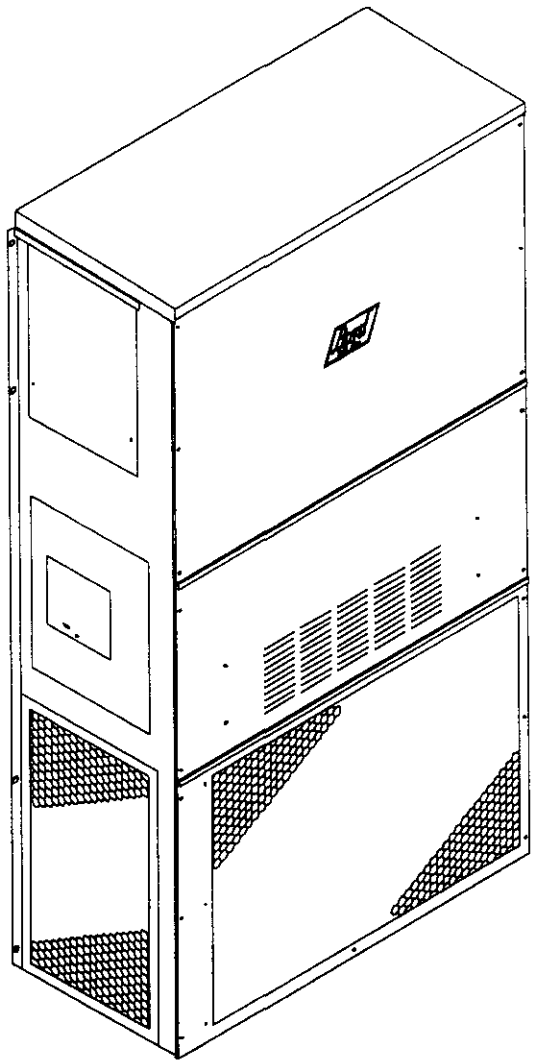
Installation Instructions

Wall Mounted Packaged Air Conditioner

Models: WL181, WL241



MIS-861

Bard Manufacturing Company
Bryan, Ohio 43506

Since 1914...Moving ahead, just as planned.

Manual No.: 2100-291
File: Volume III, Tab 16
Date: 01/20/97

Contents

Getting Other Information and Publications

These publications can help you install the air conditioner or heat pump. You can usually find these at your local library or purchase them directly from the publisher. Be sure to consult current edition of each standard.

National Electrical Code ..... ANSI/NFPA 70

Standard for the Installation ..... ANSI/NFPA 90A
of Air Conditioning and
Ventilating Systems

Standard for Warm Air ..... ANSI/NFPA 90B
Heating and Air
Conditioning Systems

Load Calculation for ..... ACCA Manual J
Residential Winter and
Summer Air Conditioning

Duct Design for Residential ..... ACCA Manual D
Winter and Summer Air
Conditioning and Equipment
Selection

For more information, contact these publishers:

ACCA — Air Conditioning Contractors of America
1712 New Hampshire Avenue NW
Washington, DC 20009
Telephone: (202) 483-9370
Fax: (202) 234-4721

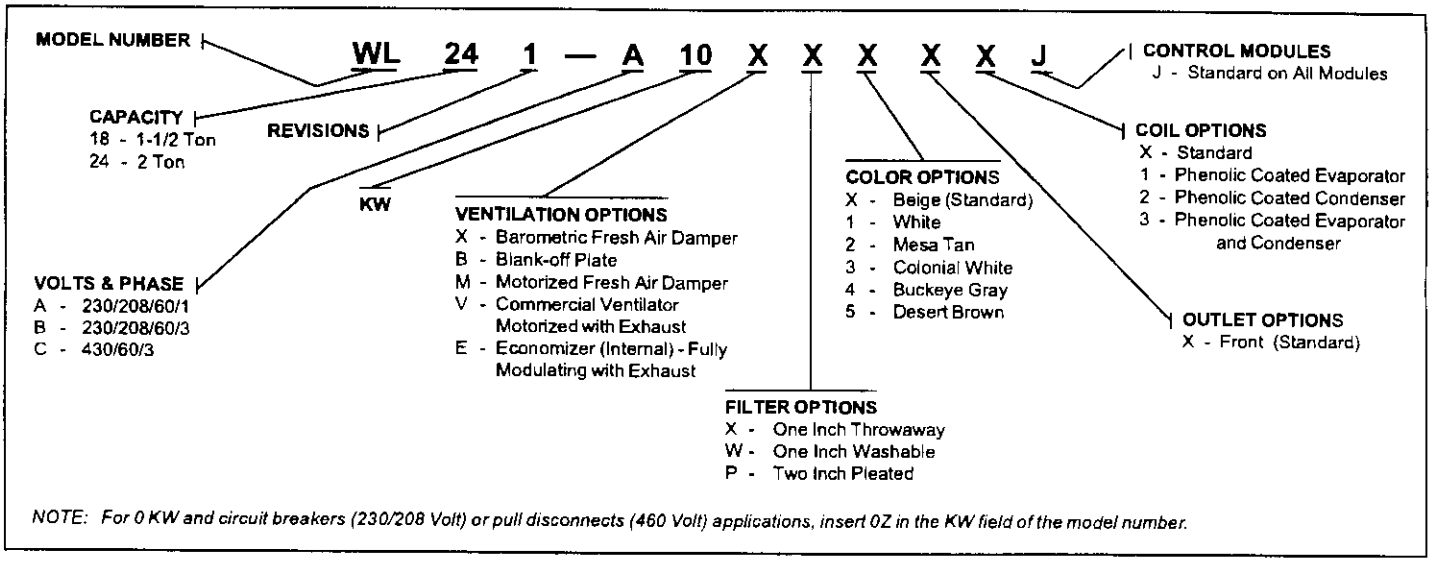
ANSI — American National Standards Institute
11 West Street, 13th Floor
New York, NY 10036
Telephone: (212) 642-4900
Fax: (212) 302-1286

ASHRAE — American Society of Heating Refrigerating, and Air Conditioning Engineers, Incorporated
1791 Tullie Circle, N.E.
Atlanta, GA 30329-2305
Telephone: (404) 636-8400
Fax: (404) 321-5478

NFPA — National Fire Protection Association
Batterymarch Park
P.O. Box 9101
Quincy, MA 02269-9901
Telephone: (800) 344-3555
Fax: (617) 984-7057

Wall Mount General Information

Air Conditioner Wall Mount Model Nomenclature



NOTE: For 0 KW and circuit breakers (230/208 Volt) or pull disconnects (460 Volt) applications, insert 0Z in the KW field of the model number.

TABLE 1 – ELECTRICAL SPECIFICATIONS

SINGLE CIRCUIT						
Model	Rated Volts and Phase	Number Field Power Circuits	(3) Minimum Circuit Ampacity	(1) Maximum External Fuse or Circuit Breaker	(2) Field Power Wire Size	(2) Ground Wire Size
WL181-A0Z	230/208-1	1	16	20	12	12
A05		1	30	30	10	10
A08		1	45	45	8	10
A10		1	56	60	6	10
WL241-A0Z	230/208-1	1	17	20	12	12
A05		1	30	30	10	10
A08		1	45	45	8	10
A10		1	56	60	6	10
WL241-B0Z	230/208-3	1	13	15	14	12
B06		1	22	25	10	10

(1) Maximum size of the time delay fuse or HACR type circuit breaker for protection of field wiring conductors.

