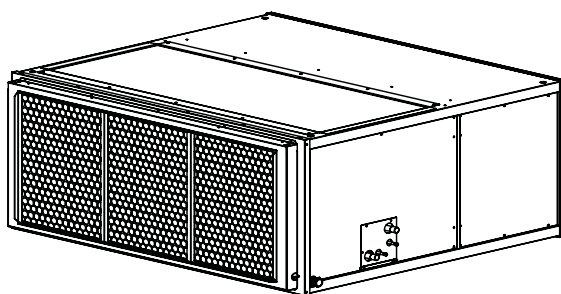


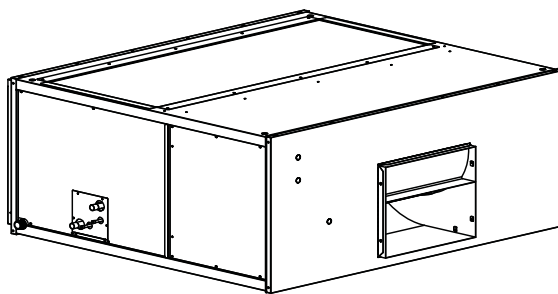
# Light Commercial Air Handler

## Installation Instructions

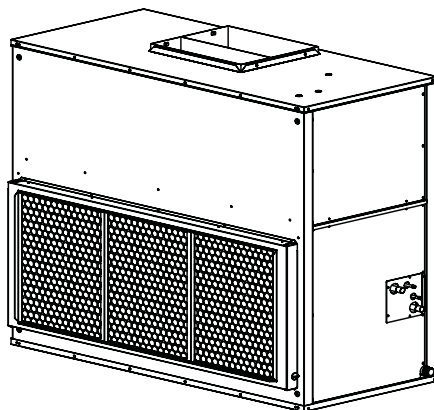
### B4SM -090/120 Series



**Figure 1a. Horizontal Application,  
Rear View**



**Figure 1b. Horizontal Application,  
Front View**



**Figure 2. Vertical Application  
Configuration**

These instructions are intended to assist qualified individuals only. The installation of this equipment must be performed in accordance with these instructions and with any applicable national, state and local codes, standards and ordinances. Some local codes require licensed installation/service personnel for this type equipment. For questions regarding the installation of this equipment – consult a professional, experienced in the proper installation of heating and/or air conditioning appliances.

The improper installation, service, adjustment, or maintenance of this equipment could produce a hazardous condition resulting in fire, electrical shock or other damage to equipment, property and possibly personal injury.

The manufacturer assumes no responsibility for improperly installed equipment or installations that are in violation of any code, standard or ordinance requirement.

Prior to installation of the unit, read all cautions, warnings and instructions. Follow the instructions thoroughly for this unit and the instructions provided with any attached, supplemental or accessory equipment that is meant to be installed with this unit.

These instructions give information relative to the installation of these air handlers only. For other related equipment refer to their proper instructions.

Material in this shipment has been inspected at the factory and released to the transportation agency in good condition. When received, a visual inspection of all cartons should be made immediately. Any evidence of rough handling or apparent damage should be noted on the delivery receipt and the material inspected in the presence of the carrier's representative. If damage is found, a claim should be filed against the carrier immediately.



## **WARNING:**

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**Unless otherwise noted in these instructions, only factory authorized kits or accessories may be used with or when modifying this product.**

**When performing brazing operations always use industry recognized best practices. A fire extinguisher should be readily available and use a quenching cloth and brazing shield.**

**Evaporator Coils are factory shipped with a nitrogen charge. Use caution when preparing coils for field connections.**

**Always disconnect electrical power and allow all rotating equipment to stop before performing maintenance or servicing the unit. Failure to do so may result in personal injury, loss of limb, or death from electrical shock or entanglement in moving parts.**

**Before proceeding with the electrical connections, make certain that the voltage, frequency, and phase of the power source are the same as those specified on the rating plate.**

**In the event that any of the original wire as supplied with the unit must be replaced, it must be replaced with similar wire consisting of the same gauge and temperature rating.**

---

## INSTALLATION REQUIREMENTS:

### Mounting:

The 7-1/2 and 10 Ton air handler units are shipped from the factory ready for installation in a horizontal position. (Figures 1a & 1b) The units can be easily re-configured in the field for vertical applications. (Figure 2) The return air opening is interchangeable between the bottom of the unit and the top panel simply by switching the filter-rack with the return air cover panel. For either configuration, sufficient clearance must be provided on the sides of the unit to allow access for servicing the blower, motor, coil assembly, and filters.

