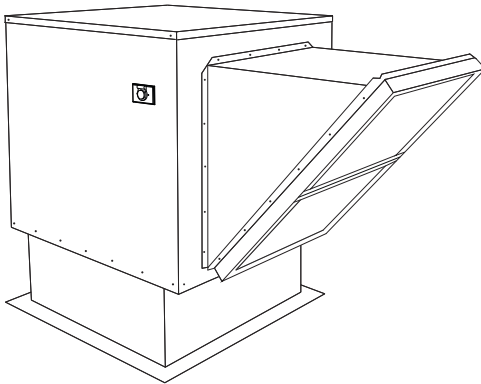
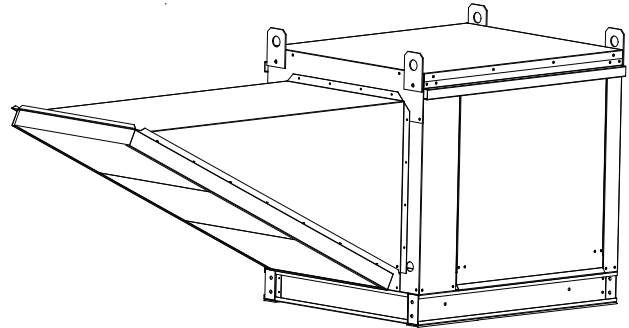


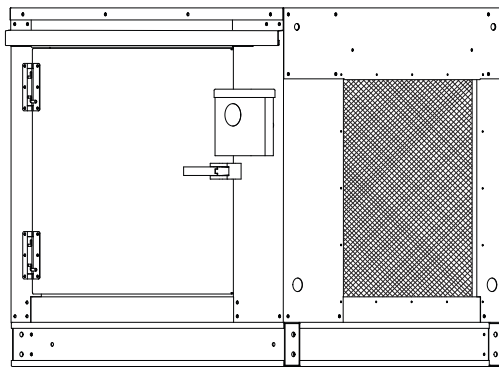
Standard and Modular Centrifugal Untempered Supply Fans Installation, Operation, and Maintenance Manual



Standard Untempered Supply Fan



Modular Untempered Supply Fan



Inline Filtered Supply Fan



RECEIVING AND INSPECTION

Upon receiving unit, check for any interior and exterior damage. If damage is found, report it immediately to the carrier. Check that all accessory items are accounted for and are not damaged.

WARNING!!

Installation of this equipment 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 and other potential hazards. Read this manual thoroughly before installing or servicing this equipment. **ALWAYS** disconnect power prior to working on equipment

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 | 4 |
| INSTALLATION | 5 |
| Mechanical | 5 |
| Site Preparation | 5 |
| Curb and Ductwork | 7 |
| Roof Mount Installation | 8 |
| Wall Mount Installation | 10 |
| Indoor (Inline) Installation | 11 |
| Installation with Exhaust Fan | 11 |
| Electrical | 12 |
| Motorized Intake Damper | 13 |
| Permanent Split Capacitor (PSC) Motor Speed Control | 13 |
| Electronically Commutated Motor (ECM) Speed Control | 14 |
| External PWM Signal | 14 |
| Unit Mount Controller | 14 |
| Fan to Building Wiring Connection | 15 |
| Variable Frequency Drive (VFD) Installation Instructions | 16 |
| Input AC Power | 16 |
| VFD Output Power | 16 |
| VFD Programming | 17 |
| ACTECH SMV VFD | 18 |
| OPERATION | 19 |
| Start-Up | 19 |
| Start-Up Procedure | 19 |
| Pulley Adjustment | 20 |
| Pulley Alignment/Proper Belt Tension | 21 |
| Pulley Combination Chart | 22 |
| Re-Circulating Control Options | 23 |
| Manual Positioning Control (Potentiometer) | 23 |
| Two Position Control | 23 |
| Building Signal Damper Control | 23 |
| Static Pressure Control (Photohelic) | 23 |
| Static Pressure Controller Installation Instructions | 24 |
| A-306 Outdoor Sensor | 24 |
| Troubleshooting | 25 |
| MAINTENANCE | 26 |
| General Maintenance | 26 |
| 2 weeks after start-up | 26 |
| Every 3 Months | 26 |
| Yearly | 26 |
| Unit Filters | 27 |
| Optional Mixing Box Filters | 27 |
| Start-up and Maintenance Documentation | 28 |
| Job Information | 28 |

WARRANTY

This equipment is warranted to be free from defects in materials and workmanship, under normal use and service, for a period of 24 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, or not maintained per the MANUFACTURER'S maintenance instructions.
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 24-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.