(2) Based on 75°C copper wire. All wiring must conform to NEC and all local codes.

(3) These "Minimum Circuit Ampacity" values are to be used for sizing the field power conductors. Refer to the National Electric Code (latest revision), Article 310 for power conductor sizing. ***Caution:*** *When more than one field power conductor circuit is run through one conduit, the conductors must be derated. Pay special attention to Note 8 of Table 310 regarding Ampacity Adjustment Factors when more than 3 conductors are in a raceway.*

FIGURE 1 – UNIT DIMENSIONS

UNIT	WIDTH (W)	DEPTH (D)	HEIGHT (H)	SUPPLY		RETURN		E	F	G	I	J	K	L	M	N	O	P	Q
				A	B	C	B												
WL181 WL241	32-7/8	16-7/8	70-1/2	7-7/8	19-7/8	11-7/8	19-7/8	34-7/8	18-1/4	25-3/4	20-3/4	26-3/4	28	29-1/4	27	2-9/16	34	22-1/16	10-1/2

All dimensions in inches

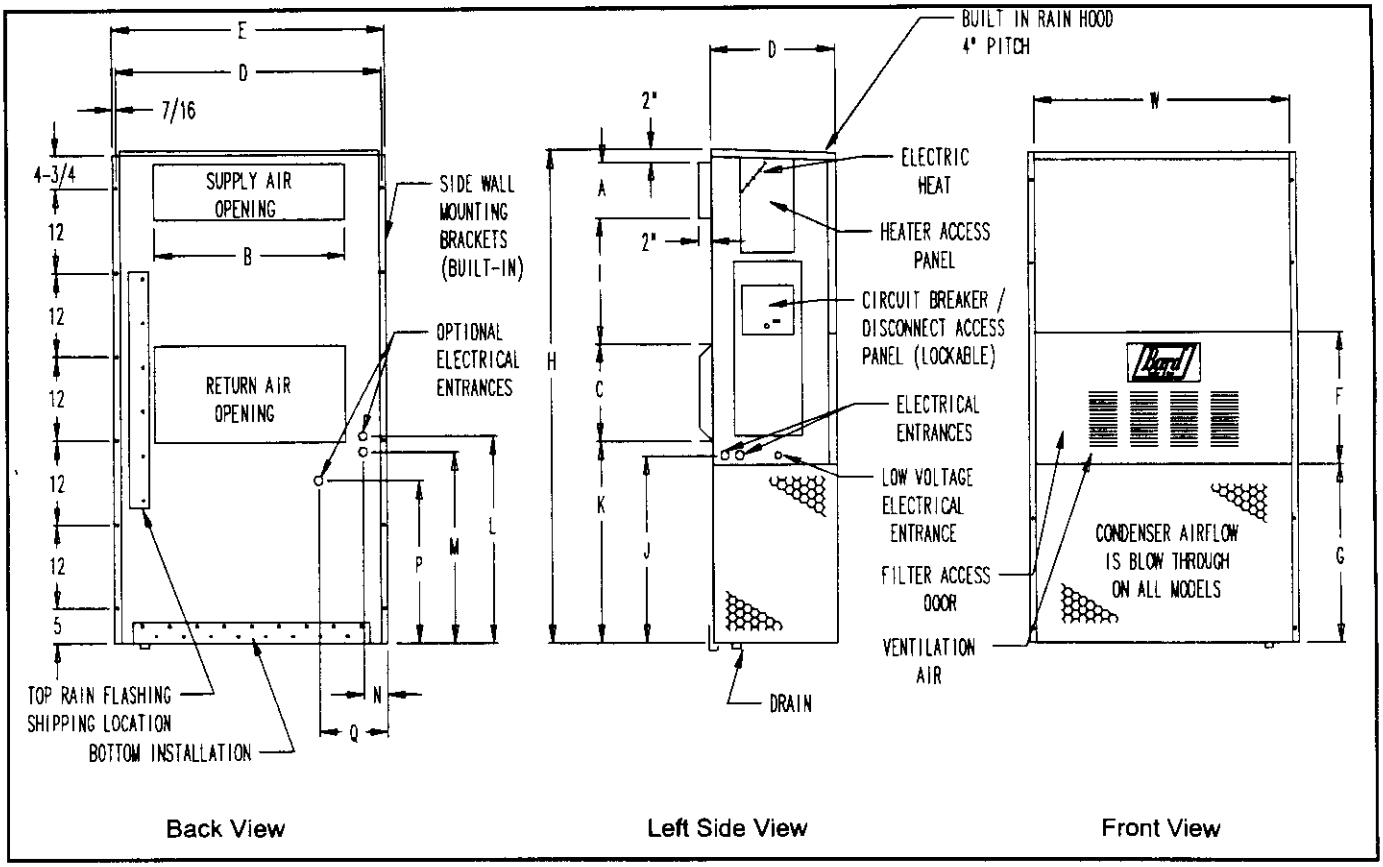


TABLE 2 – ELECTRIC HEAT TABLE

Models	WL181-A				WL241-A				WL241-B			
	240-1		208-1		240-1		208-1		240-3		208-3	
KW	A	BTU	A	BTU	A	BTU	A	BTU	A	BTU	A	BTU
5	20.8	17,065	18.1	12,800	20.8	17,065	18.1	12,800				
8	33.3	27,300	28.8	20,475	33.3	27,300	28.8	20,475				
10	41.6	34,130	36.2	25,600	41.6	34,130	36.2	25,600				
6									14.4	20,500	12.5	15,360

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 equipment covered in this manual is to be installed by trained, experienced service and installation technicians.

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. See Page 1 for information on codes and standards.

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

All duct work, supply and return, must be properly sized for the design air flow requirement of the equipment. Air Conditioning Contractors of America (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.

Refer to Table 8 for maximum static pressure available for duct design.

Design the duct work according to methods given by the Air Conditioning Contractors of America (ACCA). 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 1/4-inch clearance to combustible material for the first 3 feet of duct attached to the outlet air frame is required. See Wall Mounting Instructions and Figures 3 and 7 for further details.

Ducts through the walls must be insulated and all joints taped or sealed to prevent air or moisture entering the wall cavity.

⚠CAUTION

Some installations may not require any return air duct. A metallic return air grille is required with installations not requiring a return air duct. The spacing between louvers on the grille shall not be larger than 5/8 inches.

Any grille that meets the 5/8 inch louver criteria may be used. It is recommended that Bard Return Air Grille Kit RG-2 thru RG-5 or RFG-2 thru RFG-5 be installed when no return duct is used. Contact distributor or factory for ordering information. If using a return air filter grille, 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.

Filters

A 1 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 by loosening 2 screws in each bracket assembly and sliding the brackets apart to the required width and retightening the 4 screws.

Fresh Air Intake

All units are built with fresh air inlet slots punched in the service ınel.

