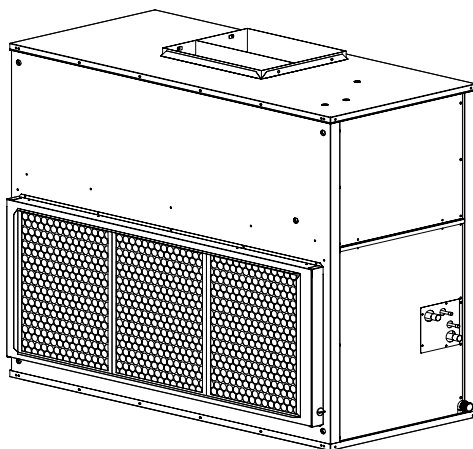


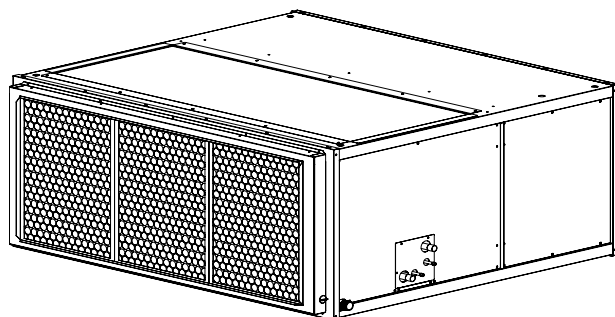
B5SM - 090 / 120 Series, A Revision

INSTALLATION INSTRUCTIONS

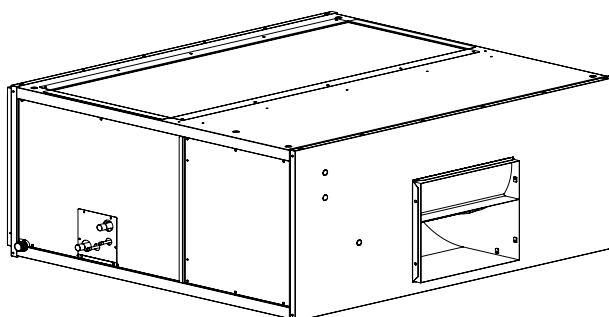
Light Commercial Air Handler



Vertical Application



Horizontal Application - Rear View



Horizontal Application - Front View

IMPORTANT

ATTENTION INSTALLERS:

It is your responsibility to know this product better than your customer. This includes being able to install the product according to strict safety guidelines and instructing the customer on how to operate and maintain the equipment for the life of the product. Safety should always be the deciding factor when installing this product and using common sense plays an important role as well. Pay attention to all safety warnings and any other special notes highlighted in the manual. Improper installation of the furnace or failure to follow safety warnings could result in serious injury, death, or property damage.

These instructions are primarily intended to assist qualified individuals experienced in the proper installation of this appliance. Some local codes require licensed installation/service personnel for this type of equipment. Please read all instructions carefully before starting the installation. Return these instructions to the customer's package for future reference.

DO NOT DESTROY. PLEASE READ CAREFULLY AND KEEP IN A SAFE PLACE FOR FUTURE REFERENCE.

IMPORTANT SAFETY INFORMATION	2
GENERAL INFORMATION	3
Before You Install this Unit	3
Locating the Air Handler	4
Field Connections for Electrical Power Supply	4
Air Ducts	4
Unconditioned Spaces	4
Acoustical Duct Work	4
AIR HANDLER INSTALLATION	4
Packaging Removal	4
Minimum Clearance Requirements	4
Horizontal Mounting Applications	4
Vertical Mounting Applications	4
Condensate Drain	4
Connecting Refrigerant Tubing	5
Filter Requirements	5
ELECTRICAL WIRING.....	6
Pre - Electrical Checklist	6
Line Voltage.....	6
Thermostat Connections	7
Electrical Wiring with a Duct Heater	7
Unbalanced 3-Phase Supply Voltage	7
Grounding.....	8
STARTUP & ADJUSTMENTS	8
Pre - Start Checklist	8
Blower Speed Adjustment	8
Motor Sheave Adjustment	8
V-Belt Alignment & Tensioning	8
Blower Rotation	8
UNIT MAINTENANCE.....	9
FIGURES & TABLES	10
Figure 4. Physical Dimensions - Horizontal.....	10
Figure 5. Physical Dimensions - Vertical	11
B5SM 090 & 120 Blower Performance Tables.....	12
Table 3- Alternate Accesory Blower Drives	12
Table 4- Pressure Drop Across Filters	12
Table 5 - Single Phase - 7.5 Ton Models.....	13
Table 6 - Single Phase - 10 Ton Models.....	14
Table 7 - Three Phase - 7.5 Ton Models.....	15
Table 8 - Three Phase - 10 Ton Models.....	16
Electrical Information.....	17
Figure 7. B5SM Wiring Diagram.....	17
Figure 8. Motor Wiring Diagram -3 Phase	17
Figure 9. Air conditioner T-stat Connections.....	18
Figure 10. Heat pump T-stat Connections	19
Maintenance Schedule.....	20
Table 9. Maintenance Schedule	20

IMPORTANT SAFETY INFORMATION

Please read all instructions before servicing this equipment. Pay attention to all safety warnings and any other special notes highlighted in the manual. Safety markings are used frequently throughout this manual to designate a degree or level of seriousness and should not be ignored.

WARNING indicates a potentially hazardous situation that if not avoided, could result in personal injury or death.

CAUTION indicates a potentially hazardous situation that if not avoided, may result in minor or moderate injury or property damage.

WARNING:

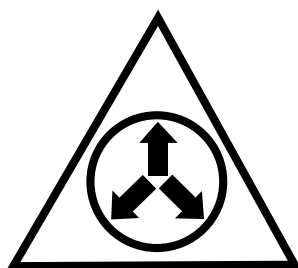
ELECTRICAL SHOCK, FIRE OR EXPLOSION HAZARD

Failure to follow safety warnings exactly could result in serious injury or property damage.

Improper servicing could result in dangerous operation, serious injury, death or property damage.

- Before servicing, disconnect all electrical power to the indoor blower.
- When servicing controls, label all wires prior to disconnecting. Reconnect wires correctly.
- Verify proper operation after servicing.

WARNING:



NITROGEN	
HEALTH	1
FLAMMABILITY	0
REACTIVITY	0
0 Minimal Hazard 1 Slight Hazard	

Evaporator coils are shipped from the factory with a nitrogen charge. Use caution when preparing coils for field connections. If repairs make it necessary for evacuation and charging, it should only be attempted by qualified, trained personnel thoroughly familiar with this equipment. Some local codes require licensed installation service personnel to service this type of equipment. Under no circumstances should the equipment owner attempt to install and/or service this equipment. Failure to comply with this warning could result in equipment damage, personal injury, or death.

WARNING:

Improper installation, service, adjustment, or maintenance may cause explosion, fire, electrical shock or other hazardous conditions which may result in personal injury or property damage. Unless otherwise noted in these instructions, only factory authorized kits or accessories may be used with this product.

WARNING:

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

WARNING:

The safety information listed below must be followed during the installation, service, and operation of this unit. Unqualified individuals should not attempt to interpret these instructions or install this equipment. Failure to follow safety recommendations could result in possible damage to the equipment, serious personal injury or death.

- The installer must comply with all local codes and regulations which govern the installation of this type of equipment. Local codes and regulations take precedence over any recommendations contained in these instructions. Consult local building codes and the National Electrical Code (ANSI C1) for special installation requirements.
- This equipment contains liquid and gaseous refrigerant under high pressure. Installation or servicing should only be performed by qualified trained personnel thoroughly familiar with this type equipment.
- All electrical wiring must be completed in accordance with local, state and national codes and regulations and with the National Electric Code (ANSI/NFPA 70) or in Canada the Canadian Electric Code Part 1 CSA C.22.1.
- Installation of equipment may require brazing operations. Installer must comply with safety codes and wear appropriate safety equipment (safety glasses, work gloves, fire extinguisher, etc.) when performing brazing operations.
- Install this unit only in a location and position as specified on pages 3 & 4. This unit is designed only for Indoor installations and should be located with consideration of minimizing the length of the supply and return ducts. Refer to Blower Performance Data (Tables 5 - 8, pages 12 - 16) for the allowable operating range and adjustments.