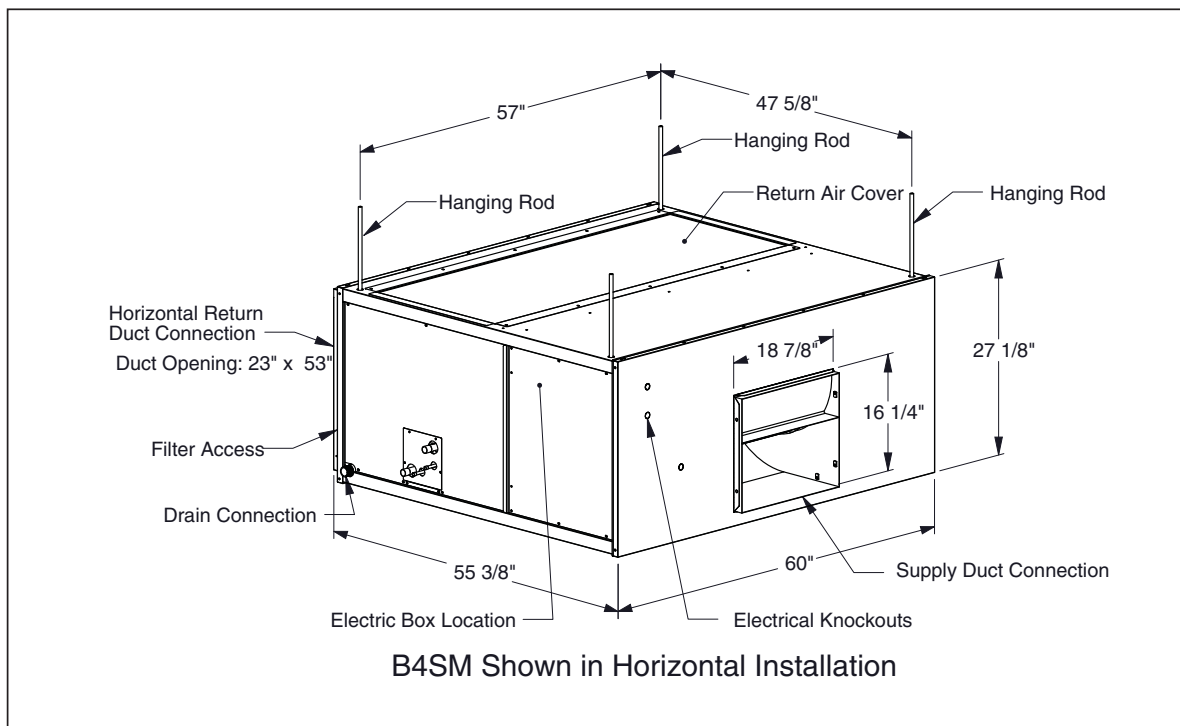
For horizontal mounting applications, these air handlers are designed to be suspended from support rods at each corner, and come supplied with the 1/2-13 NC hardware necessary for this purpose. The installer need only supply the 1/2" fully threaded support rods in an appropriate length for their application. These units can be supported with 3/8" full threaded support rods, however all mounting hardware must be field supplied. Once in position, ensure the unit is properly leveled.



## CAUTION:

**When raising the air-handler for horizontal mounting, always use safe lifting methods and equipment. Always support the unit along its entire width. Failure to do so may result in damage to the lower panels or other equipment. If determined safe for your application the shipping pallet may be utilized with a forklift for this operation.**

For vertical mounting applications, ensure that unit is properly leveled and that there is adequate clearance in order to service the unit and provide the minimum 2" trap for the condensate drain.