ıf the unit is equipped with the fresh air damper assembly, the assembly is shipped already attached to the unit. The damper blade is locked in the closed position. To allow the damper to operate, the maximum and minimum blade position stops must be installed. See Figure 2.

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.

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.

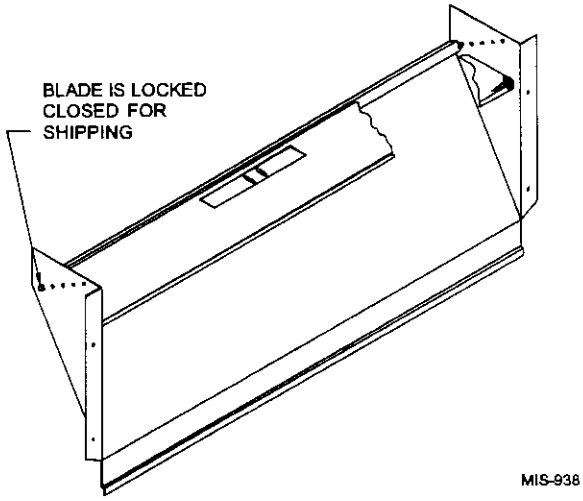


FIGURE 2 - FRESH AIR DAMPER ASSEMBLY

Installation Instructions

Wall Mounting Information

1. These units are secured by wall mounting brackets which secure the unit to the outside wall surface at both sides. A bottom mounting bracket is provided for ease of installation, but is not required.
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.

Mounting the Unit

1. Two holes for the supply and return air openings must be cut through the wall as shown in Figure 3.
2. Locate and mark lag bolt locations and bottom bracket location, if desired. See Figure 3.
3. Mount bottom mounting bracket, if used.
4. Hook top rain flashing under back bend of top. Top rain flashing is shipped attached to the back of the unit on the right side.
5. Position unit in opening and secure with 5/16 lag bolts; use 7/8-inch diameter flat washers on the lag bolts.
6. Secure rain flashing to wall and caulk across entire length of top. See Figure 3.
7. For additional mounting rigidity, the return air and supply air frames or collars can be drilled and screwed or welded to the structural wall itself (depending upon wall construction). Be sure to observe required clearance if combustible wall. Additional clearance may be required to meet local or national codes.
8. On side by side installations, maintain a minimum of 20 inches clearance on right side to allow access to heat strips and control panel and to allow proper airflow to the outdoor coil.

