

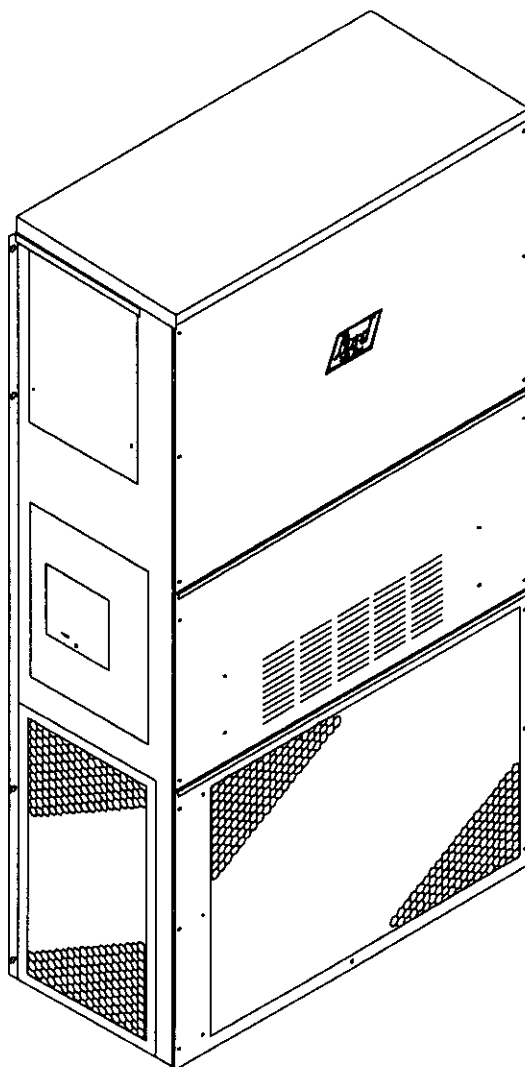
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# Installation Instructions

# Wall Mounted Packaged Air Conditioner

Models: WL301, WL361

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WIS-661



Bard Manufacturing Company  
Bryan, Ohio 43506

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

Manual No.: 2100-272B  
File: Volume III, Tab 16  
Date: 05/15/96

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# Getting Other Information and Publications

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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**  
1513 16th Street N.W.  
Washington, DC 20036  
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

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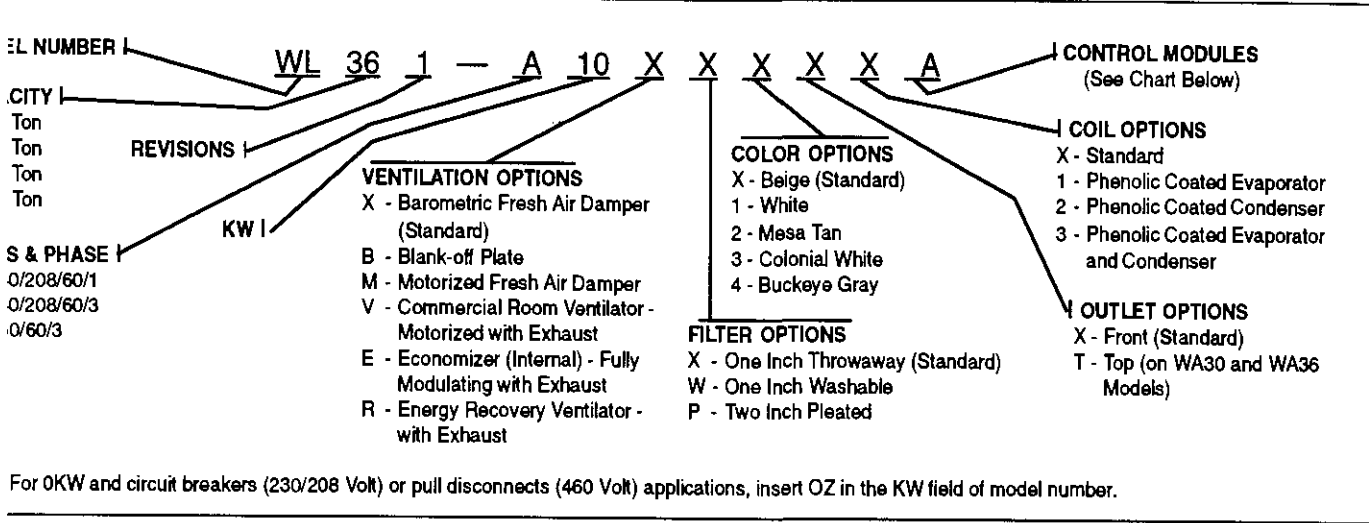
Manufactured under the following U.S. patent numbers:

5,301,744; 5,002,116; 4,924,934; 4,875,520; 4,825,936; 4,432,409

Other patents pending.