**Figure 3. Dimensional Data**

(Refer to Technical Sales Literature for more detailed dimensional and center of gravity information)

Model	Voltage	Ph.	Hz	FLA	HP	MCA	MOP
-090 & -120 J	208-230/460	3	60	6.6-6.6/3.3	2	8.3-8.3/4.1	15
-090 & -120 K	208-230	1	60	11.3-10.0	2	14.2-12.5	25-20
7.5 A/H (220-1-50)	220	1	50	15.5	1.5	19.4	30
7.5 A/H (380-3-50)	380	3	50	3.4	2	4.3	15
10.0 A/H (380-3-50)	380	3	50	3.4	2	4.3	15

FLA = Full Load Amps, MCA = Minimum Circuit Ampacity, MOP = Maximum Over-Current Protection

**Table 1. Electrical Rating Data**

#### Condensate Drain:

These air handlers have condensate drain ports on both sides of the unit, and may be configured for drainage from either the left, right or both sides. Connection to the drains can be made with a  $\frac{3}{4}$ " threaded PVC adapter. The units come configured from the factory with the service side drain open and a threaded PVC drain plug installed on the opposite side. Each drain line installed requires its own drain trap. To assure proper drainage the drain trap(s) installed must provide a minimum trap of 2 inches.

**Note:** It is recommended that a secondary drain pan be used when the unit is hung inside an enclosed ceiling.

#### Electrical:

Always ensure that the unit rating label is applied to the unit. The label is located near the refrigerant lines. Prior to making electrical power connections, make certain that the voltage, frequency, and phase of the power source are the same as listed on the rating label. Always make field wiring and electrical connections in accordance with the applicable codes, standards and ordinances, and in accordance with the current revision of the National Electrical Code (ANSI/NFPA 70). Additionally, a means of disconnecting the unit from electrical power must be readily accessible and located within sight of the unit.

These air handlers can be purchased in both single and three phase power configurations, all single phase equipment is shipped from the factory ready for field connections.

Three phase units are shipped from the factory pre-configured for high voltage operation but the 460 volt, 60 hertz units may be reconfigured in the field for the other voltages indicated on the unit rating label. For additional information, Maximum Current Ampacity (MCA), or the Maximum Over-current Protection (MOP) refer to Table 1 or the unit rating label. For the proper high voltage wiring and other wiring requirements refer to the Wiring Diagram.

**Note: For three phase units only.** If blower is turning opposite of arrow direction, disconnect all power to unit and allow all rotating equipment to stop, then interchange any two field wired leads at the terminal block OR disconnect connections.

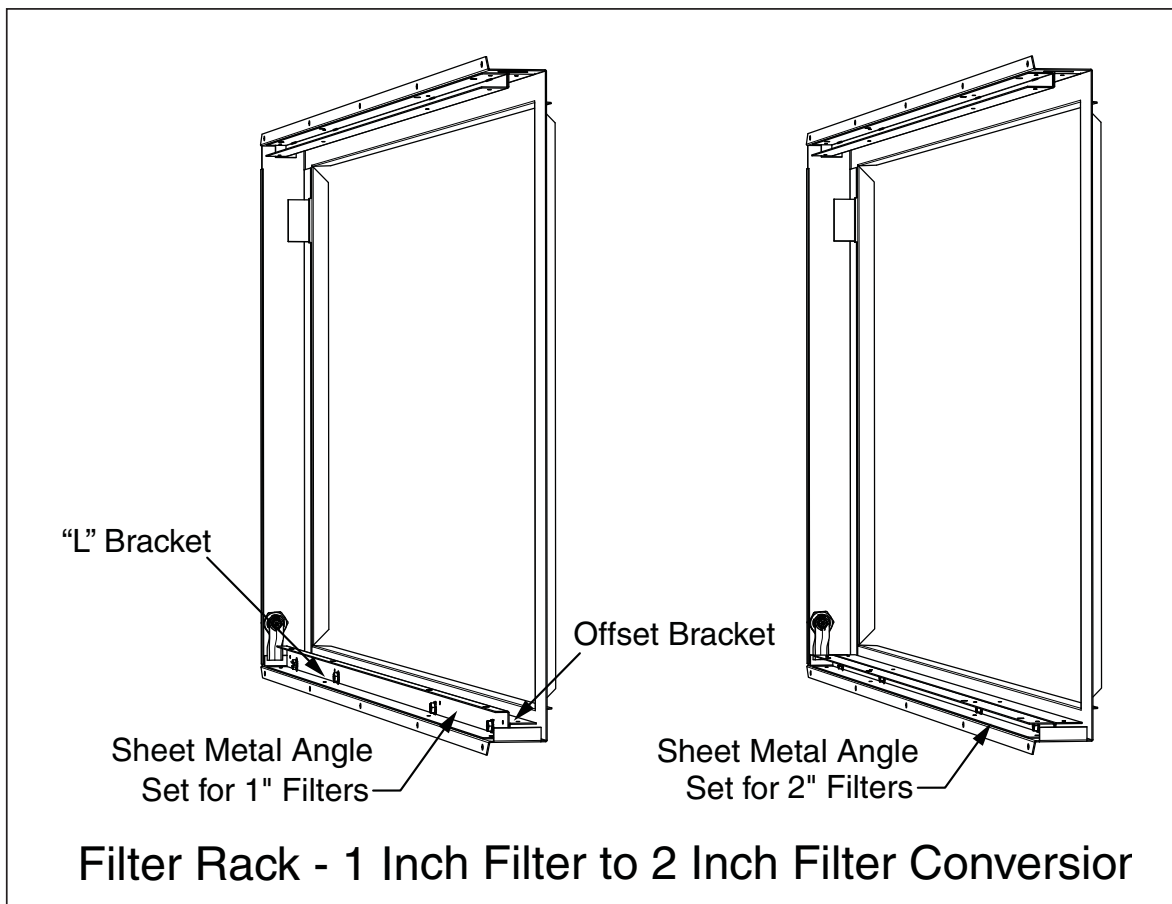
#### Piping/Tubing:

These air handlers are supplied with a direct expansion refrigerant coil and have thermostatic expansion valves standard. The B4SM-120 air handler has a dual circuit coil and the B4SM-090 has a single circuit coil. Refrigerant line connections are located on the motor side (service side) of cabinet and require sweat connections.



## CAUTION:

**Notice to Installer: Evaporator Coils are factory shipped with a nitrogen charge. Use caution when preparing coils for field connections.**



**Figure 4. Filter Conversion**

The B4SM-120 air handler is charged through service valves on the end of the liquid tube for each circuit. These must be removed before brazing the line sets. The B4SM-090 is charged through a service valve inside the unit, which should not be removed.

**NOTE: Before brazing the B4SM-090, remove the core from the service port.** Failure to do this may result in a leak at the service valve. Replace the core and cap once brazing is complete. Always refer to the installation instructions supplied with the outdoor unit for piping requirements, the suction and liquid lines must be sized in accordance with the condensing unit specifications.

#### **Air Distribution Ducts:**

All duct work must be installed in accordance with National Fire Protection Association Codes 90A and 90B.

The return air duct must have the same free area as the opening provided on the blower coil

unit. For questions regarding duct installation requirements, consult a qualified professional.

#### **Filters:**

The B4SM air handlers are shipped with three permanent 1" filters. The filter rack can accommodate a 2" filter. For a 2" filter remove the 4 screws holding the bottom "L" bracket in place. Rotate the "L" bracket so that the "L" bracket is flush with the off-set bracket (as shown in Figure 4). Using the same 4 screws, reassemble the "L" bracket to the off-set bracket. **NOTE: If replacing factory supplied filters with disposable filters, only use 2" disposable filters.**

Accessing the filters does not require tools and can be performed from either side of the filter-rack. On the service side of the unit, locate the release knob at the base of the filter rack and rotate clockwise to unlock, then pull up and out to remove the filter access panel. On the blower side, use the same method but rotate counter-clockwise to unlock.

# BLOWER PERFORMANCE - B4SM 60 HZ. SERIES

Model	Motor Sheave Position	External Static Pressures (Inches Water Column)																	
		0.2			0.3			0.4			0.5			0.6			0.7		
		CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw
B4SM-090 (2HP) 60 Hz	Fully Closed	4162	666	1.28	3961	667	1.20	3706	668	1.11	3436	669	1.03	3081	669	0.93	2738	672	0.83
	1 Turn Open	3867	629	1.09	3638	630	1.01	3366	631	0.95	3055	632	0.85	2672	633	0.77			
	2 Turns Open *	3268	592	0.82	3074	593	0.80	2783	593	0.74	2490	594	0.68	2062	597	0.59			
	3 Turns Open	3283	554	0.79	2966	555	0.72	2619	555	0.65	2203	555	0.57						
	4 Turns Open	2611	486	0.57	2355	487	0.53												

