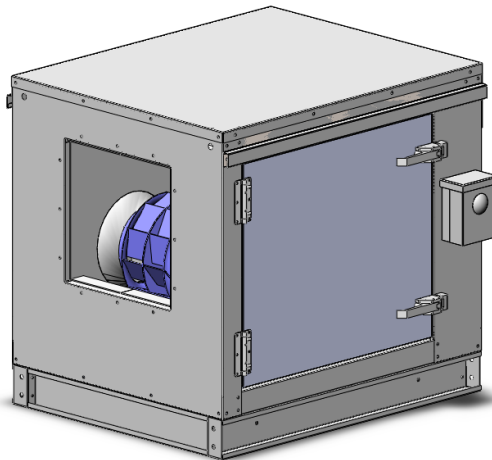


PCU and Inline Exhaust Fan
Installation, Operation, and Maintenance Manual



RECEIVING AND INSPECTION

Upon receiving unit, check for any interior and exterior damage, and if found, report it immediately to the carrier. Also check that all accessory items are accounted for and are damage free. Turn the blower wheel by hand to verify free rotation and check the damper (if supplied) for free operation.

WARNING!!

Installation of this ventilator should only be performed by a qualified professional who has read and understands these instructions and is familiar with proper safety precautions. Improper installation poses serious risk of injury due to electric shock, contact with rotating equipment, and other potential hazards. Read this manual thoroughly before installing or servicing this equipment. **ALWAYS** disconnect power prior to working on fan.

Save these instructions. This document is the property of the owner of this equipment and is required for future maintenance. Leave this document with the owner when installation or service is complete.

TABLE OF CONTENTS

WARRANTY.....	3
LISTINGS.....	4
INSTALLATION.....	4
Mechanical.....	4
Site Preparation.....	4
Roof Mounting.....	4
Indoor Mounting.....	4
Curb and Ductwork.....	5
Table 1 - Recommended Discharge Ductwork Size.....	5
Typical Roof Mount KB Installation with PCU.....	6
Typical Indoor KB Installation with PCU.....	6
Typical Roof Mount KB-INLINE Installation.....	7
Typical Indoor KB-INLINE Installation.....	7
Table 2 - Copper Wire Ampacity.....	8
Fan to Building Wiring Connection.....	9
OPERATION.....	10
Start Up.....	10
Special Tools Required.....	10
Start Up Procedure.....	10
Pulley Adjustment (Belt Drive Fans).....	11
Figure 7 - Pulley Setscrew Torque.....	11
Pulley Alignment.....	11
Proper Belt Tension.....	11
Pulley Combination Chart for 3600 RPM Motors.....	11
Pulley Combination Chart for 1800 RPM Motors.....	13
Pulley Combination Chart for 25/30/40 HP Motors (Triple Groove Fixed Speed pulleys).....	14
Troubleshooting.....	14
Troubleshooting Chart.....	14
MAINTENANCE.....	15
General Maintenance.....	15
2 weeks after startup.....	15
Every 3 months.....	15
Yearly.....	15
Start-Up and Maintenance Documentation.....	16
Job Information.....	16
Fan Unit Information.....	16
Maintenance Record.....	16
Factory Service Department.....	16

WARRANTY

This equipment is warranted to be free from defects in materials and workmanship, under normal use and service, for a period of 12 months from date of shipment. This warranty shall not apply if:

1. The equipment is not installed by a qualified installer per the MANUFACTURER'S installation instructions shipped with the product,
2. The equipment is not installed in accordance with federal, state and local codes and regulations,
3. The equipment is misused or neglected,
4. The equipment is not operated within its published capacity,
5. The invoice is not paid within the terms of the sales agreement.

The MANUFACTURER shall not be liable for incidental and consequential losses and damages potentially attributable to malfunctioning equipment. Should any part of the equipment prove to be defective in material or workmanship within the 12-month warranty period, upon examination by the MANUFACTURER, such part will be repaired or replaced by MANUFACTURER at no charge. The BUYER shall pay all labor costs incurred in connection with such repair or replacement. Equipment shall not be returned without MANUFACTURER'S prior authorization and all returned equipment shall be shipped by the BUYER, freight prepaid to a destination determined by the MANUFACTURER.