# Wall Mount General Information

## Conditioner Wall Mount Model Nomenclature



### Electrical Specifications

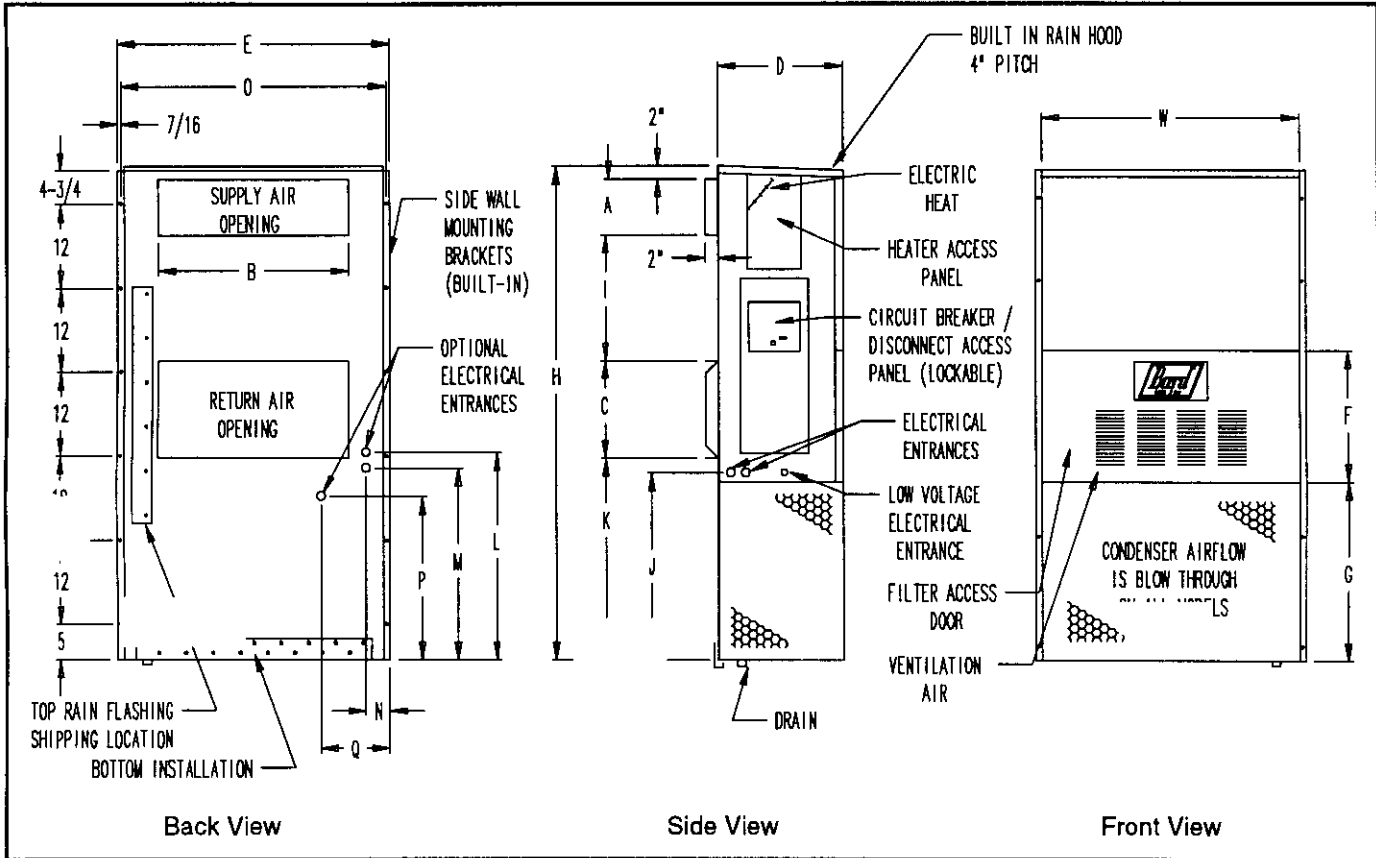
S	RATED VOLTS & PHASE	NO. FIELD POWER CIRCUITS	③ MINIMUM CIRCUIT AMPACITY	① MAXIMUM EXTERNAL FUSE OR CKT. BREAKER		② FIELD POWER WIRE SIZE	② GROUND WIRE SIZE	③ MINIMUM CIRCUIT AMPACITY		① MAXIMUM EXTERNAL FUSE OR CKT. BREAKER		② FIELD POWER WIRE SIZE		② GROUND WIRE SIZE	
				CKTA	CKT.B			CKTA	CKT.B	CKTA	CKT.B	CKTA	CKT.B		
														CKTA	CKT.B
A00, A0Z	230/208-1	1	24	35	8	10	—	—	—	—	—	—	—	—	—
A05		1	31	35	8	10	—	—	—	—	—	—	—	—	—
A10		1	57	60	6	10	—	—	—	—	—	—	—	—	—
A15		1 or 2	83	90	4	8	55	26	60	30	4	10	8	10	
B00, B0Z	230/208-3	1	17	20	12	12	—	—	—	—	—	—	—	—	—
B09		1	32	35	8	10	—	—	—	—	—	—	—	—	—
B15		1	50	50	8	10	—	—	—	—	—	—	—	—	—
C00, C0Z	460-3	1	10	15	14	14	—	—	—	—	—	—	—	—	—
C09		1	17	20	12	12	—	—	—	—	—	—	—	—	—
C15		1	26	30	10	10	—	—	—	—	—	—	—	—	—
A00, A0Z	230/208-1	1	27	35	8	10	—	—	—	—	—	—	—	—	—
A05		1	31	35	8	10	—	—	—	—	—	—	—	—	—
A10		1	57	60	6	10	—	—	—	—	—	—	—	—	—
A15		1 or 2	83	90	4	8	55	26	60	30	4	10	8	10	
B00, B0Z	230/208-3	1	20	25	10	10	—	—	—	—	—	—	—	—	—
B09		1	32	35	8	10	—	—	—	—	—	—	—	—	—
B15		1	50	50	8	10	—	—	—	—	—	—	—	—	—
C00, C0Z	460-3	1	10	15	14	14	—	—	—	—	—	—	—	—	—
C09		1	17	20	12	12	—	—	—	—	—	—	—	—	—
C15		1	26	30	10	10	—	—	—	—	—	—	—	—	—