Model	Motor Sheave Position	External Static Pressures (Inches Water Column)																	
		0.2			0.3			0.4			0.5			0.6			0.7		
		CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw
B4SM-120 (2HP) 60 Hz	Fully Closed				4789	868	2.12	4640	868	2.00	4442	870	1.95	4208	873	1.87	3875	877	1.68
	1 Turn Open	4707	822	1.92	4547	824	1.85	4416	826	1.77	4223	827	1.68	3996	829	1.60	3565	825	1.20
	2 Turns Open *	4410	779	1.63	4258	780	1.56	4071	784	1.50	3867	786	1.45	3632	787	1.31	3396	790	1.23
	3 Turns Open	3896	708	1.17	3776	724	1.20	3587	731	1.16	3408	736	1.10	3151	740	1.02	2899	743	0.94
	4 Turns Open	2873	522	0.53	2785	534	0.54												

\* Denotes Factory Adjustable Sheave Setting  
**Bold** Indicates Factory Recommended Blower Operating Range  
Shaded Area -Not Recommended for Operation  
Values based on dry coils and do not include filter losses

Table 2. Blower Performance Data - 60 Hz

## COMPONENT STATIC PRESSURE

Model	Nominal	Filter
B4SM	CFM	Size
090	2200	18 x 24 (1")
	2600	
	3000	
	3400	
	3800	
120	4200	
	3000	18 x 24 (1")
	3400	
	3800	
	4200	
	4600	
	5000	

Table 3. Pressure Drop Across Filters

# BLOWER PERFORMANCE - B4SM 50 HZ. SERIES

Blower Performance Charts B4SM 7.5&10 ton @ 50Hz

Model	Motor Sheave Position	External Static Pressures (Inches Water Column)																										
		0.2			0.3			0.4			0.5			0.6			0.7			0.8			0.9			1		
		CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw
B4SM-090 (2Hp) 50Hz 380V	Fully Closed	3868	637	1.20	3620	638	1.20	3322	640	1.11	3021	642	0.92	2694	644	0.94	2194	646	0.83									
	1 Turn Open	3689	612	0.93	3394	614	0.86	3100	615	0.79	2750	617	0.70	2335	619	0.61												
	2 Turns Open*	3427	580	0.80	3132	582	0.72	2794	584	0.64	2388	586	0.56															
	3 Turns Open	2955	515	0.70	2571	526	0.54	2323	542	0.50	1792	552	0.41															
	4 Turns Open	2227	449	0.40	1783	464	0.40																					

\* Denotes Factory Adjustable Sheave Setting

**Bold** Indicates Factory Recommended Blower Operating Range

*Italic Gray* -Not Recommended for Operation

Model	Motor Sheave Position	External Static Pressures (Inches Water Column)																										
		0.2			0.3			0.4			0.5			0.6			0.7			0.8			0.9			1		
		CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw
B4SM-120 (2Hp) 50Hz 380V	Fully Closed	4808	811	2.13	4610	812	2.09	4454	815	2.00	4274	816	1.93	4074	818	1.86	3856	820	1.78	3608	822	1.67	3316	824	1.56	3037	827	1.45
	1 Turn Open	4553	779	1.90	4379	779	1.83	4182	781	1.77	3997	782	1.69	3769	784	1.61	3519	786	1.50	3254	788	1.44	2960	791	1.33	2632	792	1.25
	2 Turns Open*	4306	746	1.77	4123	744	1.70	3917	746	1.61	3693	748	1.54	3456	749	1.47	3200	751	1.37	2831	753	1.26	2497	755	1.18			
	3 Turns Open	3966	705	1.50	3769	707	1.43	3550	708	1.37	3322	710	1.30	3037	712	1.22	2698	714	1.14	2340	715	1.06						
	4 Turns Open	3544	643	1.20	3339	649	1.20	3151	655	1.17	2919	664	1.12	2613	670	1.05	2261	674	1.05									