LISTINGS

The KB fan is ETL listed to standard UL-705 (electrical). The KB fan complies with UL-762 and CSA Std C22.2, No.113 listing when attached to a multi-pass air cleaning unit and installed in accordance with National Fire Protection Association Standard “NFPA 96, Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations”.

KB-INLINE is ETL listed and complies with UL705 (electrical) and UL762 and CSA Std C22.2, No 113.

INSTALLATION

It is imperative that this unit is installed and operated with the designed airflow and electrical supply in accordance with this manual. If there are any questions about any items, please call the service department at **1-866-784-6900** for warranty and technical support issues.

Mechanical

WARNING: DO NOT RAISE VENTILATOR BY THE HOOD, BLOWER OR MOTOR SHAFT, OR BEARINGS – USE LIFTING LUGS PROVIDED OR A SLING

Site Preparation

1. Provide clearance around installation site to safely rig and lift equipment into its final position. Supports must adequately support equipment. Refer to manufacturer’s estimated weights.
2. Consider general service and installation space when locating unit.
3. Locate unit close to the space it will serve to reduce long, twisted duct runs.
4. The fan discharge must be located at least 10 feet away from any supply intakes. The fan discharge shall be located in accordance with the applicable building code provisions.
5. The PCU is designed to operate in a negative pressure environment. Be sure to install the KB unit after a PCU. This will also keep the fan cleaner during operation.

Roof Mounting

1. Ventilators are designed for installation atop a prefabricated or factory built roof curb. Follow manufacturer’s instructions for proper curb installation.
2. Secure ventilator curb through vertical portion of the ventilator base assembly flange using a minimum of eight (8) lug screws, anchor bolts, or other suitable fasteners (not furnished).
3. Before connecting fan motor to power source verify power line wiring is de-energized.
4. Connect power supply wiring to the motor as indicated on the motor nameplate or terminal box cover. Make certain that the power source is compatible with the requirements of your equipment.
5. Before powering up fan check ventilator wheel for free rotation.
6. Check all fasteners for tightness.

Indoor Mounting

1. Ventilators are designed for installation in indoor or inline installations.
2. Optional uni-strut bars can be ordered to suspend the unit from a roof structure.
3. 18 inches of clearance are required on all sides of the ventilator or the unit must be wrapped with clearance reducing grease rated insulation.
4. Before connecting fan motor to power source verify power line wiring is de-energized.
5. Connect power supply wiring to the motor as indicated on the motor nameplate or terminal box cover. Make certain that the power source is compatible with the requirements of your equipment.
6. Before powering up fan check ventilator wheel for free rotation.
7. Check all fasteners for tightness.

Curb and Ductwork

This fan was specified for a specific CFM and static pressure. The ductwork attached to this unit will significantly affect the airflow performance. Flexible ductwork and square elbows should not be used. Also, transitions and turns in ductwork near the fan inlet will cause system effect and will drastically increase the static pressure and reduce airflow. **Follow SMACNA guides and recommendations for the remaining duct run.** Fans designed for rooftop installation should be installed on a prefabricated or factory built roof curb. Follow curb manufacturer's instructions for proper curb installation. Curbs should be connected to structural roof members with at least four (3) lug screws, anchor bolts, or other suitable fasteners (not furnished) per curb flange. Curb flanges should be caulked to roof.

Table 1 - Recommended Discharge Ductwork Size

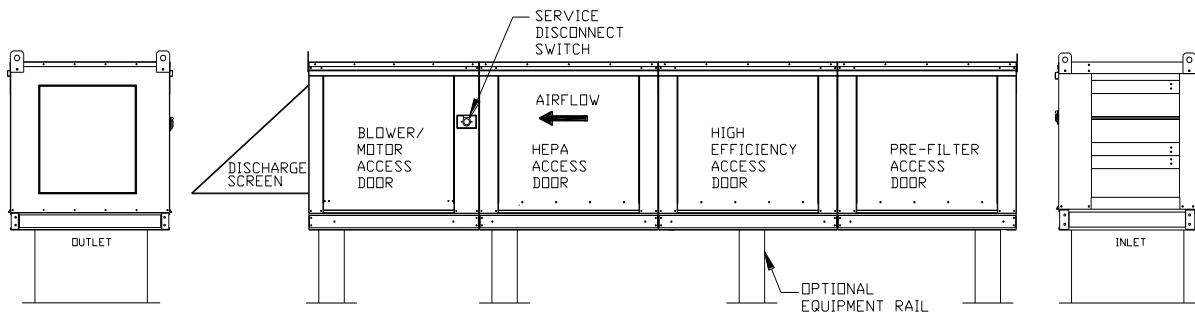
Blower Size	Min. Rectangular Duct Size	Min. Round Duct Diameter	Min. Straight Duct Length
10	14 in. x 14 in.	19 in.	48 in.
14	20 in. x 20 in.	26 in.	72 in.
18	24 in. x 24 in.	33 in.	86 in.
20	26 in. x 26 in.	37 in.	108 in.
25	32 in. x 32 in.	46 in.	168 in.
32	40 in. x 40 in.	57 in.	208 in.

