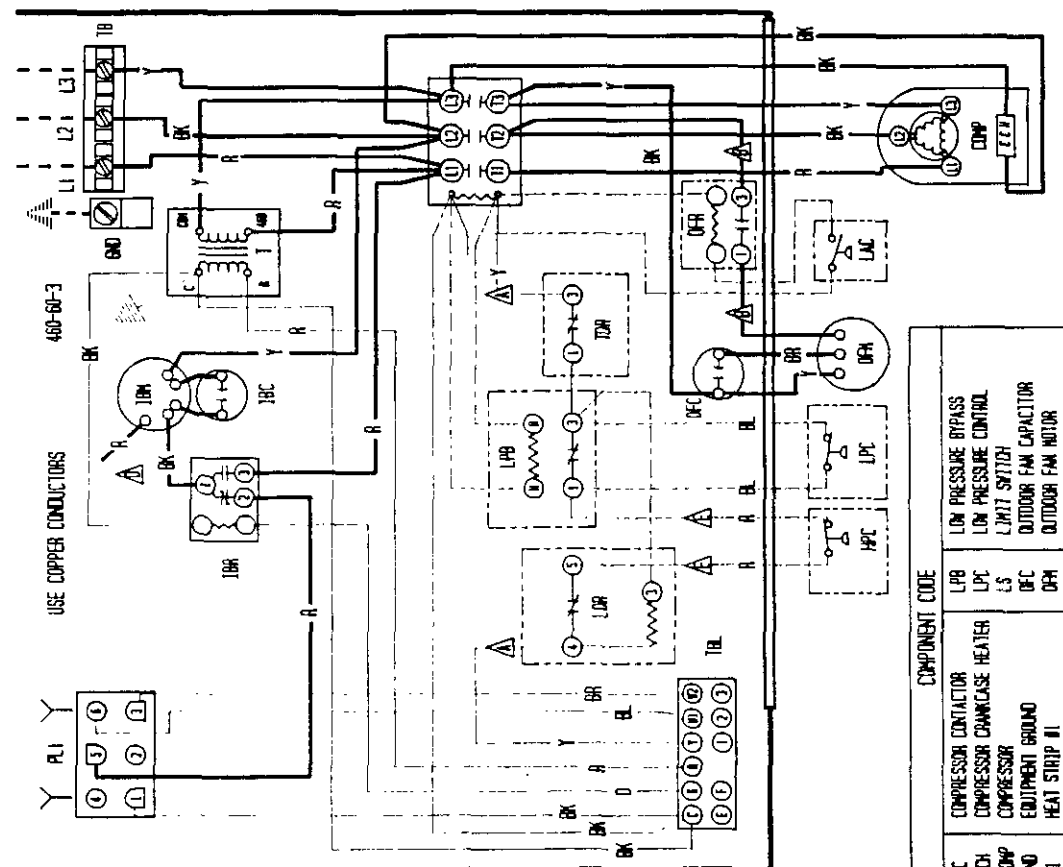
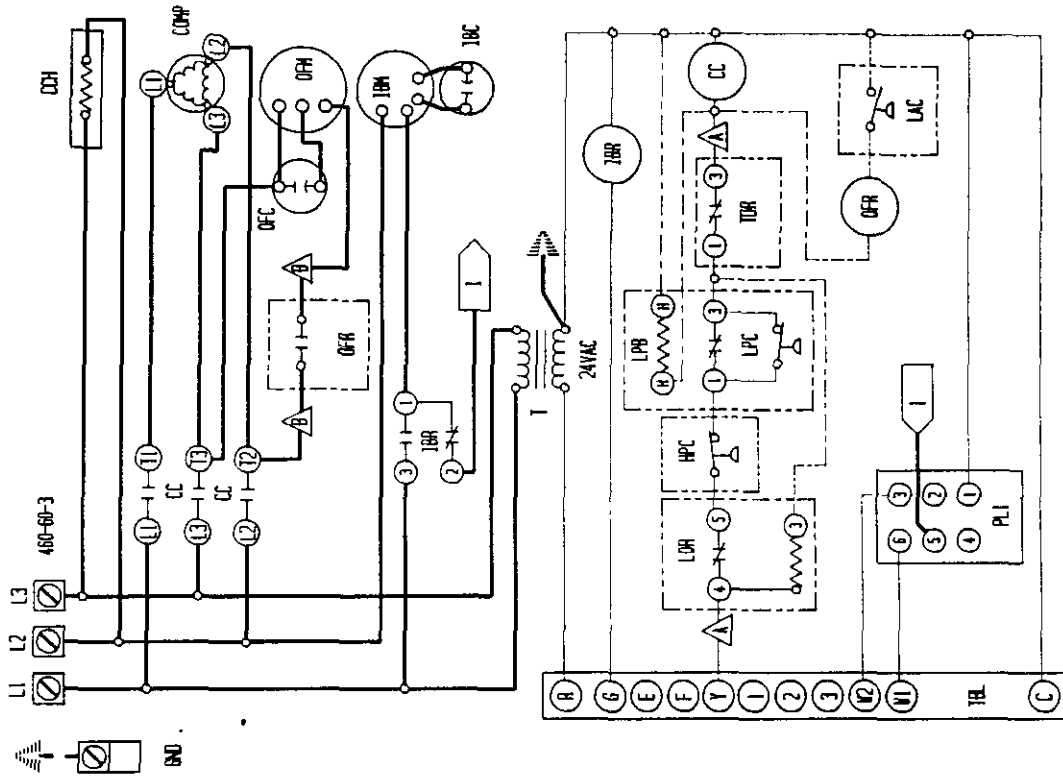
COMPONENT CODE	
CB1	CIRCUIT BREAKER #1
CB2	CIRCUIT BREAKER #2
CC	COMPRESSOR CONTACTOR
CD	COMPRESSOR CRANKCASE HEATER
COMP	COMPRESSOR
END	EQUIPMENT GROUND
H1	HEAT STRIP #1
H2	HEAT STRIP #2
HCl	HEATER CONTACTOR #1
H2C	HEATER CONTACTOR #2
HPC	HIGH PRESSURE CONTROL
IBC	INDOOR BLOWER CAPACITOR
IBH	INDOOR BLOWER MOTOR
IBR	INDOOR BLOWER RELAY
LAC	LOW AMBIENT CONTROL
LOR	LOCK OUT RELAY
LPB	LOW PRESSURE BYPASS
LPC	LOW PRESSURE CONTROL
LS	LIMIT SWITCH
OFC	OUTDOOR FAN CAPACITOR
OFH	OUTDOOR FAN MOTOR
PL1	PLUS #1
SK	START KIT
T	TRANSFORMER
TB	TERMINAL BLOCK
TBL	LOW VOLTAGE TERMINAL BLOCK
TED	THERMAL OFF/ON
TDR	TIME DELAY RELAY