\* Denotes Factory Adjustable Sheave Setting

**Bold** Indicates Factory Recommended Blower Operating Range

*Italic Gray* -Not Recommended for Operation

Model	Motor Sheave Position	External Static Pressures (Inches Water Column)																										
		0.2			0.3			0.4			0.5			0.6			0.7			0.8			0.9			1		
		CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw
B4SM-090 (2Hp) 50Hz 220V	Fully Closed	3950	637	1.59	3690	639	1.27	3412	641	1.00	3116	642	0.91	2752	644	0.83	1670	649	0.61									
	1 Turn Open	3721	608	0.99	3441	609	0.92	3150	611	0.84	2787	613	0.76	2310	615	0.66	1119	619	0.47									
	2 Turns Open*	3495	580	0.80	3192	582	0.79	2852	583	0.71	2417	586	0.62															
	3 Turns Open	3185	545	0.73	2869	548	0.67	2452	552	0.61	1859	555	0.49															
	4 Turns Open	2306	490	0.50	1982	472	0.46	1701	501	0.42																		

\* Denotes Factory Adjustable Sheave Setting

**Bold** Indicates Factory Recommended Blower Operating Range

*Italic Gray* -Not Recommended for Operation

Table 4. Blower Performance Data - 50 Hz



### Blower Adjustments:

The blower speed has been preset at the factory. For optimum system performance and comfort, it may be necessary to change the factory set speed. Adjustment of the blower speed is made through varying the pitch of the motor pulley, this adjustment allows for a wide range of installation applications. Refer to Table 2 for blower performance data. Blower adjustment procedures are in the maintenance section of this document.

### Initial Operation Pre-Inspection:

Prior to start-up, complete the following inspection:

1. Check that the unit is mounted securely.
2. Check that the unit is level.
3. Check condensate drain line(s) for proper slope and trap.
4. Check all ductwork connections.
5. Check coil connections for leaks.
6. Check for proper blower belt alignment and tension.
7. Inspect electrical disconnect for proper installation and function.
8. Inspect all electrical connections.
9. Inspect for proper blower rotation.
10. Ensure that all filters are in place and that all unit panels have been re-installed.

Correct any deficiencies prior to initial operation.



## WARNING:

**Never perform maintenance on energized or rotating equipment. Always disconnect electrical power and allow all rotating equipment to stop before servicing the unit. Failure to do so may result in personal injury, loss of limb, or death from electrical shock or entanglement in moving parts.**

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## MAINTENANCE REQUIREMENTS

\*The maintenance requirements below should be performed in accordance with the Maintenance Schedule at the end of this document.

### Miscellaneous Components:

#### Filters:

To clean permanent filters, remove the filters and wash gently with mild soap and water. Rinse in clean, hot water and allow to drain and dry thoroughly before reinstallation of the filters.

#### Drain Pan:

The drain pan and the drain lines should be cleaned to allow condensate flow. Remove any accumulation of residue or sludge from the drain pan and inspect for rust, holes and leaks in and around the drain pan.

#### V-Belts:

Inspect for cracks, tears and excessive or abnormal wear. V-belts tend to elongate with time after normal application and use. Ensure the belt always maintains adequate tension without over tightening. Belts which have been over tightened will wear out rapidly and may cause motor and blower bearings to receive undue strain and wear. As a result the unit could experience excessive vibration and noise problems. See next section for belt tension adjustment.

### Blower Assembly & Components:

#### Blower Bearings:

The Blower assembly incorporates sealed bearings, under normal operating conditions, no maintenance is necessary for the life of the equipment.

#### Blower Fan Wheel:

Blower wheel blades should be inspected for accumulations of dirt and cleaned as required. Inspect mounting nut for security when done.



### Blower Motor and Assembly:

Inspect all blower assembly and motor mounting brackets for security and corrosion. Correct deficiencies as appropriate. The blower motors have sealed bearings and under normal operating conditions, no maintenance is necessary for the life of the equipment.