The fan should be installed on a curb and/or rail elevated not less than 14" above any surface when installed outdoors. Be sure duct connection and fan outlet are properly aligned and sealed. Secure fan to curb through vertical portion of the ventilator base assembly flange using a minimum of eight (8) lug screws, anchor bolts, or other suitable fasteners (not furnished). Shims may be required depending upon curb installation and roofing material. Check all fasteners for tightness. The diagrams below show different mechanical installation configurations.

Ensure duct connections are properly aligned and sealed. When this fan unit is used in commercial grease ductwork, the ductwork connections must be **FULLY WELDED** to the fan. Clearance ratings of ductwork connected to the unit apply to the fan as well. Ductwork must be listed or installed in accordance with the IMC.

Typical Roof Mount KB Installation with PCU

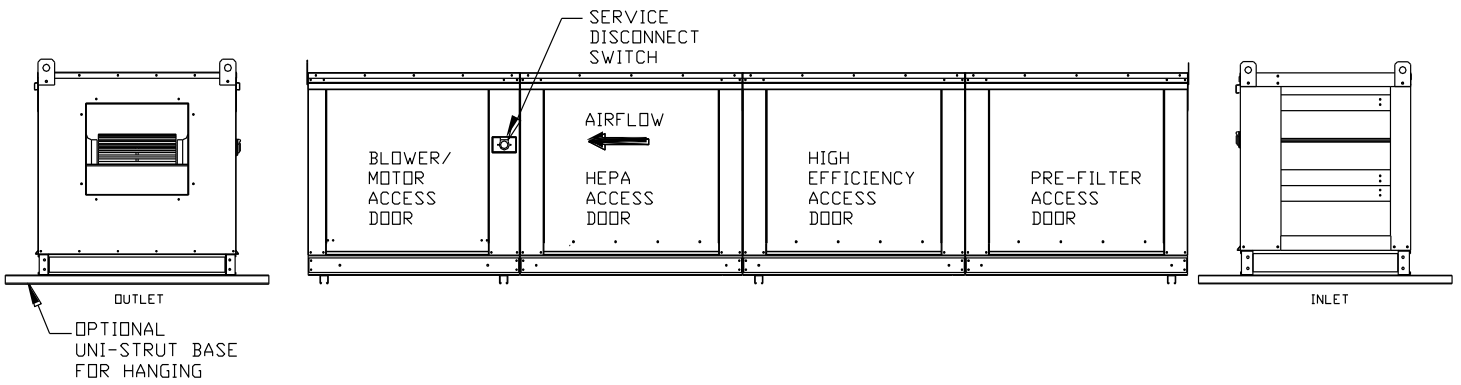
Figure 1



NOTE: For size 7 PCU, use the Auto Draw submittal for rail placement and dimensions.