FIGURE 3 – MOUNTING INSTRUCTIONS

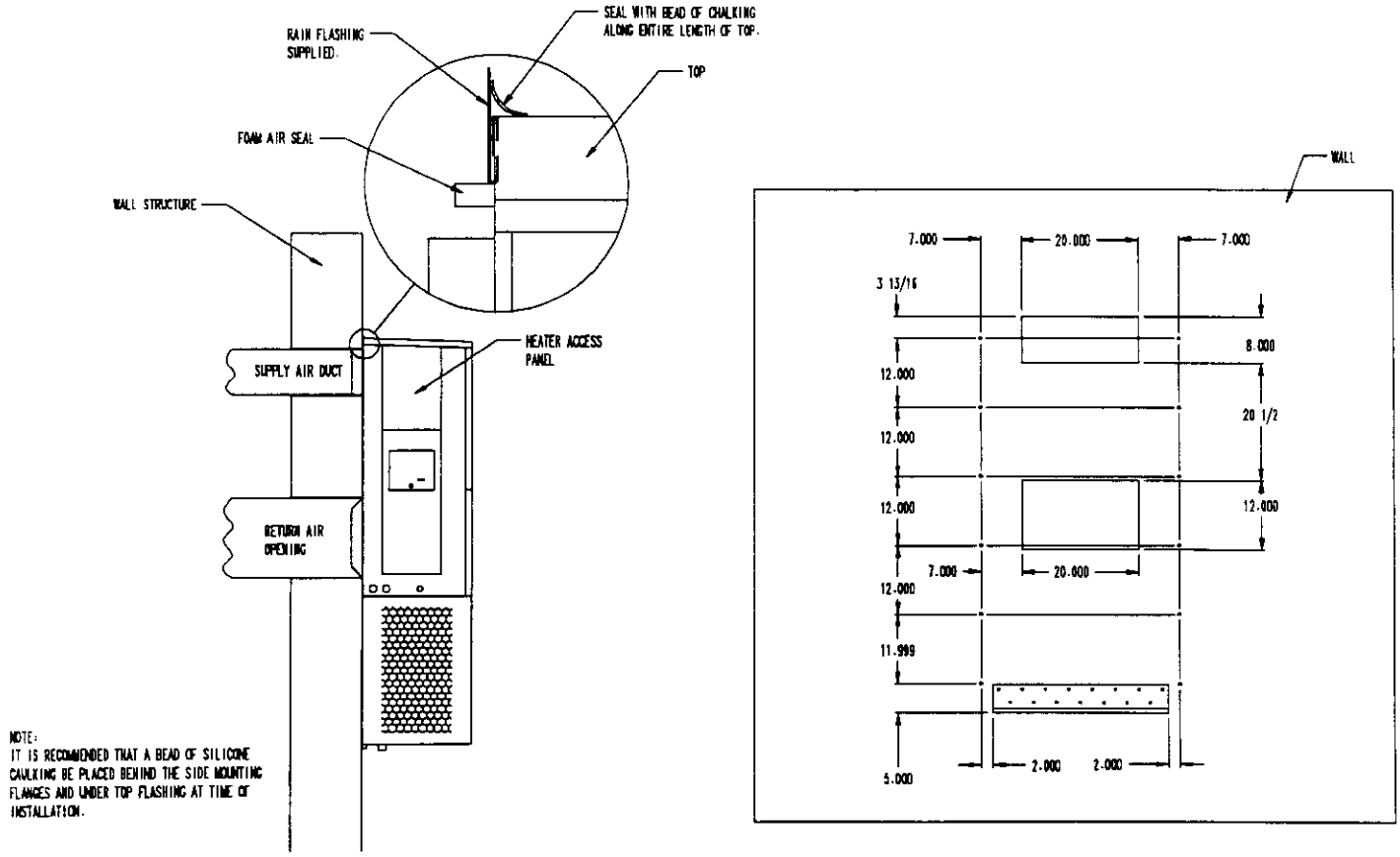


FIGURE 4 – WALL-MOUNTING INSTRUCTIONS

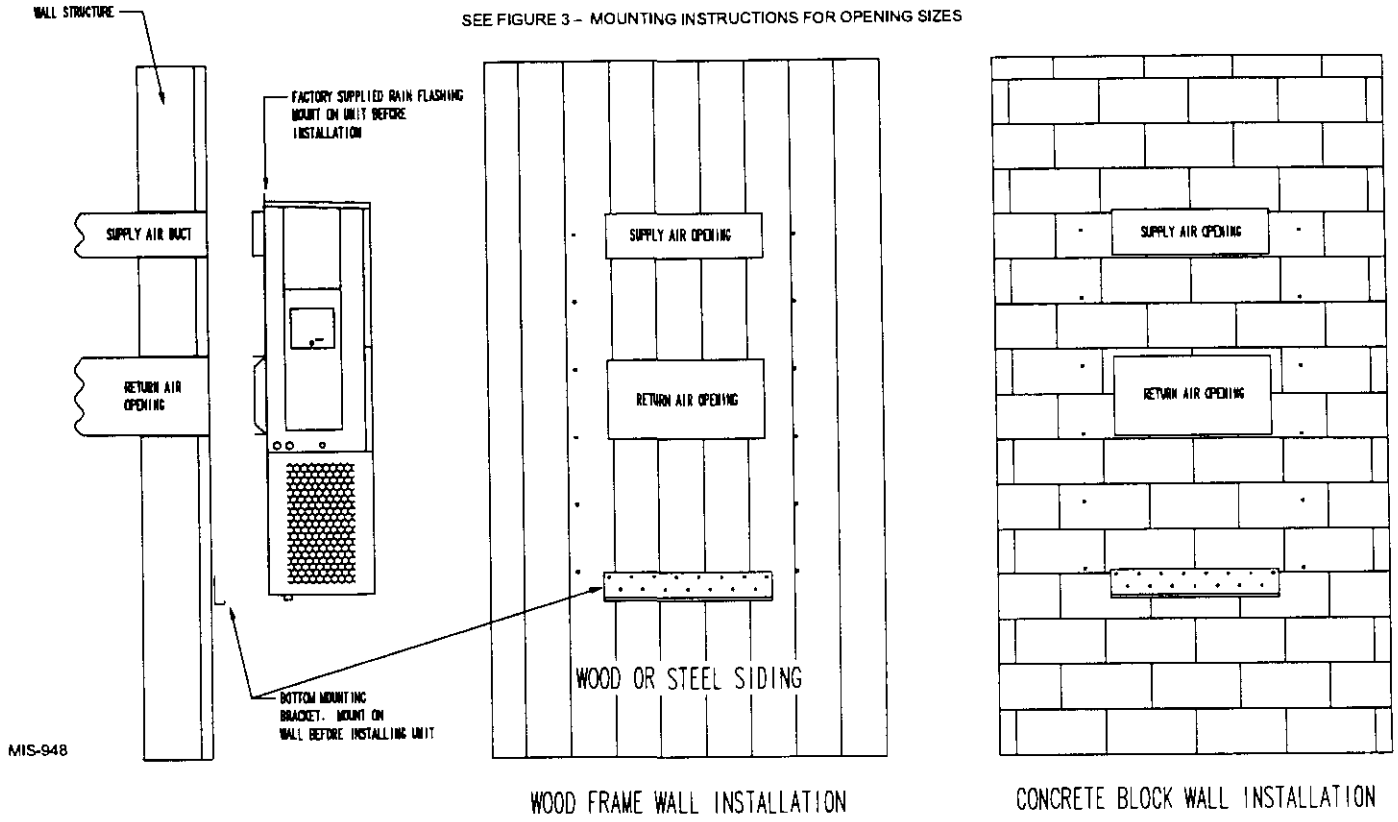


FIGURE 5 – WALL-MOUNTING INSTRUCTIONS

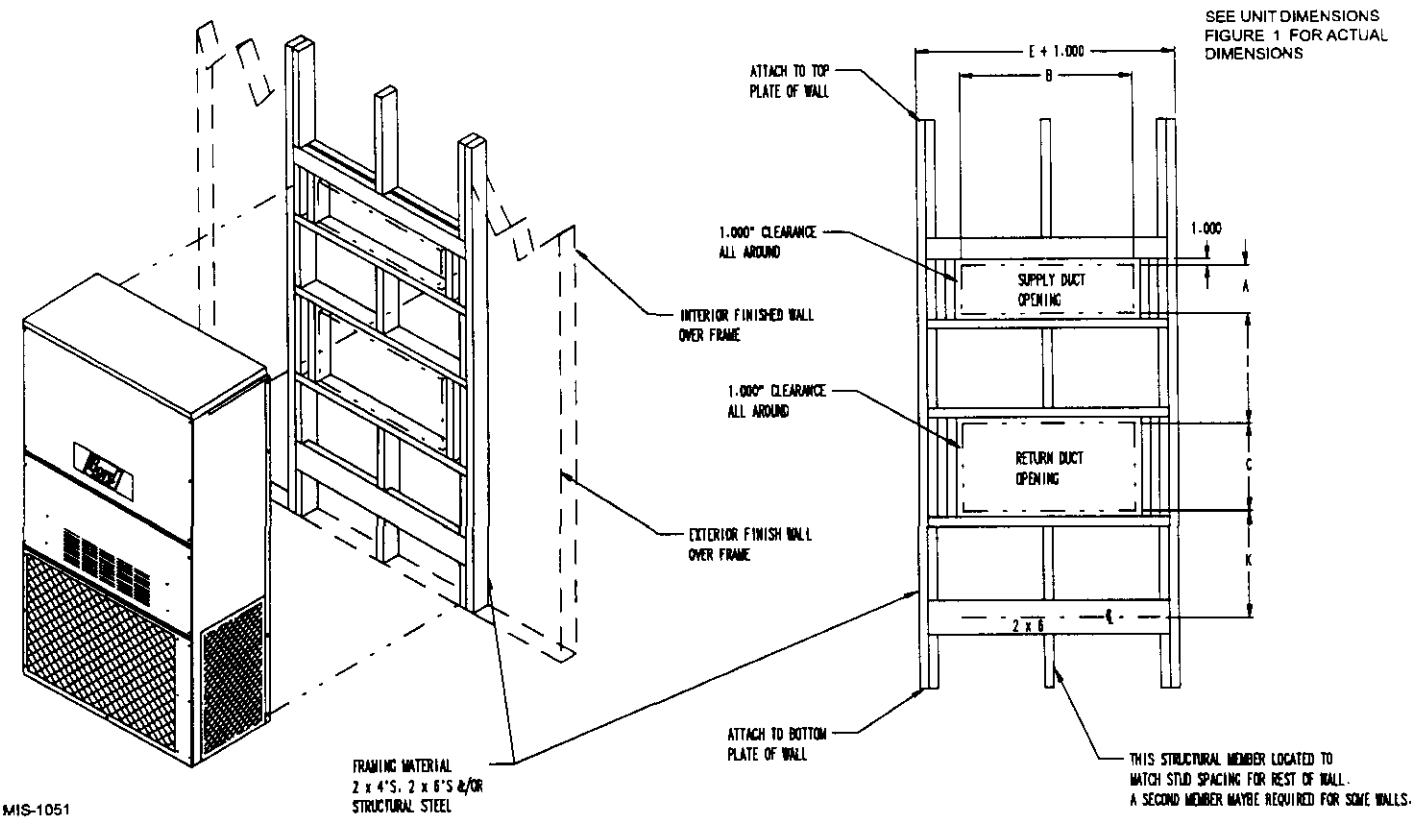
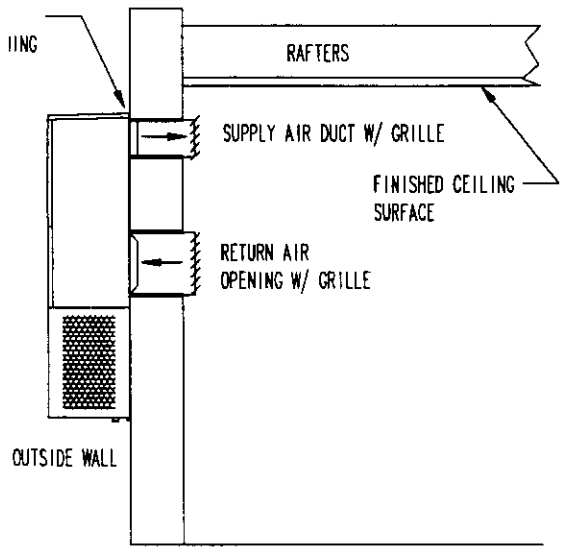
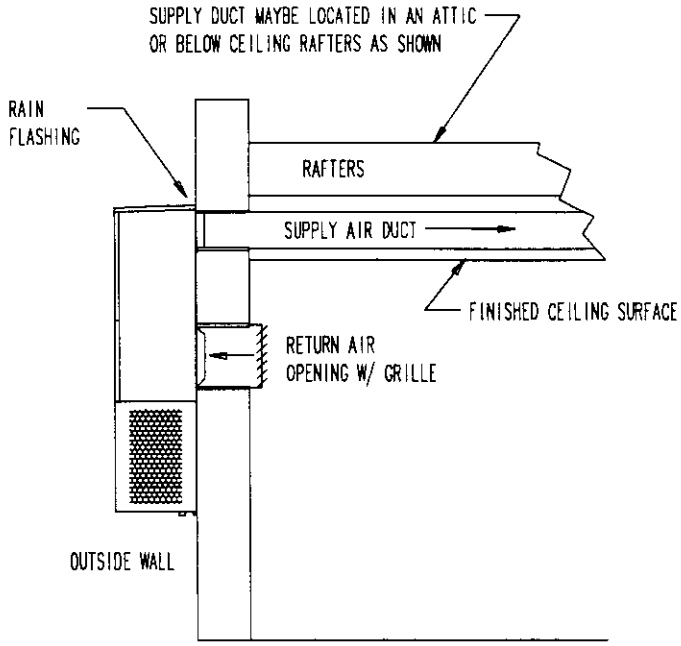