- Consideration should also be given to the accessibility of fuel, electric power, service access, noise, and shade. Physical dimensions for each type of installation is shown on pages 10 & 11. See Figure 4 for horizontal installations or Figure 5 for Vertical installations.
- Follow all precautions in the literature, on tags, and on labels provided with the equipment. Read and thoroughly understand the instructions provided with the equipment prior to performing the installation and operational checkout of the equipment.

GENERAL INFORMATION

B5SM air handlers are shipped from the factory ready for installation in a horizontal position. The units can be easily re-configured in the field for vertical applications. 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.

This unit has been designed and tested for capacity and efficiency in accordance with AHRI Standards. Refer to technical service literature for AHRI matched systems. This unit will provide many years of safe and dependable comfort, providing it is properly installed and maintained. With regular maintenance, this unit will operate reliably year after year. Abuse, improper use, and/or improper maintenance can shorten the life of the appliance and create unsafe hazards.

Before You Install the Air Handler

- ✓ This equipment is securely packed at the time of shipment and upon arrival should be carefully inspected for damage prior to installing the equipment at the job site. Claims for damage (apparent or concealed) should be filed immediately with the carrier.
- ✓ The cooling load of the area to be conditioned must be calculated and a system of the proper capacity selected.
- ✓ Check the electrical supply and verify the power supply is adequate for unit operation. The system must be wired and provided with circuit protection in accordance with local building codes. If there is any question concerning the power supply, contact the local power company.
- ✓ The air handler should be installed before routing the refrigerant tubing. Refer to the indoor unit's installation instructions for installation details.
- ✓ Verify the air delivery of the air handler is adequate to handle the static pressure drop of the coil, filter, and duct work.
- ✓ Please consult your dealer for maintenance information and availability of maintenance contracts. Please read all instructions before installing the unit.

Locating the Air Handler

- Survey the job site to determine the best location for mounting the unit.
- Overhead obstructions, poorly ventilated areas, and areas subject to accumulation of debris should be avoided.
- Consideration should be given to availability of electric power, service access, noise, and shade.

Field Connections for Electrical Power Supply

- All wiring must comply with current provisions of the National Electrical Code (ANSI/NFPA 70) and with applicable local codes having jurisdiction.
- The minimum size of electrical conductors and circuit protection must be in compliance with information listed on the outdoor unit data label.
- Electrical power supplied to the unit must be adequate for proper operation of the equipment. The system must be wired and provided with circuit protection in accordance with local building codes.

Air Ducts

This unit is designed only for use with a supply and return duct. Air ducts should be installed in accordance with the standards of the National Fire Protection Association Standard for Installation of Air Conditioning Systems (NFPA 90A), Standard for Installation of Residence Type Warm Air Heating and Air Conditioning Systems (NFPA 90B), and all applicable local codes. NFPA publications are available by writing to: National Fire Protection Association, Batterymarch Park, Quincy, ME 02269 or visit www.nfpa.org on the web.

- Design the duct work according to methods described by the Air Conditioning Contractors of America (ACCA), Manual Q.
- The return air duct must have the same free area as the opening provided on the blower coil unit.
- Duct work should be attached directly to the unit flanges for horizontal and vertical applications. See Figures 4 or 5 (pages 10 or 11).

Unconditioned Spaces

All duct work passing through unconditioned space must be properly insulated to minimize duct losses and prevent condensation. Use insulation with an outer vapor barrier. Refer to local codes for insulation material requirements.

Acoustical Duct Work

Certain installations may require the use of acoustical lining inside the supply duct work.

- Acoustical insulation must be in accordance with the current revision of the Sheet Metal and Air Conditioning Contractors National Association (SMACNA) application standard for duct liners.
- Duct lining must be UL classified batts or blankets with a fire hazard classification of FHC-25/50 or less.
- Fiber duct work may be used in place of internal duct liners if the fiber duct work is in accordance with the current revision of the SMACNA construction standard on fibrous glass ducts. Fibrous duct work and internal acoustical lining must be NFPA Class 1 air ducts when tested per UL Standard 181 for Class 1 ducts.

AIR HANDLER INSTALLATION

Packaging Removal

Remove the shipping crate and User's Manual from the equipment. Take care not to damage the tubing connections when removing the crate.

Minimum Clearance Requirements

This air handler must be installed with ample clearance for easy access to the air filters, blower assembly, and, controls. Allow 24 inches minimum clearance from the front of the motor and refrigerant access panels for service and maintenance. However 36 inches is strongly recommended.

Horizontal Mounting Applications

B5SM air handlers can be suspended from support rods at each corner and are supplied with the required 1/2-13 NC hardware. The installer only needs to supply the 1/2" full threaded support rods in an appropriate length for their application. **NOTE:** These units can be supported with 3/8" full threaded support rods, however all mounting hardware must be field supplied. Once in position, verify the unit is level. See Figure 4 (page 10).



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.

Vertical Mounting Applications

Verify the unit is level and there is adequate clearances to service the unit and provide the minimum 2" trap needed for the condensate drain. See Figure 5 (page 11).

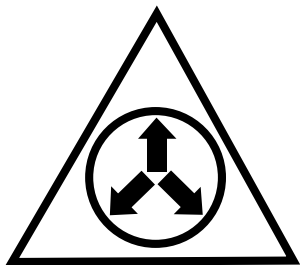
Condensate Drain

B5SM air handlers have condensate drain ports on both sides of the unit, and may be configured for drainage from the left, right or both sides (Figures 4 or 5). Connection to the drains can be made with a 3/4" threaded PVC adapter.

Units are configured at 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 ensure proper drainage, the installed drain trap(s) must provide a minimum trap of 2 inches. **NOTE:** It is recommended that a secondary drain pan be used when the unit is hung above an enclosed ceiling.

Connecting Refrigerant Tubing

WARNING:



NITROGEN	
HEALTH	1
FLAMMABILITY	0
REACTIVITY	0
0 Minimal Hazard 1 Slight Hazard	

Evaporator Coils are factory shipped with a nitrogen charge. Avoid direct face exposure or contact with valve when gas is escaping. Always ensure adequate ventilation is present during the depressurization process. Any uncertainties should be addressed before proceeding.

- When connecting refrigerant linesets together, it is recommended that dry nitrogen be flowing through the joints during brazing. This will prevent internal oxidation and scaling from occurring.
- Refrigerant tubing should be routed in a manner that minimizes the length of tubing and the number of bends in the tubing.
- Refrigerant tubing should be supported in a manner that the tubing will not vibrate or abrade during system operation.
- Tubing should be kept clean of foreign debris during installation.
- Every effort should be made by the installer to ensure that the field installed refrigerant containing components of the system have been installed in accordance with these instructions and sound installation practices to insure reliable system operation and longevity.
- 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.
- If precise forming of refrigerant lines is required, a copper tubing bender is recommended. Avoid sharp bends and contact of the refrigerant lines with metal surfaces.
- A filter dryer is provided with the unit and must be installed in the liquid line of the system. If the installation replaces a system with a filter dryer already present in the liquid line, the filter dryer must be replaced with the one supplied with the unit. The filter dryer must be installed in strict accordance with the manufacturer's installation instructions.
- B5SM air handlers are supplied with a direct expansion refrigerant coil and thermostatic expansion valves. Refrigerant line connections are located on the motor side (service side) of cabinet and require sweat connections.
- The B5SM-120 air handler has a dual circuit coil and the B5SM-090 has a single circuit coil.
- The B5SM-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 B5SM-090 is charged through a service valve inside the unit, which should not be removed.
- **Before brazing the B5SM-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.
- Optional equipment such as liquid line solenoid valves, low ambient, etc., should be installed in strict accordance with the manufacturer's installation instructions.

Filter Requirements

B5SM air handlers are shipped with three permanent 1" filters; however the filter rack can be converted to accommodate a 2" filter as shown in Figure 1 (page 6). To convert to a 2" filter:

1. Remove all filters from the unit.
2. Locate and remove the 4 screws (Figure 1, page 6) holding the bottom filter slide assembly (latch end) to the filter rack frame. **NOTE:** Be careful when removing the slide assembly so it does not drop into unit and cause damage to the coil.
3. Remove the 4 screws securing the "L" bracket to the "Z" bracket.
4. Rotate the "L" bracket 180 degrees, and reposition it so it mounts flush with the "Z" bracket. See Figure 1.
5. Secure the filter slide assembly together with the four screws.
6. Re-install the filter slide assembly back into the filter rack frame and secure with the 4 screws removed earlier. If replacing factory supplied filters with disposable filters, use only 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.