Typical Indoor KB Installation with PCU

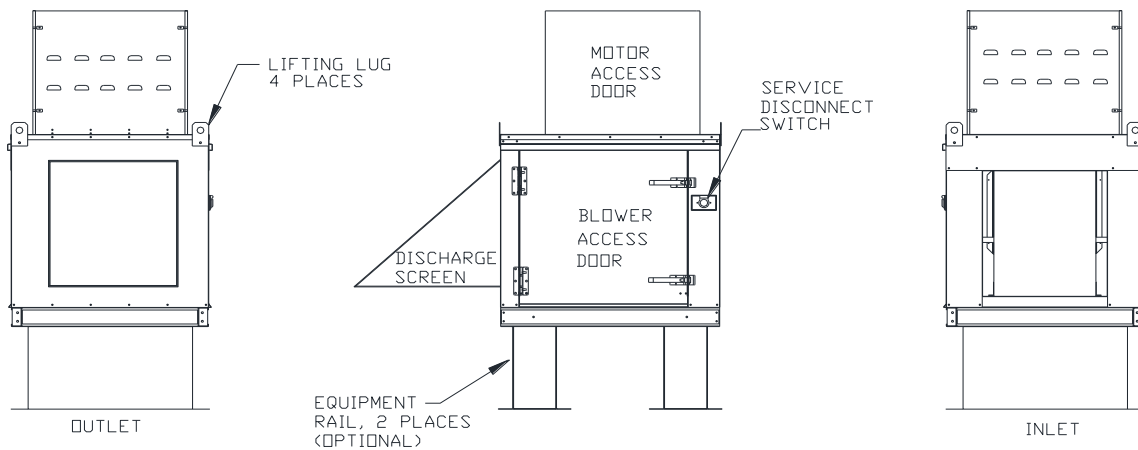
Figure 2



NOTE: For size 7 PCU, use the Auto Draw submittal for placement of uni-strut and dimensions.

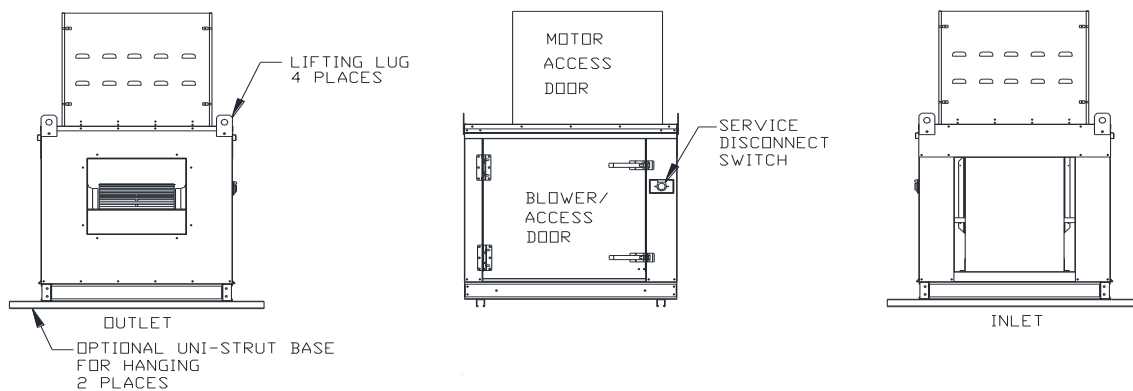
Typical Roof Mount KB-INLINE Installation

Figure 3



Typical Indoor KB-INLINE Installation

Figure 4



Electrical

Before connecting power to the fan, read and understand this entire section of this document. As-built wiring diagrams are available with each fan by the factory.

Electrical wiring and connections should be done in accordance with local ordinances and the National Electric Code, ANSI/NFPA70. Be sure the voltage and phase of the power supply and the wire amperage capacity is in accordance with the motor nameplate. For additional safety information refer to AMCA publication 410-96, *Recommended Safety Practices for Users and Installers of Industrial and Commercial Fans*.

1. Always **disconnect power** before working on or near a fan. Lock and tag the disconnect switch or breaker to prevent accidental power up.
2. A disconnect switch is shipped with every fan. The switch is located on the exterior of up-blast fans and in the interior of down-blast fans. On down-blast direct drive fans, the disconnect function is built into the speed controller.
3. A dedicated branch circuit should supply the motor circuit with short circuit protection according to the National Electric Code. This dedicated branch should be run to the junction box mentioned above and connected as shown in a following illustration labeled "Fan to Building Wiring Connection".
4. Make certain that the power source is compatible with the requirements of your equipment. The fan nameplate identifies the **proper phase and voltage** of the motor.
5. Before connecting fan to building power source, verify power line wiring is de-energized.
6. Secure the power cable to prevent contact with sharp objects.
7. Do not kink power cable and never allow the cable to come in contact with oil, grease, hot surfaces or chemicals.
8. Before powering up fan check fan wheel for free rotation and make sure that the interior of the fan is free of loose debris or shipping materials.
9. If any of the original wire supplied with the fan must be replaced, it must be replaced with type TW wire or equivalent.

WARNING!!