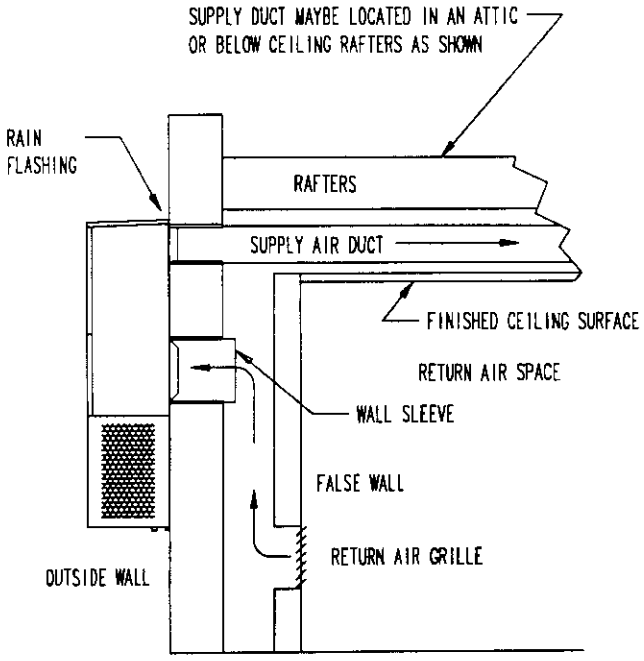
FIGURE 6 – COMMON WALL-MOUNTING INSTALLATIONS



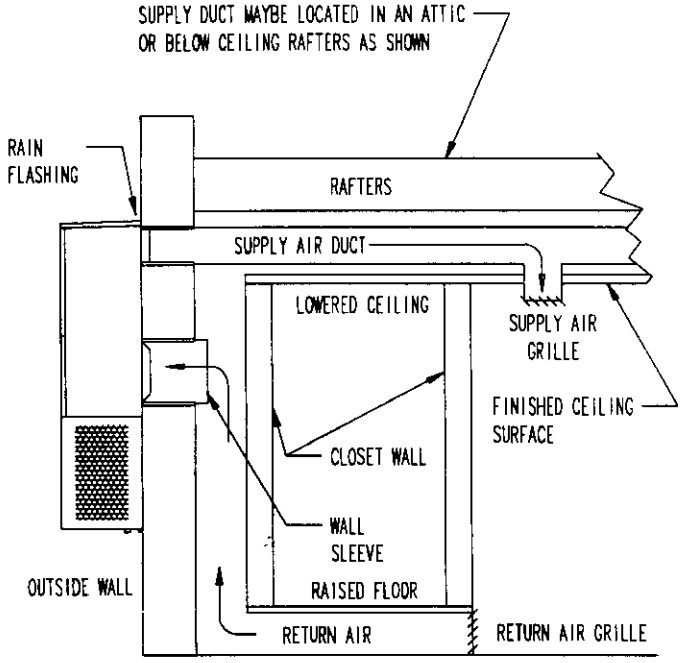
FREE AIR FLOW
NO DUCT



DUCTED SUPPLY
RETURN AT UNIT



FALSE WALL INSTALLATION



CLOSET INSALLATION

MIS-1050

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 (NEC) for complete current carrying capacity data on the various insulation grades of wiring material. All wiring must conform to NEC and all local codes.

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.

The disconnect access door on this unit may be locked to prevent unauthorized access to the disconnect. To convert for the locking capability, bend the tab located in the bottom left hand corner of the disconnect opening under the disconnect access panel straight out. This tab will now line up with the slot in the door. When shut, a padlock may be placed through the hole in the tab preventing entry.

Wiring — Low Voltage Wiring

230/208V – 1 phase and 3 phase equipment dual primary voltage transformers. All equipment leaves the factory wired on 240V tap. For 208V operation, reconnect from 240V to 208V tap. The acceptable operating voltage range for the 240V and 208V taps are:

TAP	RANGE
240	253 – 216
208	220 – 187

NOTE: The voltage should be measured at the field power connection point in the unit and while the unit is operating at full load (maximum amperage operating condition).

Five (5) wires should be run from thermostat subbase to the 24V terminal board in the unit. A five conductor, 18 gauge copper, color-coded thermostat cable is recommended. The connection points are shown in Figure 8.