Minimum size of the time delay fuse or HACR type circuit breaker for protection of field wiring conductors.  
 based on 75°C copper wire. All wiring must conform to the National Electrical Code and all local codes.  
 \*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 three conductors are in a raceway.

**Table 2 — Dimensions of Basic Unit for Architectural and Installation Requirements (Nominal)**

UNIT	WIDTH	DEPTH	HEIGHT	SUPPLY		RETURN		E	F	G	I	J	K	L	M	N	O	P	Q
	(W)	(D)	(H)	A	B	C	B												
WL30C	7/8	16-7/8	70-1/2	7-7/8	127-7/8	13-7/8	27-7/8	39-7/8	18-1/4	25-3/4	18	26-3/4	28-3/4	29-1/4	27	2-9/16	39	22-3/4	9
WL30t																			

All dimensions are in inches



**Figure 1 — Unit Dimensions**

**Table 3 — Electric Heat Table**

MODELS	WL301-A, WL361-A				WL301-B, WL361-B				WL301-C, WL361-C	
	240V-1		208V-1		240V-3		208V-3		460V-3	
KW	AMPS	BTUH	AMPS	BTUH	AMPS	BTUH	AMPS	BTUH	AMPS	BTUH
5.0	20.8	17,065	18.1	12,800						
10.0	41.6	34,130	36.2	25,600						
5.0	62.5	51,200	54.1	38,400						
9.0					21.7	30,600	18.7	23,030		
5.0									18.0	51,200

## 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

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. 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 .10 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 1-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.



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## CAUTION

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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.

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Any grille that meets the 5/8 inch louver criteria, may be used. It is recommended that Bard Return Air Grille Kit RG2 thru RG5 or RFG2 thru RFG5 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 panel.

If 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.

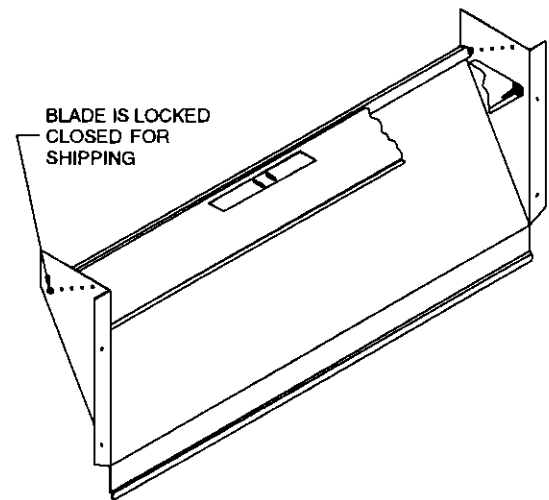


Figure 2 - Blower Damper Assembly

# Installation Instructions

## Wall Mounting Information

1. Two holes, for the supply and return air openings, must be cut through the wall as shown in Figure 3.
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.



### WARNING

Fire hazard can result if 1/4 inch clearance to combustible materials for supply air duct is not maintained. See Figure 3.

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. 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. The unit itself is suitable for "0" inch clearance, but the supply air duct flange and the first 3 feet of supply air duct require a minimum of 1/4-inch clearance to combustible material. If a combustible wall, use a minimum of 28-1/2" x 8-1/2" dimensions for sizing. However, it is generally recommended that a 1-inch clearance is used for ease of installation and maintaining the required clearance to combustible material. The supply air opening would then be 30" x 10". See Figures 3 and 7 for details.



### WARNING

Failure to provide the 1/4-inch clearance between the supply duct and a combustible surface for the first 3 feet of duct can result in fire.