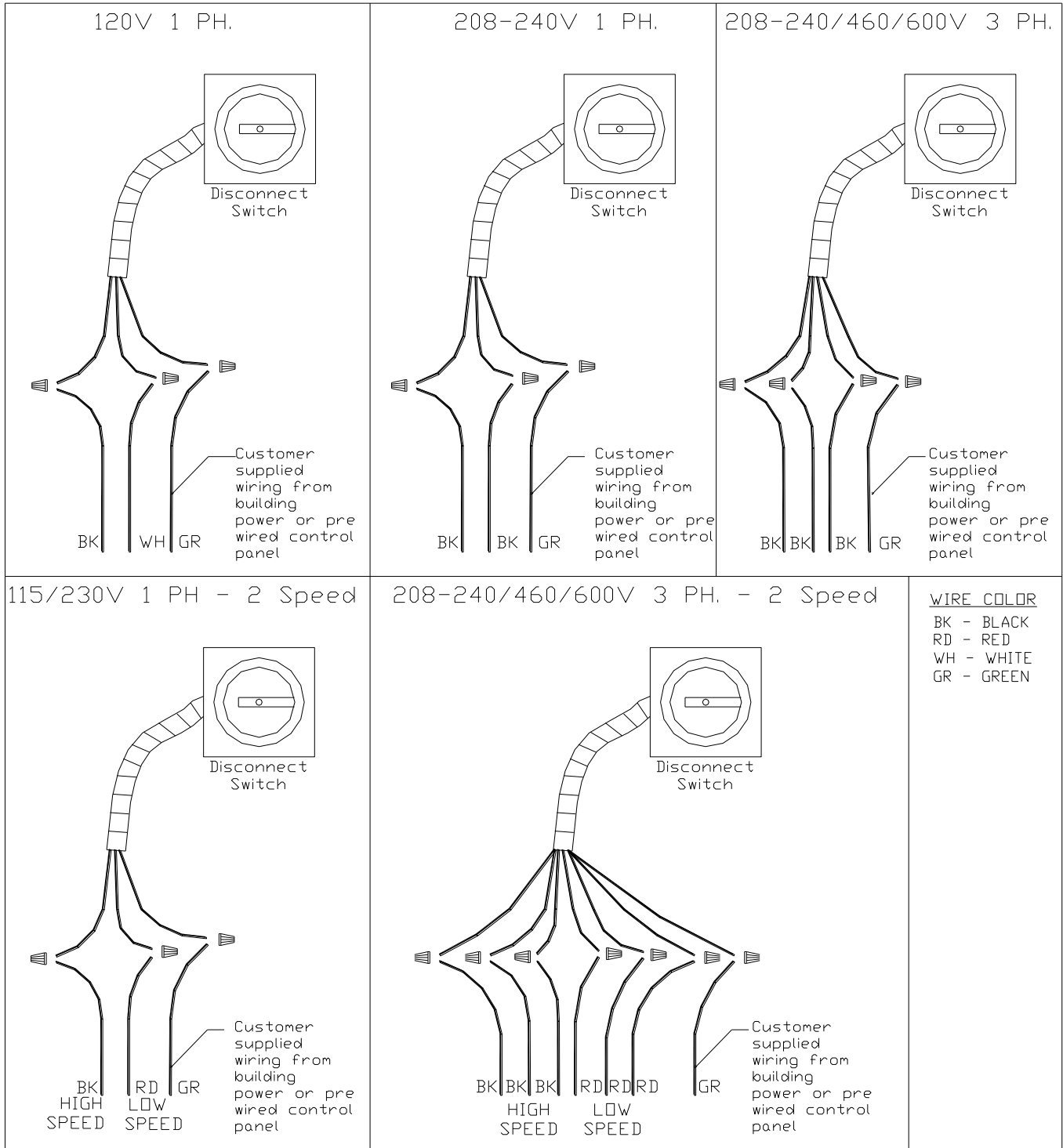
Disconnect power before installing or servicing fan. High voltage electrical input is needed for this equipment. This work should be performed by a qualified electrician.

Table 2 - Copper Wire Ampacity

Wire Size AWG	Maximum Amps
14	20
12	25
10	30
8	40
6	55
4	70

Fan to Building Wiring Connection

Figure 5



OPERATION

Prior to starting up or operating the ventilator, check all fasteners for tightness. In particular, check the set screw in the wheel hub, bearings and the fan sheaves (pulleys). With power to the fan **OFF** or prior to connecting ventilator to power, turn the fan wheel by hand to be sure it is not striking the inlet or any obstacles. Re-center if necessary.