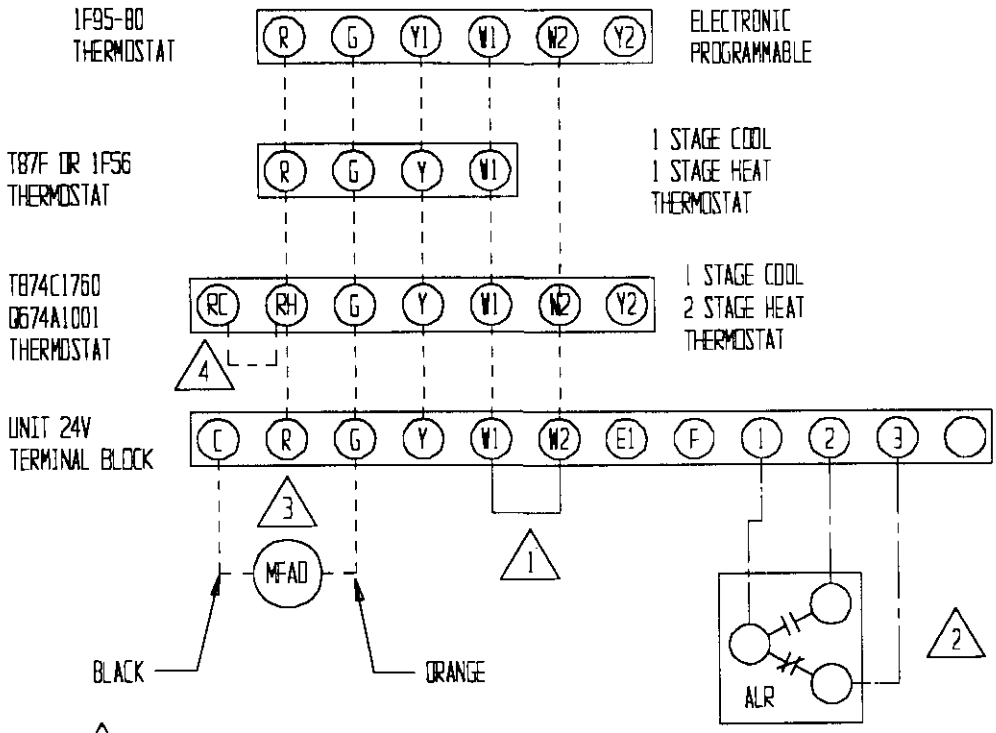
TABLE 3 – THERMOSTAT WIRE SIZE

Transformer VA	FLA	Wire Gauge	Maximum Distance in Feet
55	2.3	20 Gauge	45
		18 Gauge	60
		16 Gauge	100
		14 Gauge	160
		12 Gauge	250

TABLE 3A – WALL THERMOSTAT and SUBBASE COMBINATIONS

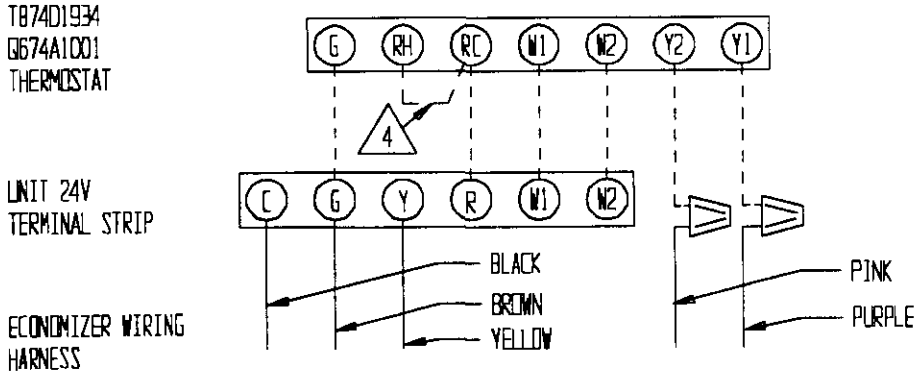
Thermostat	Subbase	Predominate Features
8403-019 T874C1760	8404-012 Q674A1001	1 stage cool, 2 stage heat System: heat-auto-cool Fan: on-auto
8403-002 T87F3111	8404-003 Q539A1220	1 stage heat, 1 stage cool System: heat-off-cool Fan: on-auto
8403-009 1F56-318	- - - - -	1 stage heat, 1 stage cool
8403-035 1F05-80	- - - - -	2 stage cool, 2 stage heat Programmable Electronic

LOW VOLTAGE WIRING DIAGRAM – FIGURE 8



1. REMOVE JUMPER FOR 2 STAGE ELECTRIC HEAT ON UNITS WITH 15 OR MORE KW
2. OPTIONAL ALARM RELAY PROVIDED ON UNITS WITH CONTROL MODULE "M" OR "J" INSTALLED. CONTACT RATING 24VAC @ 125VA
3. OPTIONAL MOTORIZED FRESH AIR DAMPER SUGGESTED HOOK UP
4. FIELD INSTALLED PER INSTALLATION

OPTIONAL ECONOMIZER LOW VOLTAGE WIRING



IMPORTANT INSTALLER NOTE

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

CRANKCASE HEATERS

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

All 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.

The decal in Figure 9 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 9 – START-UP LABEL

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

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 – Circuit R-W1 make at the thermostat pulling in heat contact for the strip heat and blower operation. On a call for second stage heat, R-W2 makes bringing on second heat contactor, if so equipped.

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. It is imperative to match the correct pressure curve to the unit by model number.

Troubleshooting

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.

Figure 10 – Fan Blade Setting

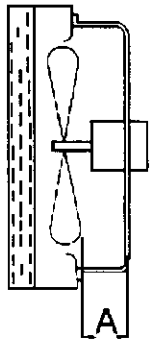


TABLE 4 – FAN BLADE DIMENSIONS

Model	Dimension A
WL181 WL241	1.00

Removal of Fan Shroud

1. Disconnect all power to unit.
2. Remove the screws holding both grills – one on each side of unit – and remove grills.
3. Remove screws holding fan shroud to condenser and bottom – 9 screws.
4. Unwire condenser fan motor.
5. Slide complete motor, fan blade, and shroud assembly out the right side of the unit.
6. Service motor/fan as needed.
7. Reverse steps to reinstall.

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 inches from compressor) as shown in Table 5.

TABLE 5 – SUCTION LINE TEMPERATURES

Model	Rated Airflow	95° F ODTemperature	82° F ODTemperature
WL181	650	51 – 53	63 – 65
WL241	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 6 – INDOOR BLOWER PERFORMANCE – CFM at 230V

E.S.P. in H_2O	WL181, WL241
	230V Dry / Wet
.0	1020 / 975
.1	960 / 905
.2	865 / 800
.3	820 / 735
.4	735 / 650
.5	615 / 535

TABLE 7 – CFM and ESP

Model	Rated CFM*	Rated ESP*	Recommended Airflow Range
WL181	650	.40	575 – 725
WL241	800	.20	700 – 950
* Rated CFM and ESP on high speed tap.			

TABLE 8 – MAXIMUM ESP of OPERATION ELECTRIC HEAT ONLY

Model		ESP
WL181 WL241	A0Z	.50
	A05	.50
	A08	.50
	A10	.50
WL241	B00	.50
	B06	.50
Values shown are for units equipped with standard 1" throw-away filter or 1" washable filter. Derate ESP by .15 for 2" pleated filters.		