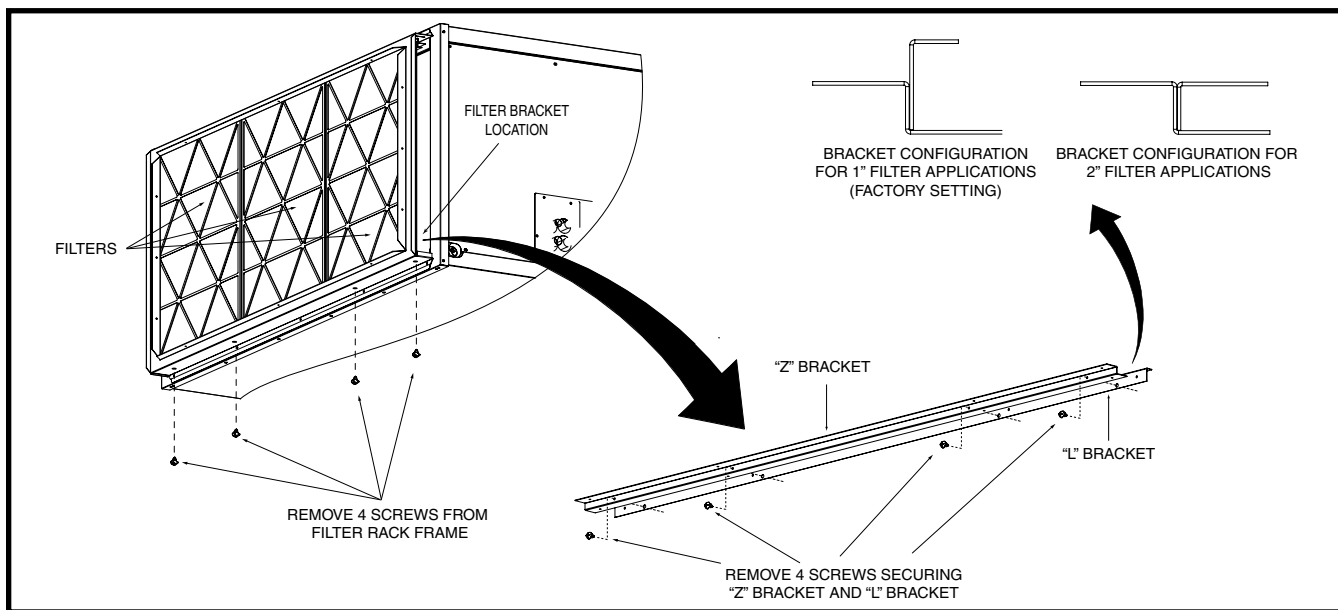


Figure 1. Converting from 1" Filter to 2" Filter Applications

ELECTRICAL WIRING

WARNING:

ELECTRICAL SHOCK, FIRE OR EXPLOSION HAZARD

Failure to follow safety warnings exactly could result in serious injury or property damage.

Improper servicing could result in dangerous operation, serious injury, death or property damage.

- Before servicing, disconnect all electrical power to the indoor blower.
- When servicing controls, label all wires prior to disconnecting. Reconnect wires correctly.
- Verify proper operation after servicing.

- Electrical connections must be in compliance with all applicable local codes and ordinances, and with the current revision of the National Electric Code (ANSI/NFPA 70).
- For Canadian installations, the electrical connections and grounding shall comply with the current Canadian Electrical Code (CSA C22.1 and/or local codes).

Pre-Electrical Checklist:

- ✓ Verify that the voltage, frequency, and phase of the supply source match the specifications on the unit rating plate. The label is located near the refrigerant lines.
- ✓ Verify that the service provided by the utility is sufficient to handle the additional load imposed by this equipment.
- ✓ Phase balance on 3 phase units must always be checked. See Unbalanced 3-Phase Supply Voltage (page 7).

Line Voltage

- It is recommended that the line voltage to the unit be supplied from a dedicated branch circuit containing the correct fuse or circuit breaker for the unit.
- **An electrical disconnect must be located within sight of and readily accessible to the unit.** This switch shall be capable of electrically de-energizing the outdoor unit. See unit data label for proper incoming field wiring. Any other wiring methods must be acceptable to authority having jurisdiction.
- Refer to the unit wiring label for proper high and low voltage wiring.
- Use only copper wire for the line voltage power supply to this unit (Table 1, page 7). Use proper code agency listed conduit and a conduit connector for connecting the supply wires to the unit.
- Overcurrent protection must be provided at the branch circuit distribution panel and sized as shown on the unit rating label and according to applicable local codes. See the unit rating plate for maximum circuit ampacity and maximum overcurrent protection limits.
- If replacing any of the original wires supplied with the unit, the replacement wire must be copper wire consisting of the same gauge and temperature rating.
- Provide power supply for the unit in accordance with the unit wiring diagram, and the unit rating plate. The installer should become familiar with the wiring diagram/schematic before making any electrical connections to the unit. See Figure 7 (page 17).
- 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. For electrical connection locations see Figures 4 or 5 (pages 10 or 11).
- Three phase units are shipped from the factory pre-configured for high voltage operation. The 460 volt, 60 hertz units may be reconfigured in the field for the other voltages indicated on the unit rating label. For additional Maximum Current Ampacity (MCA), or

Model	Phase	Hertz	Voltage	Blower Motor			MCA	MOP	Unit Configuration
				Hp	FLA	SFA			
-090Ja	3	60	208-230/460	1	3.2-3.0/1.5	3.5-3.3/1.7	4.4-4.2/2.2	15	Factory Std.
				1.5	4.4-4.2/2.1	5.0-4.6/2.3	6.3-5.8/2.9	15	w/ MSD kit
-120Ja	3	60	208-230/460	1.5	4.4-4.2/2.1	5.0-4.6/2.3	6.3-5.8/2.9	15	Factory Std.
				2	6.0-5.8/2.9	6.7-6.4/3.2	8.4-8.0/4.0	15	w/ MSD kit
-090Ka & -120Ka	1	60	208-230	2	11.3 - 10.0	11.3 - 11.0	14.2 - 13.8	25 - 20	Factory Std.

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

Table 1. Electrical Rating Data

Maximum Over-current Protection (MOP) information, refer to the unit rating label. For proper high voltage wiring or other wiring requirements refer to the Wiring Diagram (Figure 7).

- Internally mounted circuit breakers are available as field installed options. These circuit breakers can be used as an electrical disconnect.

Thermostat Connections

- Thermostat connections shall be in accordance with the instructions supplied with the thermostat and the indoor equipment. The low voltage wires must be properly connected to the units low voltage terminal block.
- A single stage thermostat is used with this equipment and must operate in conjunction with any installed accessories. A typical AC and air handler hookup is shown in Figure 9 (page 18). For heat pump and air handler connections, see Figure 10 (page 19).
- The thermostat should be mounted about 5 feet above the floor on an inside wall. DO NOT install the thermostat on an outside wall or any other location where its operation may be adversely affected by radiant heat from fireplaces, sunlight, or lighting fixtures, and convective heat from warm air registers or electrical appliances. Refer to the thermostat manufacturer's instruction sheet for detailed mounting and installation information.

Electrical Wiring with a Duct Heater

Slip-in duct heaters are available as an accessory with the B5SM air handler. See Table 2 for available sizes. These heaters mount in the supply duct external to the air handler. The heater kits are available in 10, 16, 26, and 36 KW sizes and 240 or 460 voltages. All heater kits are set up for three phase operation. To wire the heater kits to the B5SM air handler unit, refer to the Installation Instructions supplied with the kit.