3. Locate and mark lag bolt locations and bottom mounting bracket location. See Figure 3.
4. Mount bottom mounting bracket.
5. Hook top rain flashing under back bend of top. Top rain flashing is shipped secured to the right side of the back.
6. Position unit in opening and secure with 5/16 lag bolts; use 7/8-inch diameter flat washers on the lag bolts.
7. Secure rain flashing to wall and caulk across entire length of top. See Figure 3.
8. 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.

9. 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. Additional clearance may be required to meet local or national codes.

## 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:

Table 4 — Operating Voltage Range

TAP	RANGE
240V	253 - 216
208V	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

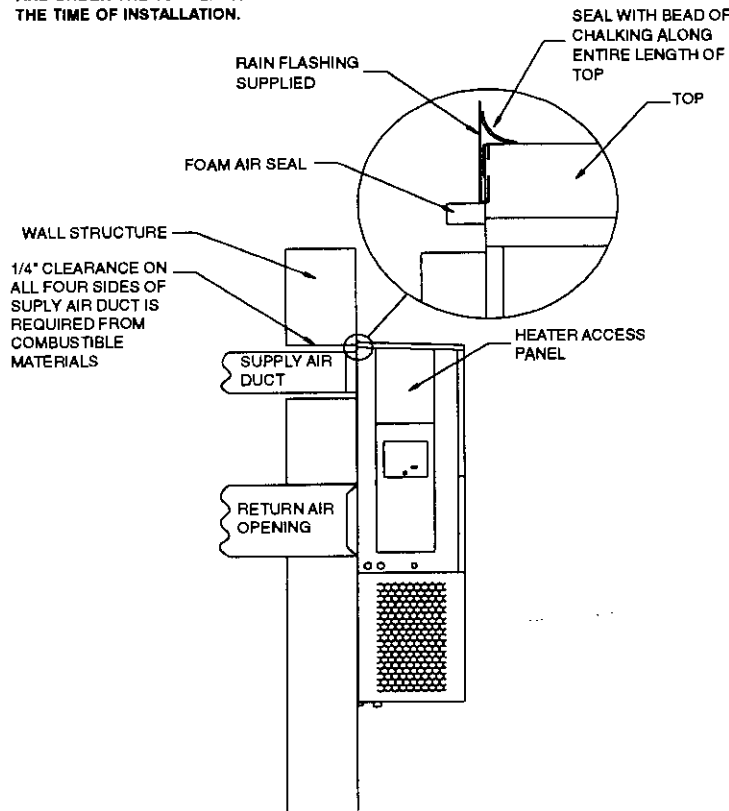
**Table 5 — Thermostat Wire Size**

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

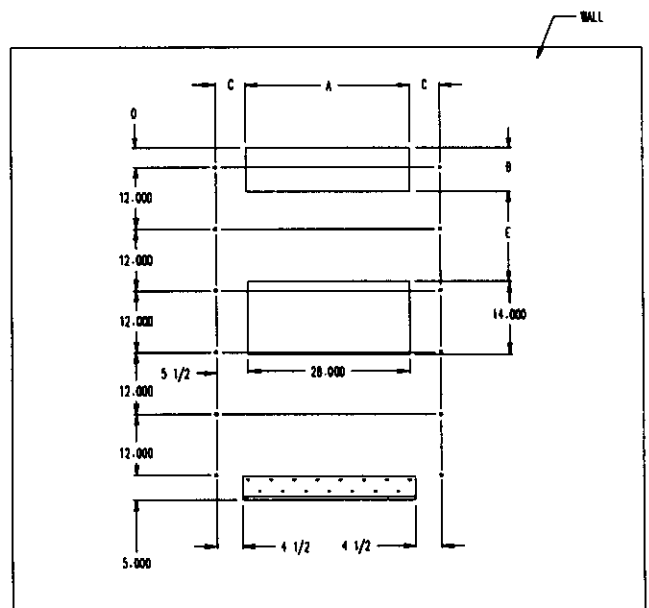
**Table 6 — Wall Thermostat and Subbase Combinations**

FEATURES	THERMOSTAT	SUBBASE	PREDOMINATE
8403-002	8404-003		1 stage cool, 1 stage heat
T87F3111	Q539A1220		System: heat-off-cool Fan: auto-on
8403-009	—		1 stage heat, 1 stage cool
1F56-318			
8403-019	8404-012		1 stage heat, 2 stage cool
T874C1760	Q674A1001		System: heat-auto-cool Fan: auto-on
8403-021	8404-012		2 stage cool, 2 stage heat
T874D1934	Q674A1001		System: heat-auto-cool Fan: auto-on
8403-035	—		2 stage cool, 2 stage heat, electronic
1F95-80			7 day programming

NOTE: IT IS RECOMMENDED THAT A BEAD OF SILICONE CAULKING BE PLACED BEHIND THE SIDE MOUNTING FLANGES AND UNDER THE TOP FLASHING AT THE TIME OF INSTALLATION.