TABLE 9 – COOLING PRESSURE – OUTDOOR TEMPERATURE °F

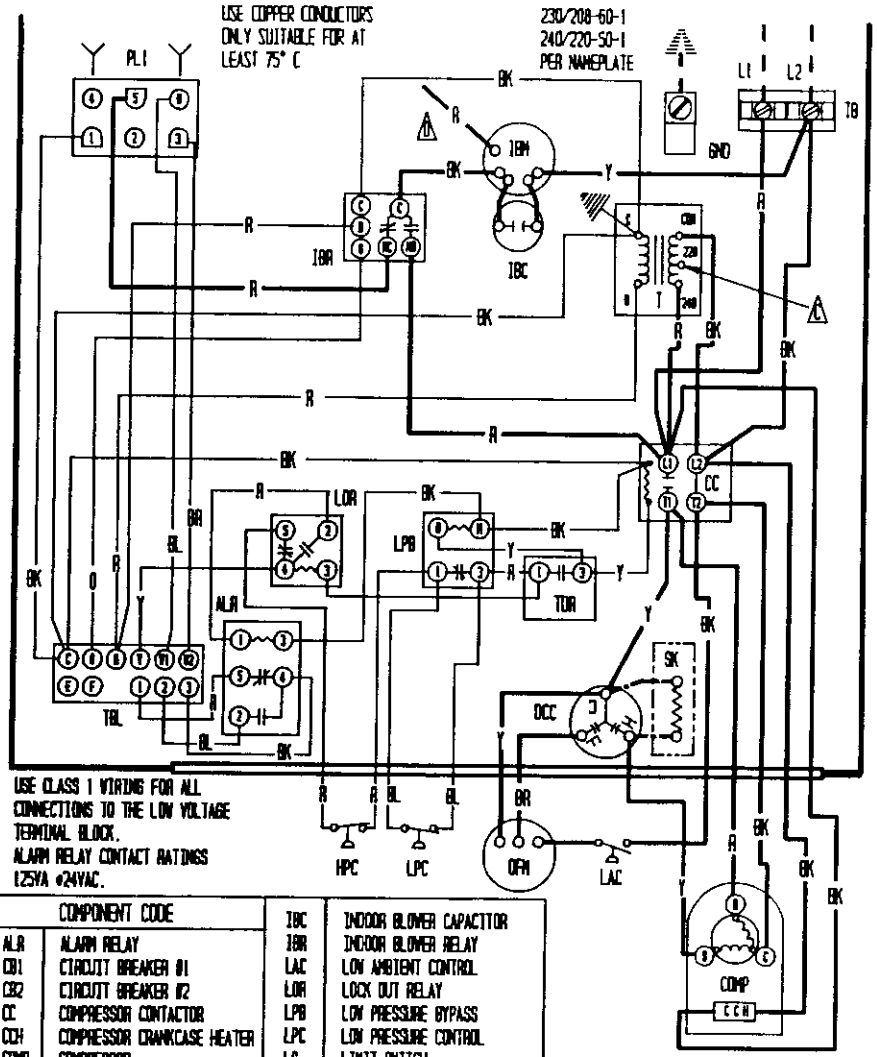
Model	Return Air Temperature	Pressure	75°	80°	85°	90°	95°	100°	105°	110°	115°	120°	125°
WL181	75° DB 62° WB	Low Side High Side	71 194	73 208	75 223	77 238	79 253	81 268	82 284	84 299	85 315	86 330	88 346
	80° DB 67° WB	Low Side High Side	76 199	78 214	80 229	83 244	84 259	86 275	88 291	90 307	91 323	93 339	95 355
	85° DB 72° WB	Low Side High Side	81 206	84 221	86 237	89 253	91 268	93 285	95 301	96 318	98 334	100 350	102 367
WL241	75° DB 62° WB	Low Side High Side	72 198	75 214	78 230	80 246	82 261	84 276	86 291	87 305	89 319	91 334	93 348
	80° DB 67° WB	Low Side High Side	74 211	77 229	80 246	82 263	84 280	86 295	88 311	90 326	91 341	93 356	95 371
	85° DB 72° WB	Low Side High Side	77 227	80 246	83 265	85 283	87 300	89 318	91 334	93 351	94 367	96 384	98 400

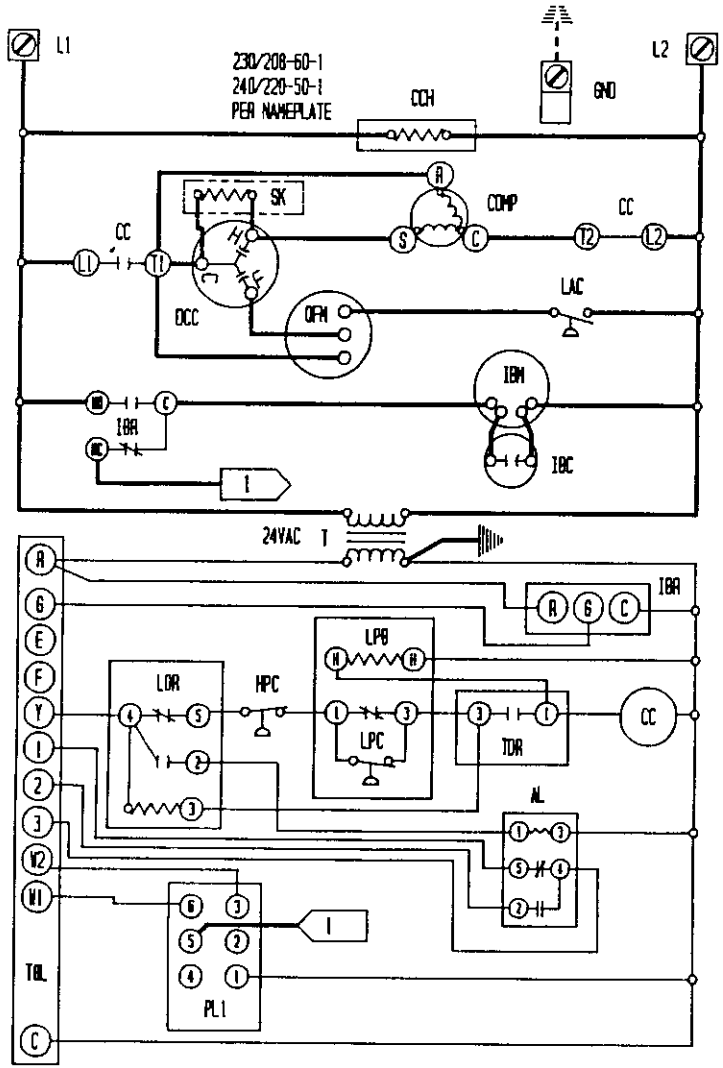
Low side pressure ± 2 PSIG
High side pressure ± 5 PSIG

Table 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 10 – OPTIONAL ACCESSORIES

Part Number	Description	WL181-A	WL241-A	WL241-B
BOP-2	Blank Off Plate	X	X	X
BFAD-2 MFAD-2	Barometric Fresh Air Damper Motorized Fresh Air Damper	X X	X X	X X
CRV-2	Commercial Room Ventilator	X	X	X
EIFM-2	Economizer With Exhaust	X	X	X
CMC-15	Start Kit	X	X	N/A