SKU	Kw	Volts/Phase/Hz	MODEL
559428	10	208-240/3/60	H7HK010Q-01
559429	10	480/3/60	H7HK010S-01
559430	16	208-240/3/60	H7HK016Q-01
559431	16	480/3/60	H7HK016S-01
559432	26	208-240/3/60	H7HK026Q-01
559433	26	480/3/60	H7HK026S-01
559434	36	208-240/3/60	H7HK036Q-01
559435	36	480/3/60	H7HK036S-01

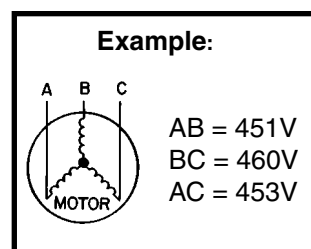
Table 2. Duct Mount Heater Kit Models

Unbalanced 3-Phase Supply Voltage

Voltage unbalance occurs when the voltages of all phases of a 3-phase power supply are no longer equal. This unbalance reduces motor efficiency and performance. Some underlying causes of voltage unbalance may include: Lack of symmetry in transmission lines, large single-phase loads, and unbalanced or overloaded transformers. A motor should never be operated when a phase imbalance in supply is greater than 2%.

Perform the following steps to determine the percentage of voltage imbalance:

- Measure the line voltages of your 3-phase power supply where it enters the building and at a location that will only be dedicated to the unit installation. (at the units circuit protection or disconnect).



- Determine the average voltage in the power supply.

In this example, the measured line voltages were 451, 460, and 453. The average would be 454 volts $(451 + 460 + 453 = 1,364 / 3 = 454)$.

- Determine the maximum deviation:

Example:

From the values given in step 1, the BC voltage (460V) is the greatest difference in value from the average:

$$460 - 454 = 6 \leftarrow \text{Highest Value}$$

$$454 - 451 = 3$$

$$454 - 453 = 1$$

- Determine percent of voltage imbalance by using the results from steps 2 & 3 in the following equation.

Example:

$$100 \times \frac{6}{454} = 1.32\%$$

$$\% \text{ Voltage Imbalance} = 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

The amount of phase imbalance (1.32%) is satisfactory since the amount is lower than the maximum allowable 2%. Please contact your local electric utility company if your voltage imbalance is more than 2%.

Grounding

WARNING:

The unit cabinet must have an uninterrupted or unbroken electrical ground to minimize personal injury if an electrical fault should occur. Do not use gas piping as an electrical ground!

This unit must be electrically grounded in accordance with local codes or, in the absence of local codes, with the National Electrical Code (ANSI/NFPA 70) or the CSA C22.1 Electrical Code. Use the grounding lug provided in the control box for grounding the unit.

STARTUP & ADJUSTMENTS

Pre-Start Check List

Prior to start-up, complete the following inspection:

- ✓ Verify the unit is level and condensate can drain. Check condensate drain line(s) for proper slope and trap.
- ✓ Verify the air handler is mounted securely.
- ✓ Verify the surrounding area and top of the unit is free from obstructions and debris.
- ✓ Check all ductwork connections. Make sure the duct work is adequately sealed to prevent air leakage.
- ✓ Check all coil connections for leaks.
- ✓ Verify that the line voltage power leads are securely connected and the unit is properly grounded.
- ✓ Verify that the low voltage wires are securely connected to the correct leads on the low voltage terminal strip. Make sure the thermostat is wired correctly.
- ✓ Verify the blower rotates properly. Check the blower belt between the pulleys for proper tension and alignment.
- ✓ Verify the power supply branch circuit overcurrent protection is sized properly.
- ✓ Verify all filters are in place and all equipment access/control panels are in place

Blower Rotation - 3 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.

Blower Speed Adjustment

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. Please refer to the Blower Performance Data section (page 12).

NOTE: Adjustment of the blower speed is made through varying the pitch of the motor sheave. This adjustment allows for a wide range of installation applications. Do not adjust a sheave to a setting not shown in the tables.

Motor Sheave Adjustment

The motor sheave consists of an outer, moveable pulley face and an inner stationary face. To adjust the motor sheave,

1. Relieve the belt pressure by loosening motor mount bolts and the belt tensioning bolts on the motor mount.
2. Move the blower fan belt out of the way (if necessary) and loosen the set screw in the outer sheave face.
3. Rotate the face in increments of one half or full turns only. **NOTE:** This maintains the set screw position precisely over the flats on the pulley hub. Rotating the sheave clockwise (when viewed from the lead end of motor - opposite end of shaft) will make the blower run slower which decreases airflow. Rotating the sheave counter clockwise (as viewed from lead end) will cause the blower to speed up.
4. Tighten the setscrews after the desired adjustment has been made and verify the moveable face is properly secured.

V-Belt Alignment & Tensioning

IMPORTANT! Belt alignment is extremely critical for proper operation and life expectancy of belts and motor bearings. If not equipped with proper alignment tools, prior to removal of blower and motor pulley, measure center of each pulley to a reference point for replacement of new pulleys.

After installing the blower pulley onto the blower shaft, use an in-groove belt alignment tool to verify the parallel offset of the sheave and pulley. If a laser alignment tool is unavailable, place a straight edge, piano wire, or string in the center of the adjustable sheave and pulley V-notch to adjust parallel offset alignments.

NOTE: The straight edge, piano wire or string should be close to the center of the groove and contact each sheave in two places (see Figure 6). The objective is to have the center lines of the two sheaves in line. Belt drives should be aligned as perfect as possible to maximize drive life.

Calculate or measure the belt span length as shown in Figures 7 & 8 (page 9). Calculate the required deflection by multiplying this number by 1/64. For example, if the belt span is 32 inches, $32 \times 1/64 = 1/2$ inch deflection.

NOTE: Excessively high or low tensions will affect belt life. Check belt tensions again after 24 hours of operation. Keep extra belts stored in a cool, dark, dry place.

The belt tension is controlled utilizing the adjustable motor mounting plate. To release the belt tension, first loosen the 4 motor mounting nuts that attach the motor to the mounting plate approximately 1/2-1 turn and then use the adjusting bolt to release the belt tension. To tighten, complete the steps in the reverse order.

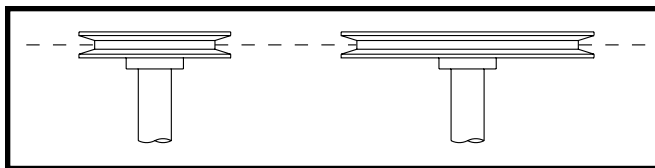


Figure 2. V-Belt Alignment

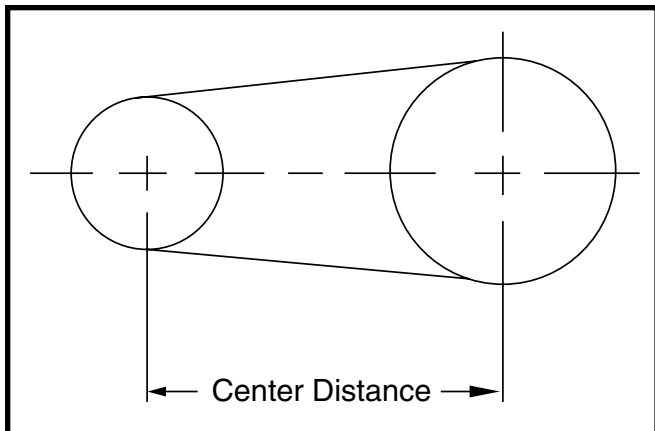


Figure 3. Pulley Alignment

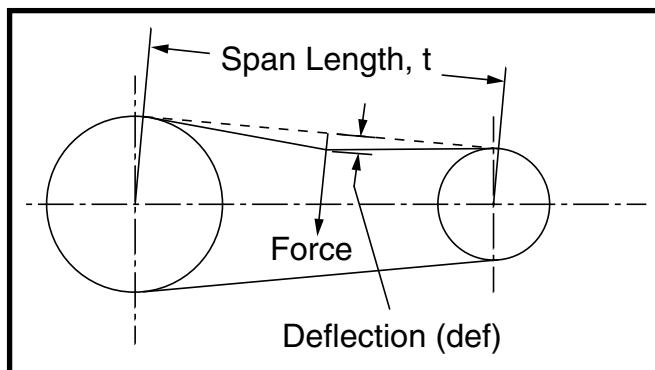


Figure 4. Tensioning V-Belts

UNIT MAINTENANCE

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.