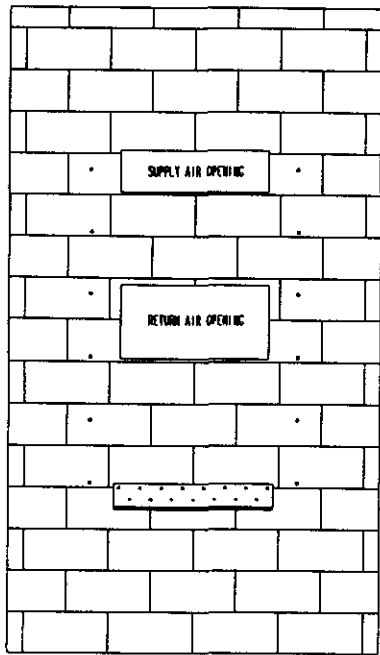


	A	B	C	D	E
REQUIRED DIMENSIONS TO MAINTAIN 1/4\"/>					
REQUIRED DIMENSIONS TO MAINTAIN RECOMMENDED 1\"/>					

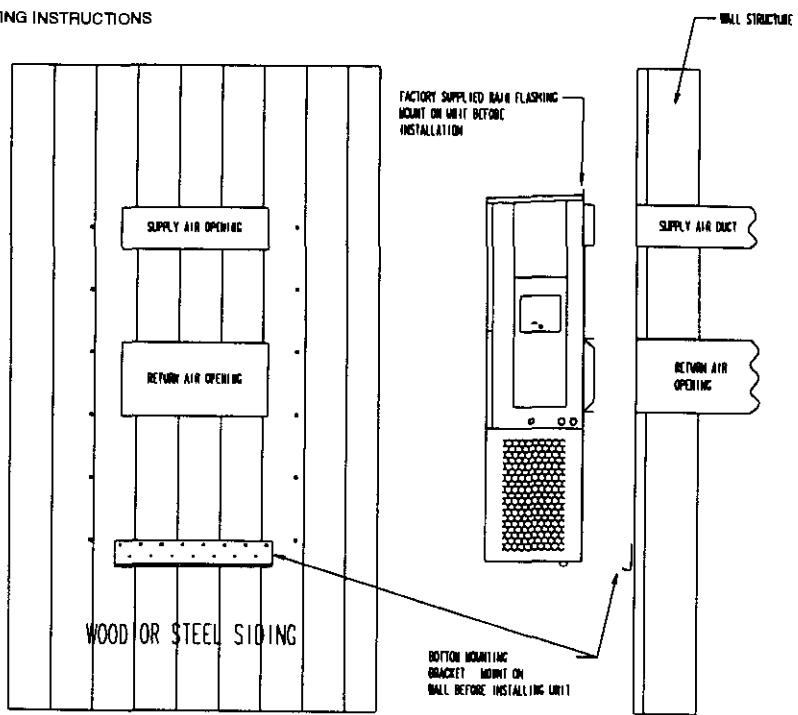


**Figure 3 — Mounting Instructions**

SEE FIGURE 3 FOR MOUNTING INSTRUCTIONS