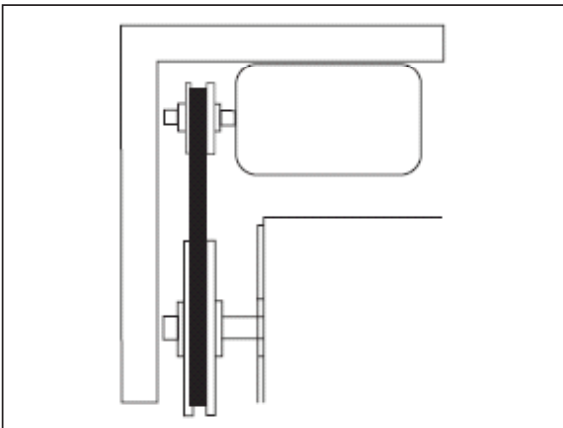
### Motor Sheave Adjustment, Fan Belt Alignment & Belt Tension:

#### Adjustable Motor Sheave:

The motor sheave consists of an outer, moveable pulley face and an inner, stationary face. To adjust the motor sheave, first relieve the belt pressure by loosening motor mount bolts and the belt tensioning bolts on the motor mount. Move the blower fan belt out of the way if necessary and loosen the set screw in the outer sheave face and rotate this face in increments of one half or full turns only. This will maintain the set screw position precisely over the flats on the pulley hub. Once the desired adjustment has been made, tighten the setscrews and ensure the moveable face is properly secured.

#### Pulley Alignment:

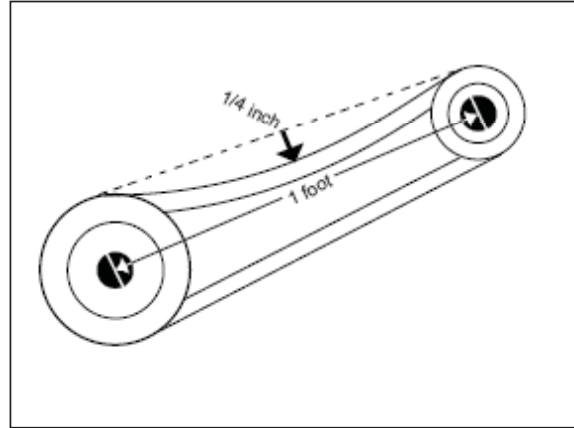
Inspect the pulley alignment between the motor sheave and blower pulley. If a misalignment is noted, adjust the location of the motor sheave by loosening the setscrew in the inner, stationary face of the motor sheave and relocating the sheave assembly on the motor shaft to ensure the belt will be straight and aligned. (Figure 5) Tighten the setscrew securely, then reinstall the fan belt and tighten the tensioning bolts as described below.



**Figure 5. Proper Belt Alignment**

### Belt Tension:

The proper belt tension can be determined by testing the belt deflection at the midpoint of the pulleys. As a general rule, the belt should deflect  $\frac{1}{4}$ " per foot of span between the centers



**Figure 6 Proper Belt Tension**

of the pulleys. (Figure 6) Once the proper tension has been applied, tighten the motor mount bolts to secure the assembly, and visually inspect the area to ensure all tools have been removed. Inspect all wire harness and routings in the vicinity and ensure that there is adequate clearance for the wire harness.

### Maintenance Schedule:

\* Above schedule is for normal duty applications only. For severe duty applications, adjust schedule as appropriate. Additional tasks may be required for severe duty environments.