The maintenance information listed below should be performed in accordance with the Maintenance Schedule shown in Figure 9 (page 16).

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 & dry thoroughly before reinstalling.

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

V-Belts - Inspect for cracks, tears, and excessive or abnormal wear. V-belts tend to elongate over time with 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.

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 - Inspect the blower wheel blades for accumulations of dirt and clean if necessary. Inspect mounting nut for tightness when done.

Blower Motor & Assembly - Inspect the blower assembly and motor mounting brackets for tightness and corrosion. Correct deficiencies if necessary. The blower motor contains sealed bearings and under normal operating conditions, no maintenance is necessary for the life of the equipment.

FIGURES & TABLES

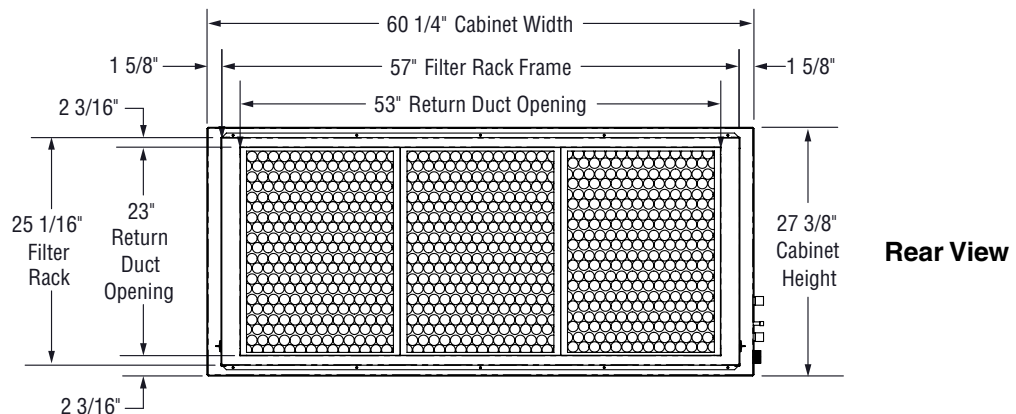
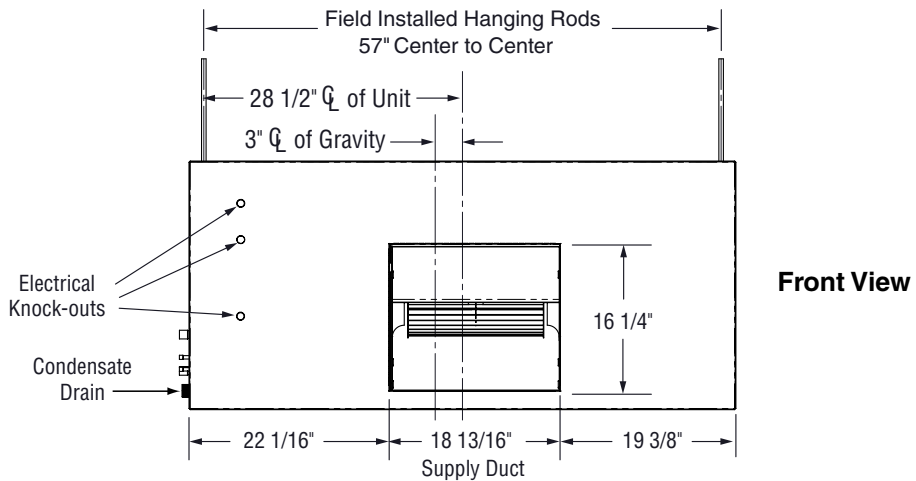
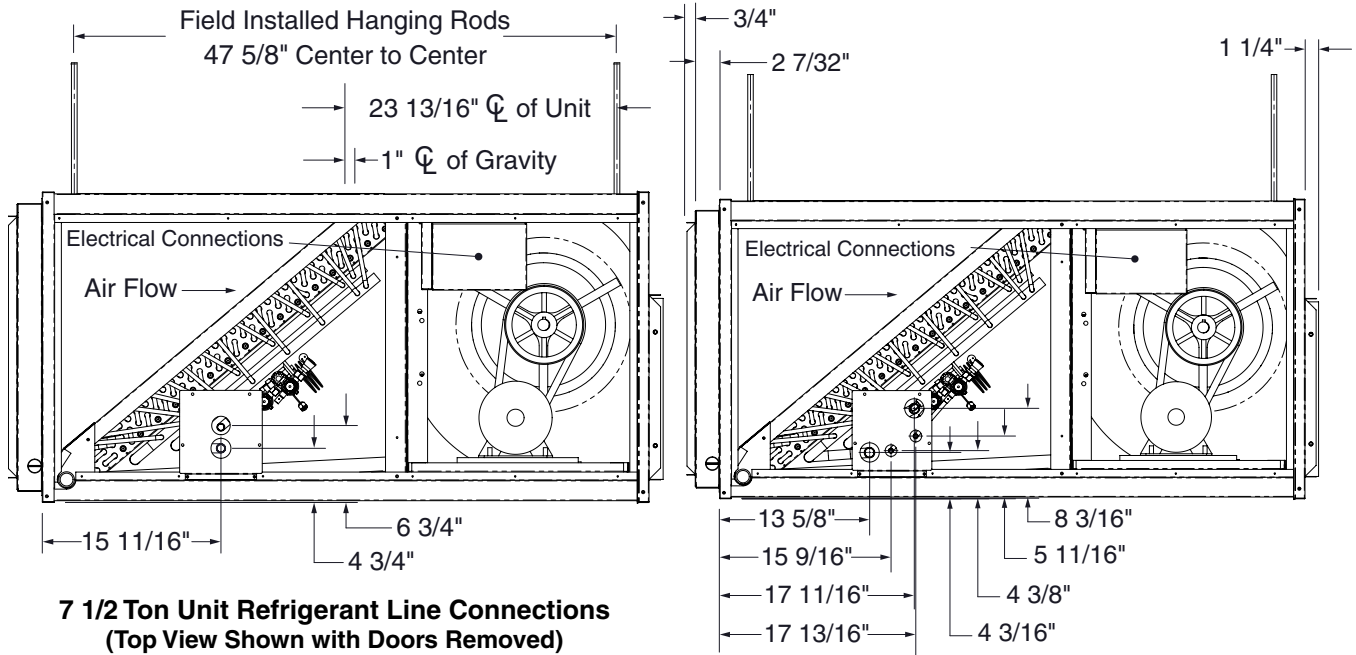
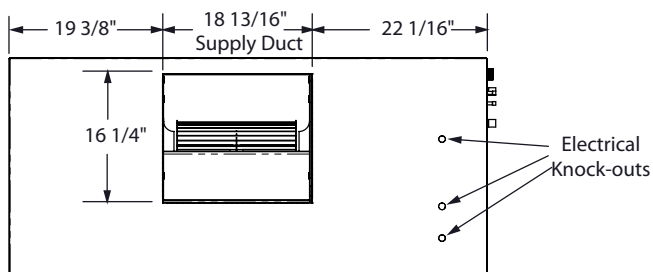
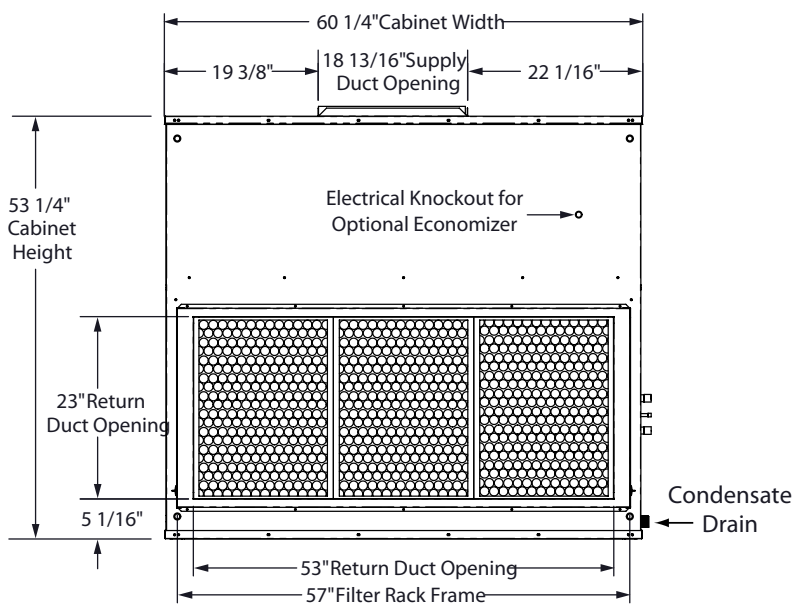