Start Up

Special Tools Required

- AC Voltage Meter
- Tachometer
- Amperage Meter
- Standard Hand Tools

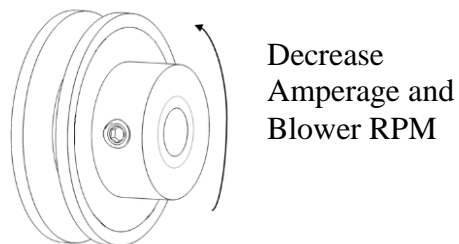
Start Up Procedure

1. Check all electrical connections for tightness and continuity.
2. Check pulley alignment and belt tension as described below for belt drive fans.
3. Inspect the condition of the damper and damper linkage, if provided.
4. Inspect the air-stream for obstructions or debris in wheel.
5. Compare the supplied **voltage** with the fan's nameplate voltage. If this does not match, correct the problem.
6. Start the fan up, by turning the external disconnect to the **ON** position, and shut it **OFF** immediately to **check rotation of the wheel** with the directional arrow on the blower scroll. Reversed rotation will result in poor air performance, motor overloading and possible burnout. For units equipped with a single-phase motor check the motor wiring diagram to change rotation. For 3-phase motors, any two power leads can be interchanged to reverse motor direction.
7. When the fan is started up, observe the operation and check for any unusual noises.
8. Switch the external disconnect back to the **ON** position and with the air system in full operation and all ducts attached, measure the system airflow. Motor sheave (pulley) is variable pitch, and allows for an increase or decrease of the fan RPM to adjust the airflow, as shown in the illustration below. For your convenience, a RPM chart is included in the following pages. If the fan is a direct drive version, it may have a speed control to adjust speed.
9. Once the proper airflow is achieved, measure and record the fan speed with a reliable tachometer. **Caution - Excessive speed will result in motor overloading or bearing failure. Do not set fan RPMs higher than specified in the maximum RPM chart.** See the troubleshooting guide for more information.
10. Measure and record the **voltage** and **amperage** to the motor and compare with the motor nameplate to determine if the motor is operating under safe load condition.
11. Once the rpm of the ventilator has been properly set, disconnect power and recheck belt tension and pulley alignment as described below.

Table 3- Maximum RPM and HP Chart

Blower Size	Maximum RPM	Maximum HP
10"	3600	3
14"	2500	5
18"	2000	7.5
20"	1600	10
25"	1400	15

Figure 6 - Pulley Adjustment Illustration



Pulley Adjustment (Belt Drive Fans)

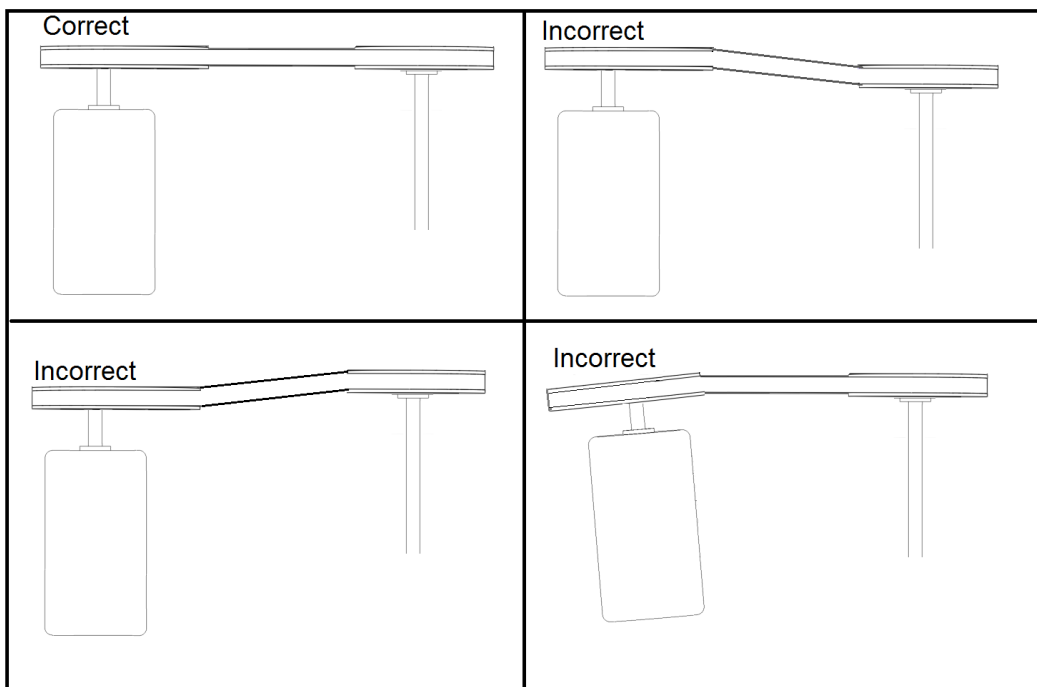
The adjustable motor pulley is factory set for the RPM specified. Speed can be increased by closing or decreased by opening the adjustable motor sheave. Two groove variable pitch pulleys must be adjusted an equal number of turns open or closed. Any increase in speed represents a substantial increase in horsepower required by the unit. Motor amperage should always be checked to avoid serious damage to the motor when the speed is varied. Always torque setscrews according to the setscrew torque chart.