# B4SM Series 7.5/10T Air Handler Systems

## Electrical Configurations

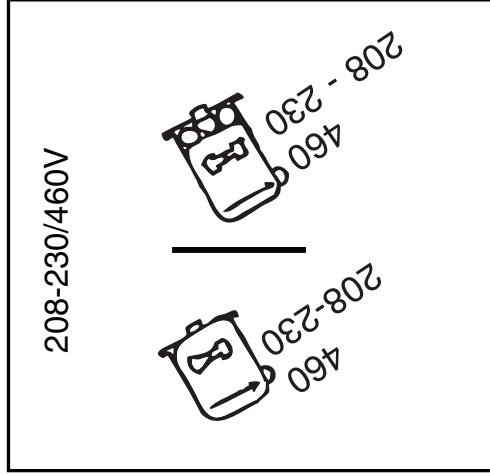
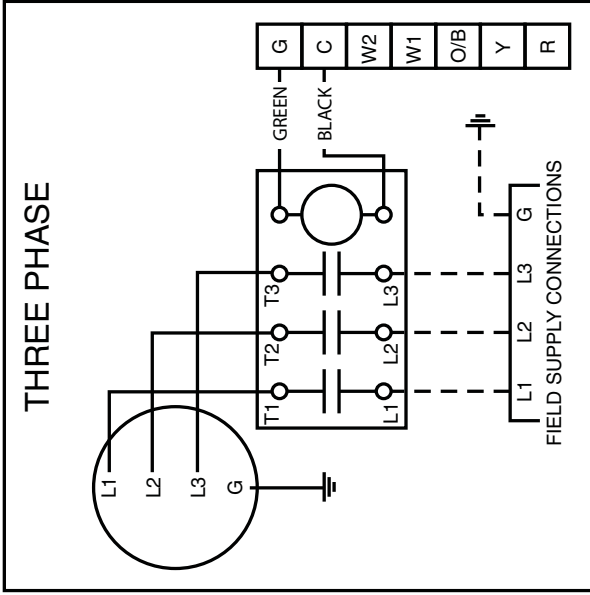
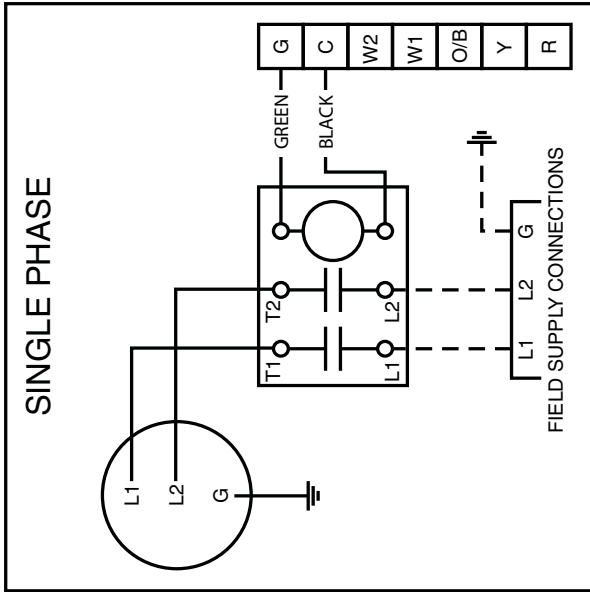
Frequency	Single Phase	Three Phase
60 Hz	208-230V	208-230/460V
50 Hz	220V	380V

### GENERAL NOTES:

1. Disconnect all power before servicing.
2. If wiring must be replaced, use only 105°C copper wire of the same gauge.

### THREE PHASE ONLY NOTES:

1. Three phase units are factory wired for 460V/60Hz or 380V/50Hz operation.
2. To reverse motor rotation, interchange any two field wired line leads.
3. Three phase, 60 Hz units may be configured for 208-230V operation by relocating the internal selector pin at the rear of the motor as shown below. (See product literature for more information, if necessary.)



LEGEND:  
FIELD WIRING - - - - -  
LOW VOLTAGE ———

**7106640**  
06/07

Installed by:

Date Installed:

Maintenance Task	Performance Schedule				Date Performed:											
	W	M	SA	A												
<b><u>Air Filters</u></b>																
Inspect, clean or replace as required.		x														
<b><u>Condensate Drain(s) &amp; Pan</u></b>																
Clean condensate drain pan		x														
Inspect the flow of condensate through the drain lines. Clean or Correct problems as necessary.		x														
<b><u>Blower Assembly</u></b>																
Inspect the fan belt for wear, alignment & and proper tension. Replace or adjust as required.		x														
Clean the blower wheel and housing.			x													
Inspect the blower assembly for corrosion and all hardware for security.				x												
Inspect the blower coil unit casing for corrosion and loose fasteners.				x												
<b><u>Coils</u></b>																
Inspect the coil fins for excessive dirt or damage. Clean or repair if required.			x													
Inspect all coil connections for leaks.				x												
<b><u>Air Handler Assm.</u></b>																
Inspect Mounting Hardware for security and corrosion				x												
Inspect Filter Rack mounting hardware for security				x												
Inspect panel assemblies for proper installation and security				x												

**INSTALLER:  
PLEASE LEAVE THESE  
INSTALLATION INSTRUCTIONS  
WITH THE HOMEOWNER**



**708715A**



**708715A** (Replaces 7087150)

Specifications and illustrations subject to change  
without notice and without incurring obligations.  
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