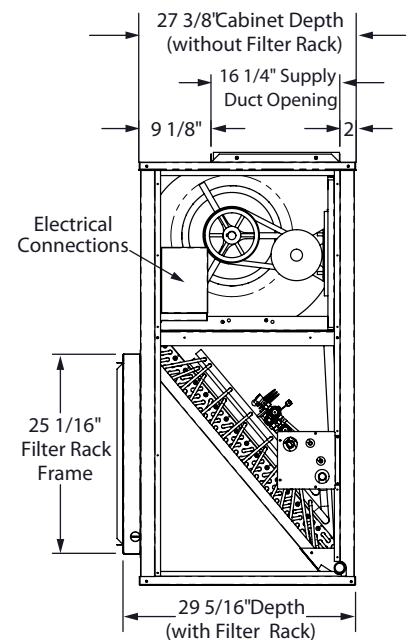
Figure 5. B5SM Physical Dimensions for Horizontal Installations



Top View



Front View



Side View

Figure 6. B5SM Physical Dimensions for Vertical Installations

Blower Performance Tables

This equipment is equipped with a belt driven blower assembly in order to accommodate a large variety of duct configurations and airflow selections. The blower has been factory inspected for proper alignment, operation and rotational direction. For a more detailed explanation of belt driven blower drives and the operation of their components please refer to any of the installation instructions listed below for the high static drive kits.

The factory standard drive installed in these units has been set to deliver 400 Cfm/ton at an External Static Pressure (ESP) of 0.25-0.30 in-Wg. Consult Table 4 or the unit rating label for the proper air filter size, circulating airflow and temperature rise for your unit. Tables 5-10 show the full blower curves of these drive configurations and can be utilized to easily set the adjustable motor sheave for alternate configurations. Refer to the Legend below for a description of the table information. After a sheave setting has been made, always inspect the blower amp draw to ensure that it is less then the service factor amps listed on the motor. For systems that include a large number of accessories or have very restrictive duct systems, alternate drive kits are available. Refer to Table 3 below for the applicable kits. The full blower curves for the HSD kits can be found in the applicable kit installation instructions or in the unit technical service literature.

Table Legend

3862
1159
3.03

Indicates a recommended unit operational point

3493
1017
2.07

Indicates an allowable setting that is not recommended for unit operation†

† These operational points should be carefully examined by the installer for proper unit setup and heater operation if used.

--

Indicates a setting that is not permitted for unit operation

Unit Model #	E.S.P. Range (in-Wg)	Blower Rpm Range	HSD Kit
-090Ja	0.2 - 0.9	575 - 831	921428
	0.3 - 1.2	610 - 898	
-120Ja	0.1 - 1.2	727 - 971	921429

Refer to B5SM TSL or Accessory Kit Installation Instructions for actual blower charts

Table 3. B5SM Series Alternate Accessory Blower Drives

Model B5SM	Nominal CFM	1" permanent Filters (Supplied)		Wet Coil Correction Δ P (in-Wg)
		Size	Δ P (in-Wg)	
090 (J/K)a	2200	18 x 24	0.03	0.017
	2600		0.04	0.019
	3000		0.05	0.021
	3400		0.07	0.023
	3800		0.08	0.025
	4200		0.09	0.026
120 (J/K)a	3000	18 x 24	0.05	0.180
	3400		0.07	0.202
	3800		0.08	0.223
	4200		0.09	0.245
	4600		0.11	0.266
	5000		0.13	0.287

Table 4. Pressure Drop Across Filters

B5SM-090Ka

Factory Standard: 2Hp Blower Performance Chart

‡ Indicates Factory Sheave Setting

External Unit Static (in-Wg)	Operation @ 230V	Adjustable Motor Sheave Setting												
		Fully Closed	1/2 Turn Open	1 Turn Open	1.5 Turns Open	2 Turns Open	2.5 Turns Open	3 Turns Open	3.5 Turns Open	4 Turns Open	4.5 Turns Open ‡	5 Turns Open	5.5 Turns Open	6 Turns Open
0.1	CFM									3747	3599	3450		
	RPM									614	592	570		
	kW									1.01	0.91	0.80		
0.2	CFM								3657	3491	3330	3169		
	RPM								637	616	595	573		
	kW								1.02	0.93	0.84	0.75		
0.3	CFM						3740	3585	3397	3209	3030	2851		
	RPM						680	659	639	619	597	575		
	kW						1.15	1.04	0.96	0.87	0.78	0.68		
0.4	CFM					3657	3478	3298	3088	2877	2675	2472		
	RPM					702	682	661	641	621	600	578		
	kW					1.17	1.07	0.97	0.87	0.78	0.69	0.61		
0.5	CFM			3700	3544	3387	3186	2985	2734	2482				
	RPM			739	722	705	684	663	644	624				
	kW			1.38	1.24	1.10	0.98	0.87	0.79	0.70				
0.6	CFM		3685	3441	3262	3082	2851	2619						
	RPM		765	741	724	707	686	665						
	kW		1.28	1.28	1.14	0.99	0.89	0.79						
0.7	CFM	3587	3403	3161	2944	2727	2232							
	RPM	788	767	743	727	710	690							
	kW	1.35	1.15	1.18	1.04	0.90	0.77							
0.8	CFM	3293	3074	2796	2323									
	RPM	791	770	746	730									
	kW	1.25	1.06	1.07	0.89									
0.9	CFM	2924	2206											
	RPM	794	774											
	kW	1.11	0.86											
1.0	CFM													
	RPM													
	kW													

Values includes losses for: Unit Casing, 1" Permanent Filters & Dry Evaporator Coil

When utilized with H7HK Heater kits, not all operational points shown may be available for use. Refer to the H7HK Installation Instructions to determine the minimum airflow requirements of the applicable heater assembly.

**Table 5. Blower Performance for B5SM-090Ka Series
(Single - Phase, 7.5 Ton Models Only)**

B5SM-120Ka

Factory Standard: 2Hp Blower Performance Chart

‡ Indicates Factory Sheave Setting

External Unit Static (in-Wg)	Operation @ 230V	Adjustable Motor Sheave Setting												
		Fully Closed	1/2 Turn Open	1 Turn Open	1.5 Turns Open	2 Turns Open	2.5 Turns Open	3 Turns Open	3.5 Turns Open ‡	4 Turns Open	4.5 Turns Open	5 Turns Open	5.5 Turns Open	6 Turns Open
0.1	CFM						4777	4668	4529	4390	4258	4125		
	RPM						818	796	774	751	728	705		
	kW						2.01	1.82	1.67	1.53	1.39	1.25		
0.2	CFM					4742	4624	4505	4366	4227	4066	3904		
	RPM					841	820	799	777	755	732	709		
	kW					2.13	1.93	1.73	1.60	1.47	1.33	1.19		
0.3	CFM				4753	4619	4482	4345	4197	4048	3877	3705		
	RPM				860	842	822	801	779	757	734	711		
	kW				2.20	2.05	1.85	1.66	1.53	1.41	1.27	1.14		
0.4	CFM			4750	4599	4447	4318	4189	4027	3864	3685	3506		
	RPM			879	862	844	825	805	782	759	736	712		
	kW			2.25	2.11	1.96	1.77	1.58	1.48	1.37	1.22	1.08		
0.5	CFM			4599	4457	4315	2668	1020	2347	3674	3472	3270		
	RPM			882	865	847	829	810	786	761	737	713		
	kW			2.16	2.03	1.89	1.70	1.51	1.40	1.28	1.14	0.99		
0.6	CFM			4461	4302	4143	3991	3838	3645	3452	3223	2994		
	RPM			888	869	850	831	812	788	763	739	714		
	kW			2.08	1.95	1.82	1.63	1.44	1.31	1.19	1.06	0.93		
0.7	CFM		4385	4239	4080	3920	3776	3631	3412	3111				
	RPM		906	892	873	853	834	814	790	765				
	kW		2.15	1.94	1.82	1.70	1.53	1.36	1.24	1.09				
0.8	CFM		4222	4119	3911	3703	3536	3368	3081					
	RPM		909	895	876	856	837	818	793					
	kW		2.05	1.88	1.74	1.61	1.43	1.26	1.11					
0.9	CFM	4167	4035	3921	3674	3426	3276	3125						
	RPM	928	915	899	879	859	840	821						
	kW	2.22	1.95	1.78	1.63	1.47	1.31	1.15						
1.0	CFM	3965	3814	3619	3362	3104								
	RPM	933	920	904	884	864								
	kW	2.09	1.83	1.62	1.48	1.35								
1.1	CFM	3715	3528											
	RPM	941	927											
	kW	1.93	1.69											
1.2	CFM	3407												
	RPM	949												
	kW	1.77												

Values includes losses for: Unit Casing, 1" Permanent Filters & Dry Evaporator Coil

When utilized with H7HK Heater kits, not all operational points shown may be available for use. Refer to the H7HK Installation Instructions to determine the minimum airflow requirements of the applicable heater assembly.