CONCRETE BLOCK WALL INSTALLATION



WOOD FRAME WALL INSTALLATION

Figure 4 – Wall-Mounting Instructions

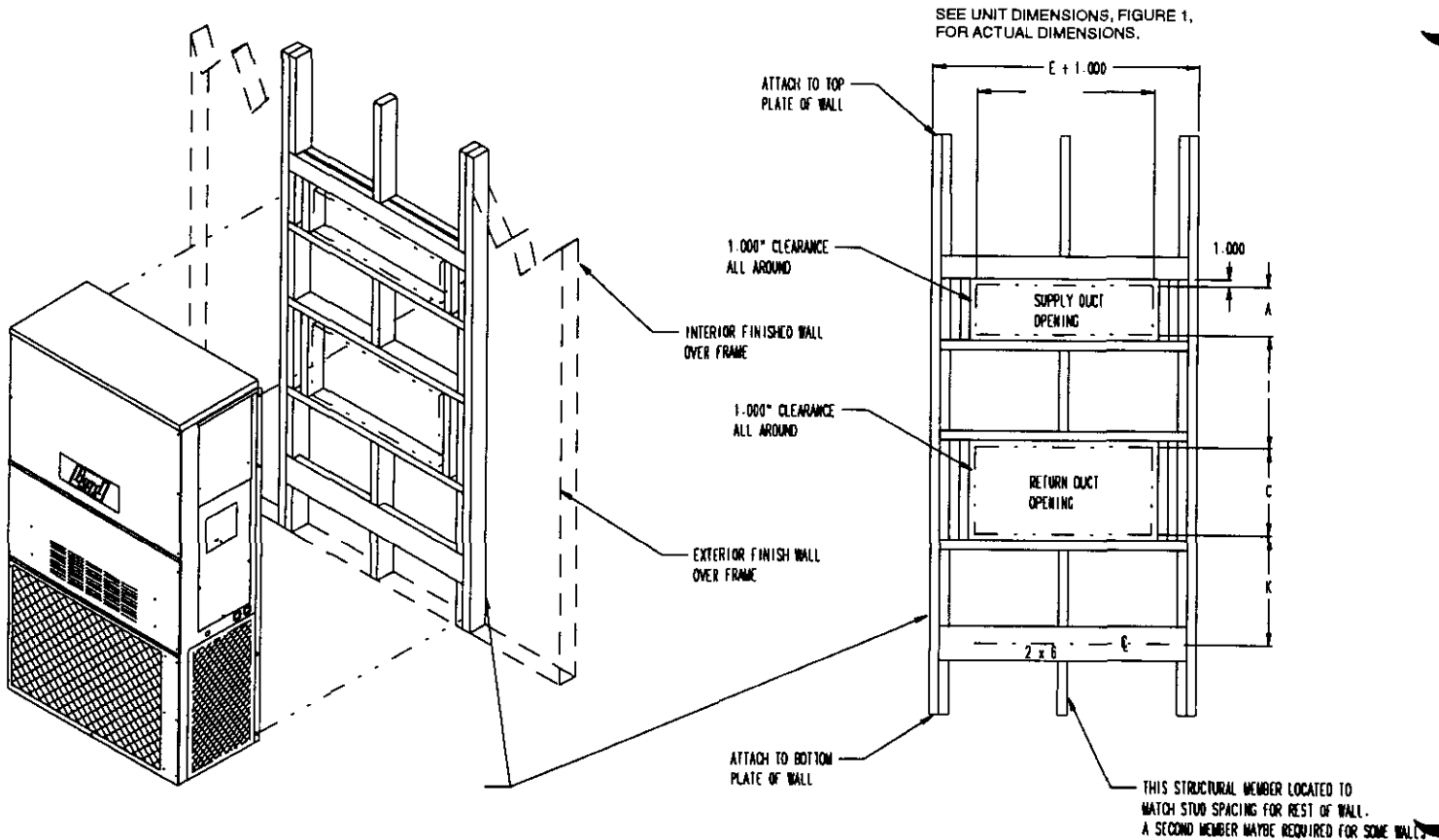
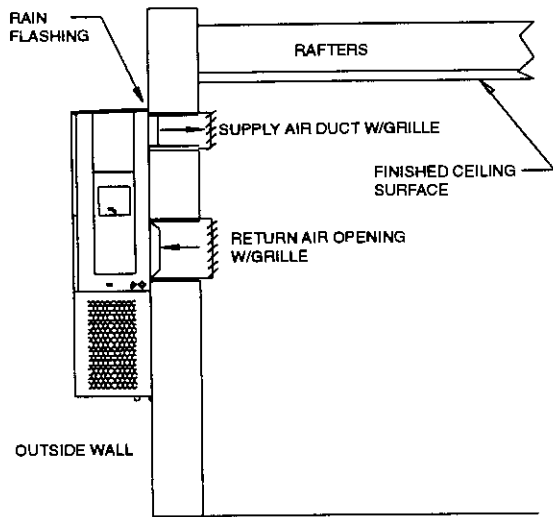
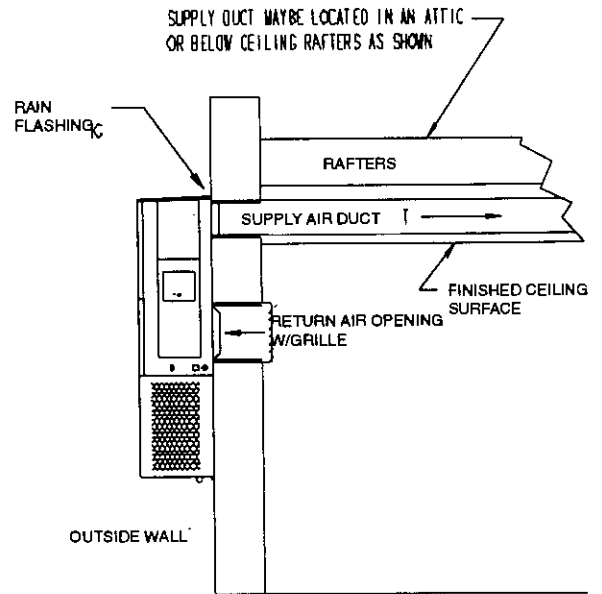