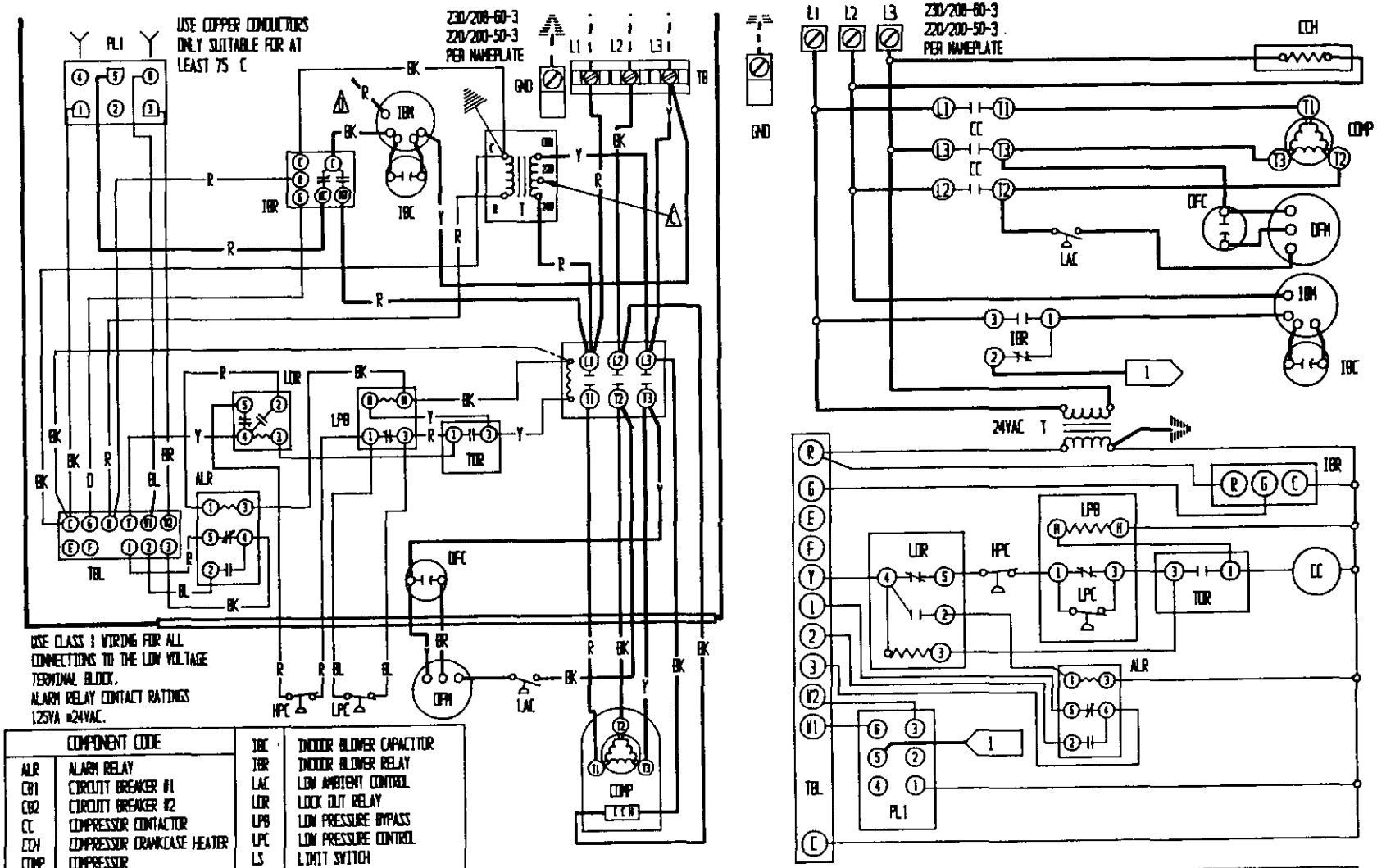
COMPONENT CODE			
ALR	ALARM RELAY	IBC	INDOOR BLOWER CAPACITOR
CB1	CIRCUIT BREAKER #1	IBR	INDOOR BLOWER RELAY
CB2	CIRCUIT BREAKER #2	LAC	LOW AMBIENT CONTROL
CC	COMPRESSOR CONTACTOR	LOR	LOCK OUT RELAY
CCH	COMPRESSOR CRANKCASE HEATER	LPB	LOW PRESSURE BYPASS
COMP	COMPRESSOR	LPC	LOW PRESSURE CONTROL
OCC	DUAL CAN CAPACITOR	LS	LIMIT SWITCH
GND	EQUIPMENT GROUND	OFM	OUTDOOR FAN MOTOR
H1	HEAT STRIP #1	PL1	PLUG #1
H2	HEAT STRIP #2	SK	START KIT
HC1	HEATER CONTACTOR #1	T	TRANSFORMER
HC2	HEATER CONTACTOR #2	TB	TERMINAL BLOCK
HPC	HIGH PRESSURE CONTROL	TBL	LOW VOLTAGE TERMINAL BLOCK
IBC	INDOOR BLOWER CAPACITOR	TCO	THERMAL CUTOFF
		TDR	TIME DELAY RELAY

⚠ MOVE RED WIRE TO 208V TAP FOR 208V OPERATION ⚠ RED (LOW) BLACK (HIGH)

	FACTORY STD.	FIELD	OPTIONAL
HIGH VOLTAGE	———	– – –	-·-·-
LOW VOLTAGE	———	– – –	------
ACCESSORY			------

COLOR CODE							
BK	BLACK	Y	YELLOW	V	VIOLET	T	TAN
BR	BROWN	G	GREEN	(PR)	PURPLE	PK	PINK
R	RED	BL	BLUE	GY	GRAY	L	LAVENDER
O	ORANGE	W	WHITE	(S)	SLATE		

BARD MFG. CO.	
DWG.	4095-111 C
DATE	5-12-92
CHK./APPR.	



COMPONENT CODE			
ALR	ALARM RELAY	IBC	INDOOR BLOWER CAPACITOR
CB1	CIRCUIT BREAKER #1	IBR	INDOOR BLOWER RELAY
CB2	CIRCUIT BREAKER #2	LAC	LOW AMBIENT CONTROL
CC	COMPRESSOR CONTACTOR	LOR	LOCK OUT RELAY
CCH	COMPRESSOR CRANKCASE HEATER	LPB	LOW PRESSURE BYPASS
COMP	COMPRESSOR	LPC	LOW PRESSURE CONTROL
DCC	DUAL CAN CAPACITOR	LS	LIMIT SWITCH
GND	EQUIPMENT GROUND	OFM	OUTDOOR FAN MOTOR
H1	HEAT STRIP #1	PL1	PLUG #1
H2	HEAT STRIP #2	SK	START KIT
HC1	HEATER CONTACTOR #1	T	TRANSFORMER
HC2	HEATER CONTACTOR #2	TB	TERMINAL BLOCK
HPC	HIGH PRESSURE CONTROL	TBL	LOW VOLTAGE TERMINAL BLOCK
IBC	INDOOR BLOWER CAPACITOR	TCO	THERMAL CUTOFF
		TDR	TIME DELAY RELAY

⚠ MOVE RED WIRE TO 208V TAP FOR 208V OPERATION ⚠ RED (LOW) BLACK (HIGH)

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

COLOR CODE							
BK	BLACK	Y	YELLOW	V	VIOLET	T	TAN
BR	BROWN	G	GREEN	(PR)	PURPLE	PK	PINK
R	RED	BL	BLUE	GY	GRAY	L	LAVENDER
O	ORANGE	W	WHITE	(S)	SLATE		

BARD MFG. CO.

4095-211 D