**Table 6. Blower Performance for B5SM-120Ka Series
(Single - Phase, 10 Ton Models Only)**

B5SM-090Ja

Factory Standard: 1Hp Blower Performance Chart

‡ Indicates Factory Sheave Setting

External Unit Static (in-Wg)	Operating @ 230 or 460 Volts	Adjustable Motor Sheave Setting												
		Fully Closed	1/2 Turn Open	1 Turn Open	1.5 Turns Open	2 Turns Open	2.5 Turns Open	3 Turns Open ‡	3.5 Turns Open	4 Turns Open	4.5 Turns Open	5 Turns Open	5.5 Turns Open	6 Turns Open
0.1	CFM							3585	3423	3260	3099	2937		
	RPM							595	573	551	529	506		
	kW							0.81	0.73	0.66	0.59	0.53		
0.2	CFM					3657	3495	3332	3154	2975	2796	2616		
	RPM					645	622	598	576	554	532	509		
	kW					0.95	0.84	0.74	0.66	0.59	0.53	0.48		
0.3	CFM				3571	3408	3224	3040	2857	2674	2440	2205		
	RPM				668	647	624	600	578	556	534	511		
	kW				0.95	0.88	0.78	0.67	0.60	0.53	0.47	0.41		
0.4	CFM		3660	3487	3299	3110	2900	2690	2259					
	RPM		711	691	670	649	626	602	581					
	kW		1.07	0.98	0.89	0.81	0.70	0.60	0.51					
0.5	CFM		3405	3209	2996	2783	2316							
	RPM		713	693	672	651	629							
	kW		0.99	0.88	0.80	0.72	0.59							
0.6	CFM	3313	3113	2891	2393									
	RPM	735	715	695	675									
	kW	1.01	0.89	0.79	0.67									
0.7	CFM	3021	2797											
	RPM	737	717											
	kW	0.94	0.81											
0.8	CFM													
	RPM													
	kW													
0.9	CFM													
	RPM													
	kW													
1.0	CFM													
	RPM													
	kW													

Values includes losses for: Unit Casing, 1" Permanent Filters & Dry Evaporator Coil

When utilized with H7HK Heater kits, not all operational points shown may be available for use. Refer to the H7HK Installation Instructions to determine the minimum airflow requirements of the applicable heater assembly.

Refer to Blower Application Table for Alternate Accessory Drive Options Available

**Table 7. Blower Performance for B5SM-090Ja Series
(Three - Phase, 7.5 Ton Models Only)**

B5SM-120Ja

Factory Standard: 1.5Hp Blower Performance Chart

‡ Indicates Factory Sheave Setting

External Unit Static (in-Wg)	Operating @ 230 or 460 Volts	Adjustable Motor Sheave Setting												
		Fully Closed	1/2 Turn Open	1 Turn Open	1.5 Turns Open ‡	2 Turns Open	2.5 Turns Open	3 Turns Open	3.5 Turns Open	4 Turns Open	4.5 Turns Open	5 Turns Open	5.5 Turns Open	6 Turns Open
0.1	CFM			4427	4290	4152	3979	3806	3633	3459	3291	3123		
	RPM			764	740	715	687	658	635	611	585	558		
	kW			1.51	1.39	1.26	1.14	1.01	0.90	0.79	0.72	0.65		
0.2	CFM			4256	4108	3959	3787	3615	3427	3238	3058			
	RPM			766	742	717	689	660	636	612	586			
	kW			1.44	1.32	1.20	1.08	0.96	0.85	0.74	0.67			
0.3	CFM			4087	3932	3776	3591	3406	3200	2993				
	RPM			768	744	719	691	662	639	615				
	kW			1.38	1.26	1.15	1.02	0.90	0.79	0.68				
0.4	CFM		4155	3929	3755	3580	3361	3141						
	RPM		803	770	746	721	693	664						
	kW		1.54	1.32	1.20	1.09	0.96	0.83						
0.5	CFM		3969	3704	3514	3323	3058							
	RPM		805	772	748	723	695							
	kW		1.46	1.23	1.11	1.00	0.87							
0.6	CFM	3925	3767	3422	3238	3053								
	RPM	827	806	774	750	725								
	kW	1.52	1.38	1.14	1.03	0.91								
0.7	CFM	3700	3549	3098										
	RPM	831	809	776										
	kW	1.43	1.27	1.04										
0.8	CFM	3463	3191											
	RPM	832	813											
	kW	1.33	1.16											
0.9	CFM	3107												
	RPM	835												
	kW	1.21												
1.0	CFM													
	RPM													
	kW													

Values includes losses for: Unit Casing, 1" Permanent Filters & Dry Evaporator Coil

When utilized with H7HK Heater kits, not all operational points shown may be available for use. Refer to the H7HK Installation Instructions to determine the minimum airflow requirements of the applicable heater assembly.

Refer to Blower Application Table for Alternate Accessory Drive Options Available

**Table 8. Blower Performance for B5SM-120Ja Series
(Three - Phase, 10 Ton Models Only)**

ELECTRICAL INFORMATION

WIRING DIAGRAM

B5SM Series

7.5/10T Air Handler Systems

GENERAL NOTES:

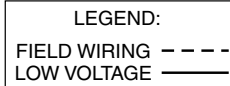
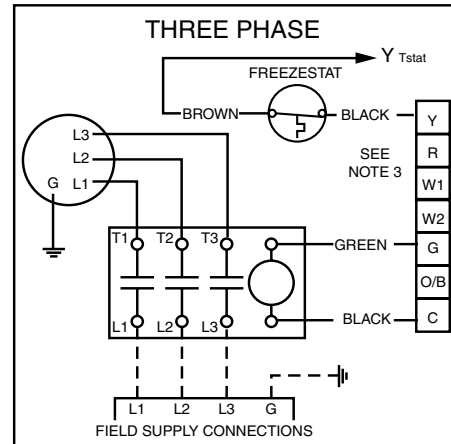
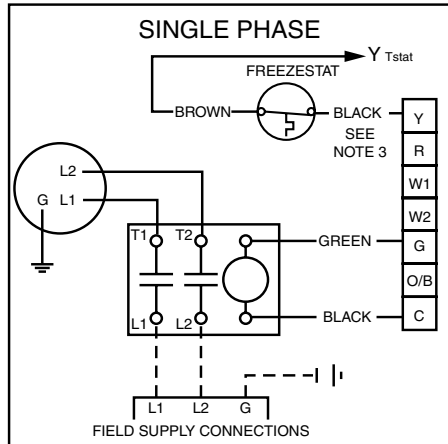
1. Disconnect all power before servicing.
2. If wiring must be replaced, use only 105°C copper wire of the same gauge.
3. For economizer application, refer to wiring instructions in economizer installation instructions for connection details.

Electrical Configurations

Elec. Code	Freq./Phase	Voltages
J	60 Hz / 3Ø	208-230 / 460V
K	60 Hz / 1Ø	208-230

THREE PHASE ONLY NOTES:

1. Three phase units are factory wired for 460V/60Hz operation.
2. To reverse motor rotation, interchange any two field wired line leads.
3. To reconfigure 3Ø units for operation at 208-230V. Refer to motor wiring diagram on the motor case or the unit installation instructions.