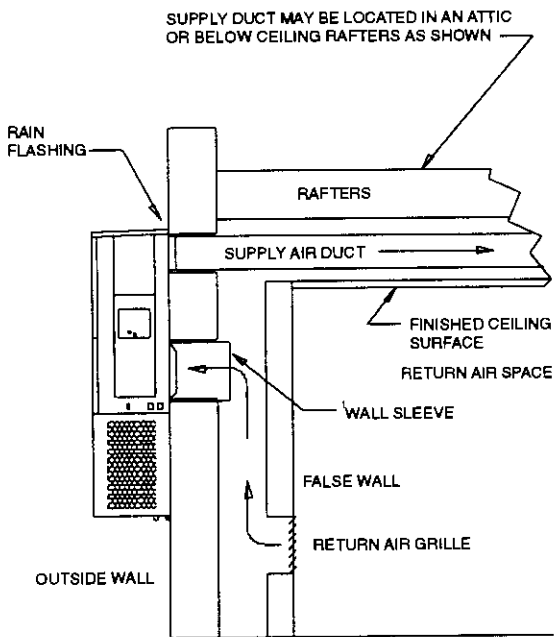
Figure 5 – Wall-Mounting Instructions



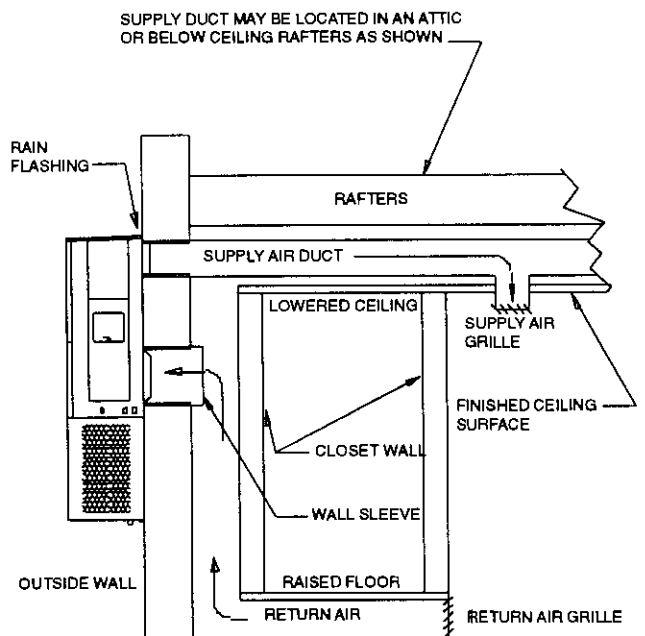
FREE AIR FLOW  
NO DUCT



DUCTED SUPPLY  
RETURN AT UNIT

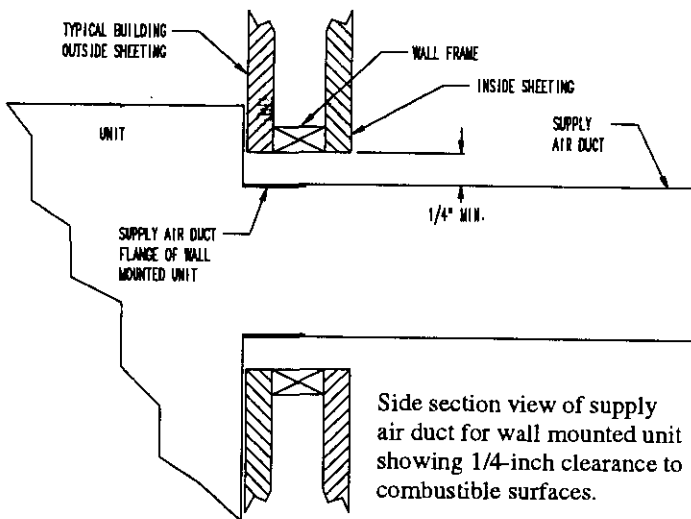


FALSE WALL INSTALLATION



CLOSET INSTALLATION

Figure 6 – Common Wall-Mounting Installations

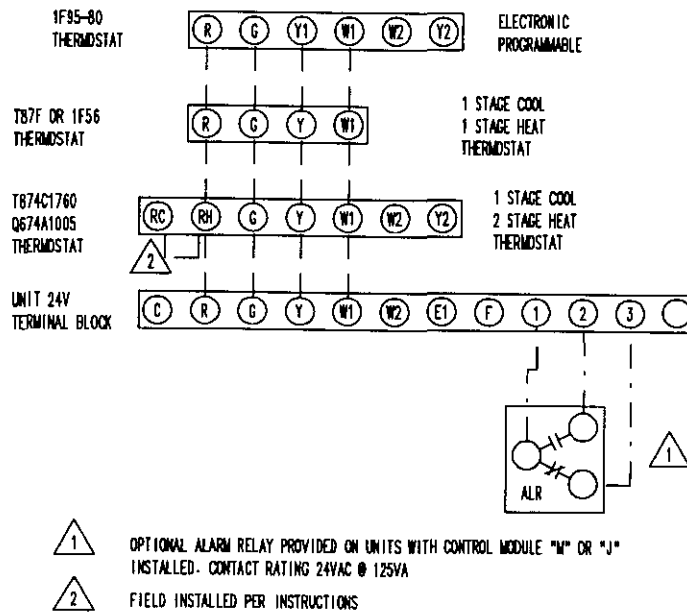


## WARNING

- A minimum of 1/4-inch clearance must be maintained between the supply air duct and combustible materials. This is required for the first 3-feet of ducting.
- It is important to insure that the 1/4-inch minimum spacing is maintained at all points.
- Failure to do this could result in overheating the combustible material and may result in fire.