▲ LABELLED WIRES CONNECT IF NO OPTIONS USED. ▲ MOVE RED WIRE TO 208V TAP FOR 208V OPERATION ▲ RED (LOW) BLACK (HIGH)

FACTORY STD.		OPTIONAL	
HIGH VOLTAGE	FIELD	HIGH VOLTAGE	FIELD
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—

COLOR CODE			
BK	BLACK	Y	YELLOW
BR	BROWN	G	GREEN
R	RED	B	BLUE
O	ORANGE	W	WHITE
		V	VIOLET
		P	PURPLE
		L	LAVENDER
		S	SLATE
		PK	PINK
		T	TAN

BARD MFG. CO.	
DWG.	4055-210
DRAWN	CRB
CHECKED	
DATE	



USE COPPER CONDUCTORS

COMPONENT CODE	COMPONENT CODE	COMPONENT CODE
CC	LOW PRESSURE BYPASS	LOW PRESSURE BYPASS
CD	LOW PRESSURE CONTROL	LOW PRESSURE CONTROL
COMP	LOW PRESSURE SWITCH	LOW PRESSURE SWITCH
END	OUTDOOR FAN CAPACITOR	OUTDOOR FAN CAPACITOR
H1	OUTDOOR FAN MOTOR	OUTDOOR FAN MOTOR
H2	OUTDOOR FAN RELAY	OUTDOOR FAN RELAY
HCL	PULL DISCONNECT	PULL DISCONNECT
HCC	TRANSFORMER	TRANSFORMER
HPC	PLUG #1	PLUG #1
HBC	TERMINAL BLOCK	TERMINAL BLOCK
HBN	INDOOR & OVER CAPACITOR	INDOOR & OVER CAPACITOR
HBR	INDOOR BLOWER MOTOR	INDOOR BLOWER MOTOR
LAC	INDOOR BLOWER RELAY	INDOOR BLOWER RELAY
LOR	LOW AMBIENT CONTROL	LOW AMBIENT CONTROL
LOR	LOCK OUT RELAY	LOCK OUT RELAY
LPC	HEATER CONTACTOR #1	HEATER CONTACTOR #1
LPC	HEATER CONTACTOR #2	HEATER CONTACTOR #2
LPC	HIGH PRESSURE CONTROL	HIGH PRESSURE CONTROL
LPC	INDOOR & OVER CAPACITOR	INDOOR & OVER CAPACITOR
LPC	INDOOR BLOWER MOTOR	INDOOR BLOWER MOTOR
LPC	INDOOR BLOWER RELAY	INDOOR BLOWER RELAY
LPC	LOW AMBIENT CONTROL	LOW AMBIENT CONTROL
LPC	LOCK OUT RELAY	LOCK OUT RELAY
LPC	HEATER CONTACTOR #1	HEATER CONTACTOR #1
LPC	HEATER CONTACTOR #2	HEATER CONTACTOR #2
LPC	HIGH PRESSURE CONTROL	HIGH PRESSURE CONTROL
LPC	INDOOR & OVER CAPACITOR	INDOOR & OVER CAPACITOR
LPC	INDOOR BLOWER MOTOR	INDOOR BLOWER MOTOR
LPC	INDOOR BLOWER RELAY	INDOOR BLOWER RELAY
LPC	LOW AMBIENT CONTROL	LOW AMBIENT CONTROL
LPC	LOCK OUT RELAY	LOCK OUT RELAY

△, ▲ LABELLED WIRES CONNECT IF NO OPTIONS USED. △ RED (LOW) BLACK (HIGH)

FACTORY STD.	FIELD	OPTIONAL
HIGH VOLTAGE	---	---
LOW VOLTAGE	---	---
ACCESSORY	---	---

BLACK	BROWN	RED	ORANGE	WHITE	SLATE	GRAY	PURPLE	VIOLET	Y	GREEN	YELLOW	RED (PR)	BLACK	WHITE
BK	BR	R	O	W	S	GR	P	V	Y	GRN	YEL	RED	BK	WHT
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

TAN	PINK	LAVENDER
16	17	18

BARO MFG. CO.
 DWG. 4095-310
 DRN. CDB
 CHK./APPR. _____