Figure 7 - Pulley Setscrew Torque

Thread Size	Torque (IN/Lb)
No. 10 (bushing)	32
1/4" (bushing)	72
5/16"	130

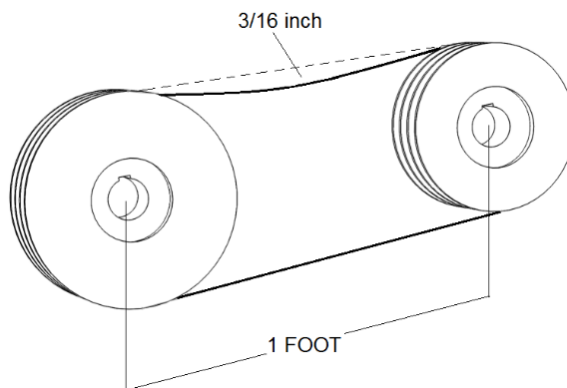
Pulley Alignment

Figure 8



Proper Belt Tension

Figure 9



Pulley Combination Chart for 25/30/40 HP Motors (Triple Groove Fixed Speed pulleys)

Table 4

Blower Pulley	Motor Pulley	RPM
3B5V184	3B5V68	628
3B5V160	3B5V68	721
3B5V154	3B5V68	748
3B5V136	3B5V68	845
3B5V124	3B5V68	925
3B5V94	3B5V68	1211
3B5V90	3B5V68	1263
3B5V86	3B5V68	1320

Troubleshooting

The following table lists causes and corrective actions for possible problems with the fan units. Review this list prior to consulting manufacturer.

Troubleshooting Chart

Problem	Potential Cause	Corrective Action
Fan Inoperative	Blown fuse or open circuit breaker	Replace fuse or reset circuit breaker and check amps
	Disconnect switch in "Off" position	Turn to "On" position
	Motor wired incorrectly	Check motor wiring to wiring diagram located on fan motor
	Broken fan belt	Replace belt
	Motor starter overloaded	Reset starter and check amps
Motor Overload	Fan rotating in the wrong direction	Be sure fan is rotating in the direction shown on rotation label
	Fan speed is too high	Reduce fan RPM
	Motor wired incorrectly	Check motor wiring to wiring diagram located on fan motor
	Overload in starter set too low	Set overload to motor FLA value
	Motor HP too low	Determine if HP is sufficient for job
	Duct static pressure lower than design	Reduce fan RPM
Insufficient Airflow	Fan rotating in the wrong direction	Be sure fan is rotating in the direction shown on rotation label
	Poor inlet/outlet conditions	There should be a straight clear duct at the inlet/outlet
	Damper not fully open	Inspect damper linkage and replace damper motor if needed
	Duct static pressure higher than design	Improve ductwork to eliminate or reduce duct losses
	Blower speed too low	Increase fan RPM. Do not overload motor
	Belt slippage	Adjust belt tension
Excessive Airflow	Blower speed to high	Reduce fan RPM
	Duct static pressure lower than design	Reduce fan RPM
Excessive Vibration and Noise	Misaligned pulleys	Align pulleys
	Damaged or unbalanced wheel	Replace wheel
	Fan is operating in the unstable region of the fan curve	Refer to performance curve for fan
	Bearings need lubrication or replacement	Lubricate or replace
	Fan speed is too high	Reduce fan RPM
	Belts too loose, worn or oily	Inspect and replace if needed
Smoke/Odor leaking from PCU	KB installed before PCU	Reattach KB fan to end of PCU.