Figure 7 — Electric Heat Clearance

### LOW VOLTAGE WIRING



### OPTIONAL ECONOMIZER LOW VOLTAGE WIRING

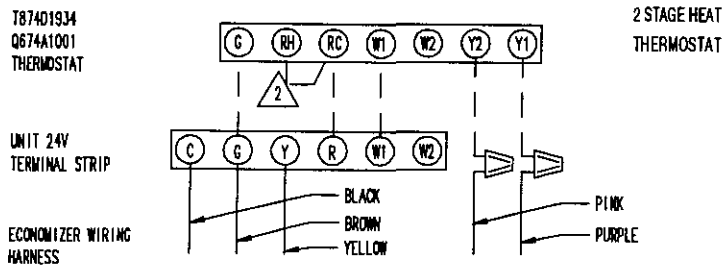


Figure 8 — Wiring

# Start Up

## 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.

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.

Figure 9 — Start-Up Label

**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.

7961-061

## 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 remote reset high pressure switch. Turn thermostat off, then on to reset the 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 they are the correct rating.
5. 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. On a call for 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.

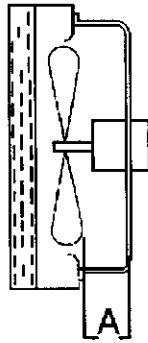


Figure 10 – Fan Blade Setting

Table 7 — Fan Blade Dimensions

MODEL	DIMENSION A
WA301	1.25
WA361	1.25

## 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 left 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 the following table:

Table 8 — Suction Line Temperatures

MODEL	RATED AIRFLOW	95°F	82°F
		OD TEMPERATURE	OD TEMPERATURE
WA301	1,100	55-57	64-66
WA361	1,100	57-59	62-64

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 9 — Indoor Blower Performance — CFM at 230 Volts

E.S.P. In H <sub>2</sub> O	WL301 WL361	
	HIGH SPEED	LOW SPEED
	DRY / WET COIL	DRY / WET COIL
.0	1,395 / 1,315	950 / 935
.1	1,340 / 1,270	930 / 915
.2	1,285 / 1,190	910 / 885
.3	1,205 / 1,100	855 / 830
.4	1,110 / 1,000	800 / 755
.5	1,005 / 870	—

Table 10 — CFM and ESP

Model	Rated CFM ①	Rated ESP ①	Recommended Airflow Range
WL301	1,100	.30	930 - 1,300
WL361	1,100	.30	930 - 1,350

① Rated CFM and ESP on high speed tap.

Table 11 — Maximum ESP of Operation Electric Heat Only

Model Speed KW	Front Outlet	
	Low Speed	High Speed
A00	.50	.50
A05	.50	.50
A08	.50	.50
A10	.45	.50
A15	.35	.40
B00	.50	.50
B06	.40	.50
B09	.50	.50
B15	.30	.45
C00	.50	.50
C06	.50	.50
C09	.40	.50
C15	.35	.45

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

**Table 12 — Cooling Pressure — Outdoor Temperature °F**

MODEL	D.B./W.B.	COOLING CAPACITY									
		75°	80°	85°	90°	95°	100°	105°	110°	115°	
WL301	75/	Total Cooling	74	77	79	81	82	84	85	85	86
	62	Sensible Cooling	218	232	247	262	277	292	308	325	341
	80/	Total Cooling	80	82	84	86	88	89	91	91	92
	67	Sensible Cooling	223	238	253	268	284	300	316	333	350
	85/	Total Cooling	85	88	91	93	95	96	97	98	99
	72	Sensible Cooling	231	246	262	278	294	310	327	345	362
WL361	75/	Total Cooling	70	72	74	76	78	79	80	81	82
	62	Sensible Cooling	224	242	259	275	290	304	316	328	339
	80/	Total Cooling	75	77	79	81	83	85	86	87	88
	67	Sensible Cooling	229	248	265	282	297	311	325	337	348
	85/	Total Cooling	80	83	85	87	89	91	92	94	95
	72	Sensible Cooling	238	257	275	292	307	322	336	349	360

Low side pressure ±2 psig

High side pressure ±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 charge being in the system, the charge should be removed, system evacuated and recharged to serial plate instructions.

**Table 13 — Optional Accessories**

MODEL	DESCRIPTION	WL301-A	WL361-A	WL301-B	WL361-B	WL301-C	WL361-C
BOP-3	Blank Off Plate	•		•		•	
BFAD-3	Barometric Fresh Air Damper	•		•		•	
MFAD-3	Motorized Fresh Air Damper	•		•		•	
CRV-3	Commercial Ventilator with Exhaust	•		•		•	
EIFM-3	Economizer with Exhaust	•		•		•	
CMC-15	Start Kit	•					