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Figure 7. Wiring Diagram for Single & Three Phase Units

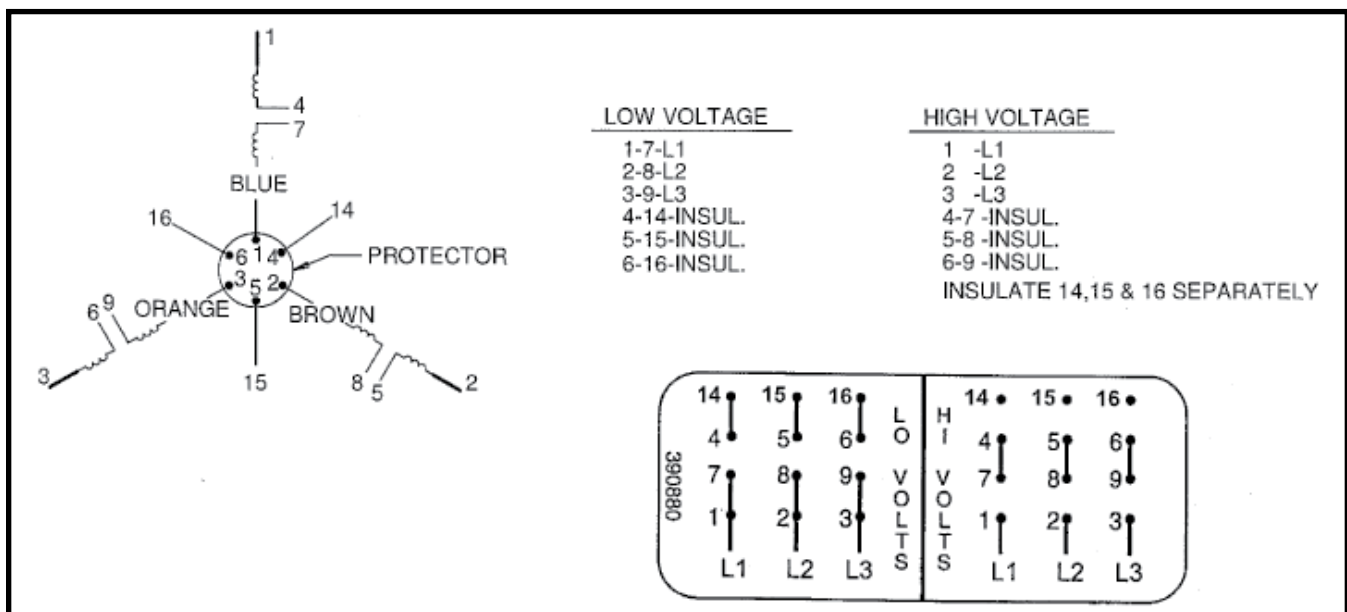
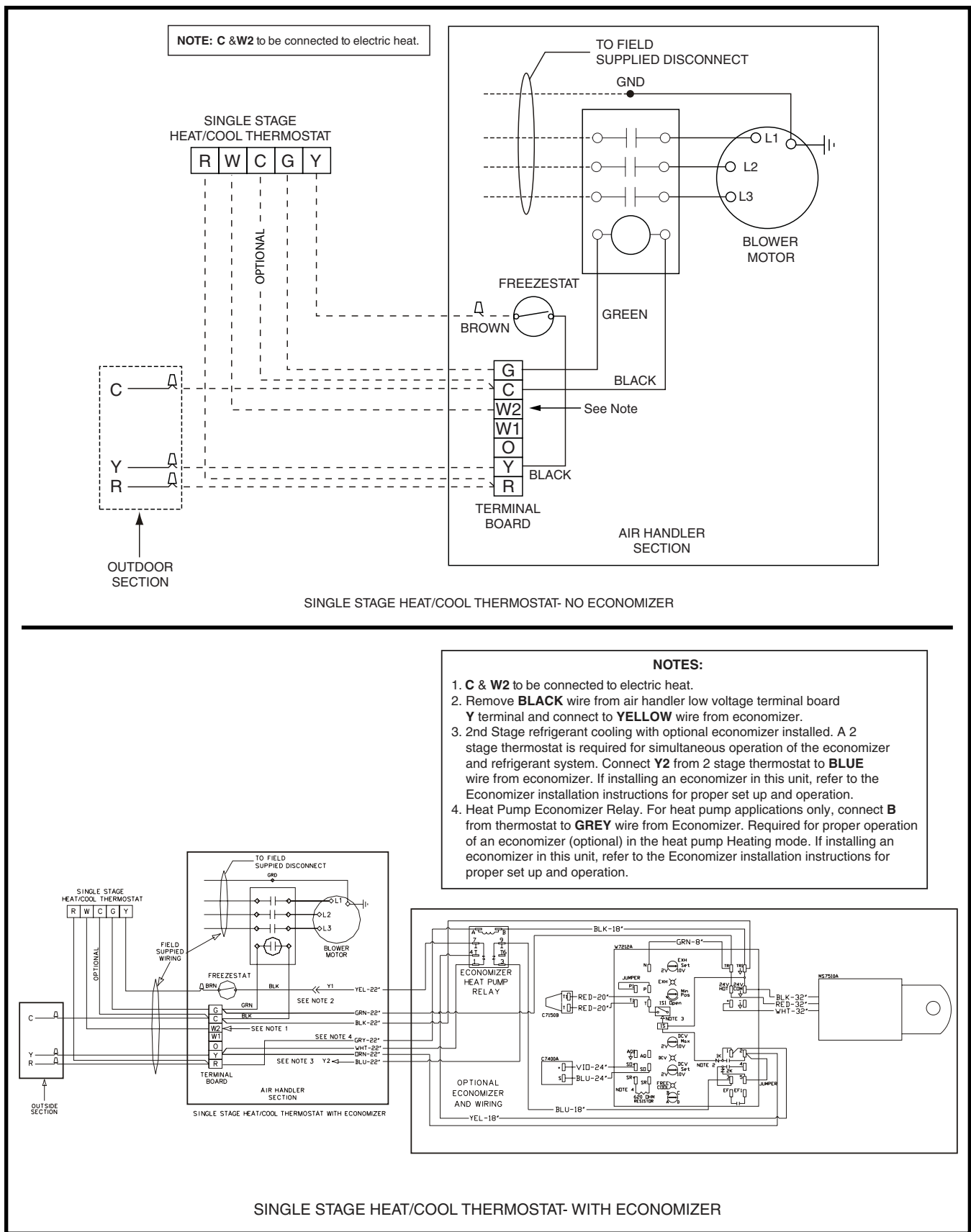


Figure 8. Motor Wiring Diagram (3-Phase Only)



INSTALLERS NAME: _____

DATE INSTALLED: _____

MAINTENANCE TASK	PERFORMANCE SCHEDULE				DATE PERFORMED													
	W	M	SA	A														
AIR FILTERS																		
Inspect, clean, or replace as required.		X																
CONDENSATE DRAIN(S) & PAN																		
Clean condensate drain pan		X																
Inspect the flow of condensate through the drain lines. Clean or correct problems as necessary.		X																
BLOWER ASSEMBLY																		
Inspect the fan belt for wear, alignment, & proper tension. Replace or adjust as required.		X																
Clean the blower wheel and housing			X															
Inspect the blower assembly and hardware for corrosion. Is the hardware secured tightly.				X														
Inspect the blower coil unit casing for corrosion and loose fasteners				X														
COILS																		
Inspect the coil fins for excessive dirt or damage. Clean or repair if required.			X															
Inspect all coil connections for leaks.				X														
AIR HANDLER ASSEMBLY																		
Inspect mounting hardware for corrosion. Is the hardware secured tightly.				X														
Inspect filter rack mounting hardware. Is it secured to the unit tightly?				X														
Inspect panel assemblies for proper installation and security.				X														

NOTE: The schedule above is for normal duty applications only. For severe duty applications, adjust schedule as appropriate. Additional tasks may be required for severe duty applications. W = Weekly, M = Monthly, SA = Semi Annually, A = Annually

Table 9. Maintenance Schedule

INSTALLER: PLEASE LEAVE THESE INSTRUCTIONS WITH THE OWNER.



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