MAINTENANCE

To guarantee trouble free operation of this fan, the manufacturer suggests following these guidelines. Most problems associated with fan failures are directly related to poor service and maintenance.

Please record any maintenance or service performed on this fan in the documentation section located at the end of this manual.

WARNING: DO NOT ATTEMPT MAINTENANCE ON THE FAN UNTIL THE ELECTRICAL SUPPLY HAS BEEN COMPLETELY DISCONNECTED

General Maintenance

1. Fan discharge and approaches to ventilator should be kept clean and free from any obstruction.
2. Motors are normally permanently lubricated. Check bearings periodically. If they have grease fittings lubricate each season. Use caution when lubricating bearings, wipe the fittings clean, the unit should be rotated by hand while lubricating. **Caution: Use care when touching the exterior of an operating motor. Motors normally run hot and may be hot enough to be painful or cause injury.**
3. All fasteners should be checked for tightness each time maintenance checks are performed prior to restarting unit.
4. Fans require very little attention when moving clean air. Occasionally oil and dust may accumulate causing imbalance. If the fan is installed in a corrosive or dirty atmosphere, periodically inspect and clean the wheel, inlet and other moving parts to ensure smooth and safe operation.

2 weeks after startup

1. Belt tension should be checked after the first 2 weeks of fan operation. Belts tend to stretch and settle into pulleys after an initial start-up sequence. **Do not tension belts by changing the setting of the motor pulley**, this will change the fan speed and may damage the motor. To re-tension belts, turn the power to the fan motor OFF. Loosen the fasteners that hold the motor to the fan. Move the motor to the left or right to adjust the belt tension. Belt tension should be adjusted to allow 1/64" of deflection per inch of belt span. Exercise extreme care when adjusting V-belts as not to misalign pulleys. Any misalignment will cause a sharp reduction in belt life and produce squeaky noises. Over-tightening will cause excessive belt and bearing wear as well as noise. Too little tension will cause slippage at startup and uneven wear. **Whenever belts are removed or installed, never force belts over pulleys without loosening motor first to relieve belt tension.** When replacing belts, use the same type as supplied by the manufacturer. On units shipped with double groove pulleys, matched belts should always be used.
2. All fasteners should be checked for tightness each time maintenance checks are performed prior to restarting unit.

Every 3 months

1. Belt tension should be checked quarterly. See instructions in the previous maintenance section. Over-tightening will cause excessive bearing wear and noise. Too little tension will cause slippage at startup and uneven wear.
2. Fans need to be cleaned quarterly, and more often in severe conditions. If the blower is insulated, **DO NOT PRESSURE WASH** as this will damage the insulation. Instead, wipe the insulation down with a rag.

Yearly

1. Inspect bearings for wear and deterioration. Replace if necessary.
2. Inspect belt wear and replace torn or worn belts.
3. Inspect bolts and set screws for tightness. Tighten as necessary.
4. Inspect motor for cleanliness. Clean exterior surfaces only. Remove dust and grease from the motor housing to ensure proper motor cooling. Remove dirt and grease from the wheel and housing to prevent imbalance and damage.

Start-Up and Maintenance Documentation

START-UP AND MEASUREMENTS SHOULD BE PERFORMED AFTER THE SYSTEM HAS BEEN AIR BALANCED (Warranty will be void without completion of this form)

Job Information

Job Name		Service Company	
Address		Address	
City		City	
State		State	
Zip		Zip	
Phone Number		Phone Number	
Fax Number		Fax Number	
Contact		Contact	
Purchase Date		Start-Up Date	

Fan Unit Information

Refer to the start-up procedure in this manual to complete this section.

Name Plate and Unit Information		Field Measured Information	
Model Number		Voltage	
Serial Number		Amperage**	
Volts		RPM	
Hertz			
Phase			
FLA			
HP			
Blower Pulley			
Motor Pulley			
Belt Number			

Blower Rotation	Correct	
	Incorrect	

**If measured amps exceed the FLA rating on the nameplate, fan RPM must be reduced to decrease the measured amps below the nameplate FLA rating.

Maintenance Record

Date	Service Performed

Factory Service Department

Phone: 1-866-784-6900

Fax: 1-919-554-9374