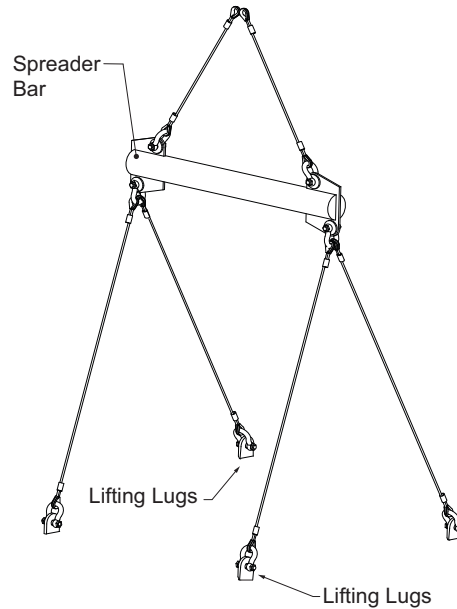
INSTALLATION

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 UNIT BY THE INTAKE HOOD, BLOWER, MOTOR SHAFT, OR BEARINGS. USE ALL LIFTING LUGS PROVIDED WITH A SPREADER BAR OR SLING UNDER THE UNIT.

Figure 1 - Spreader Bar



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. Locate unit close to the space it will serve to reduce long, twisted duct runs.
3. Consider general service and installation space when locating unit.
4. Do not allow air intake to face prevailing winds. Support unit above ground or at roof level high enough to prevent precipitation from being drawn into its inlet. The inlet must also be located at least 10 feet away from any exhaust vents. The fan inlet shall be located in accordance with the applicable building code provisions for ventilation air.

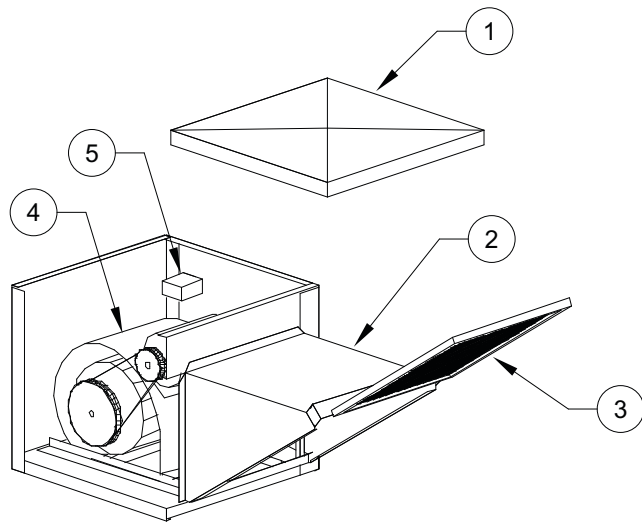
Intake Assembly

Filters and intake hoods for standard supply fans are shipped inside the supply fan housing for protection during shipping. Modular intakes are shipped on a separate skid. Upon unit arrival, follow these steps to assemble the intake to the fan:

1. Remove the fan top (standard supply fans only).
2. Remove the intake hood and filters from the fan housing.
3. Re-install the fan top (standard supply fans only).
4. Apply silicone or weather-proof gasket on the back side of the flanges of the intake hood.
5. Secure the flanges of the intake hood to the unit with the supplied sheet metal screws.
6. Use caulk on the outside of the screws to prevent water leaks.
7. Slide the filters down the filter track as shown.

Figure 2 - Intake Assembly

1. Fan Top
2. Intake Hood
3. Filter(s)
4. Supply Fan
5. External Disconnect Switch



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 outlet will cause system effect and will drastically increase the static pressure and reduce airflow.

- **Table 1** shows the minimum fan outlet duct sizes and straight lengths required for optimal fan performance.
- Do not use unit to support ductwork in any way. This may cause damage to the unit.
- **Follow SMACNA guides and manufacturer's requirements 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.
- The unit should be installed on a curb and/or rail that meets local code height requirements.
- 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.
- Verify all fasteners are secure. **Figure 3** through **Figure 6** show different mechanical installations.

***Minimum straight discharge duct length required before fitting/transition**

Table 1 - Required Supply Ductwork

| Blower Size (Inches) | Discharge | Duct Size | Straight Duct Length* |
|----------------------|-----------|-----------|-----------------------|
| 10 | Side | 14" x 14" | 48" |
| | Down | | |
| 15D, 16Z, 18Z | Side | 20" x 20" | 72" |
| | Down | 14" x 14" | 48" |
| 12 | Side | 16" x 16" | 54" |
| | Down | | |
| 15 | Side | 20" x 20" | 72" |
| | Down | | |
| 20D, 20Z, 22Z | Side | 26" x 26" | 108" |
| | Down | 20" x 20" | 72" |
| 18 | Side | 24" x 24" | 86" |
| | Down | | |
| 24D, 25Z | Side | 30" x 30" | 108" |
| | Down | 24" x 24" | 86" |
| 20 | Side | 26" x 26" | 108" |
| | Down | | |
| 30D, 28Z | Side | 32" x 32" | 168" |
| | Down | 26" x 26" | 108" |
| 25 | Side | 32" x 32" | 168" |
| | Down | | |
| 36D | Side | 36" x 36" | 189" |
| | Down | 32" x 32" | 168" |

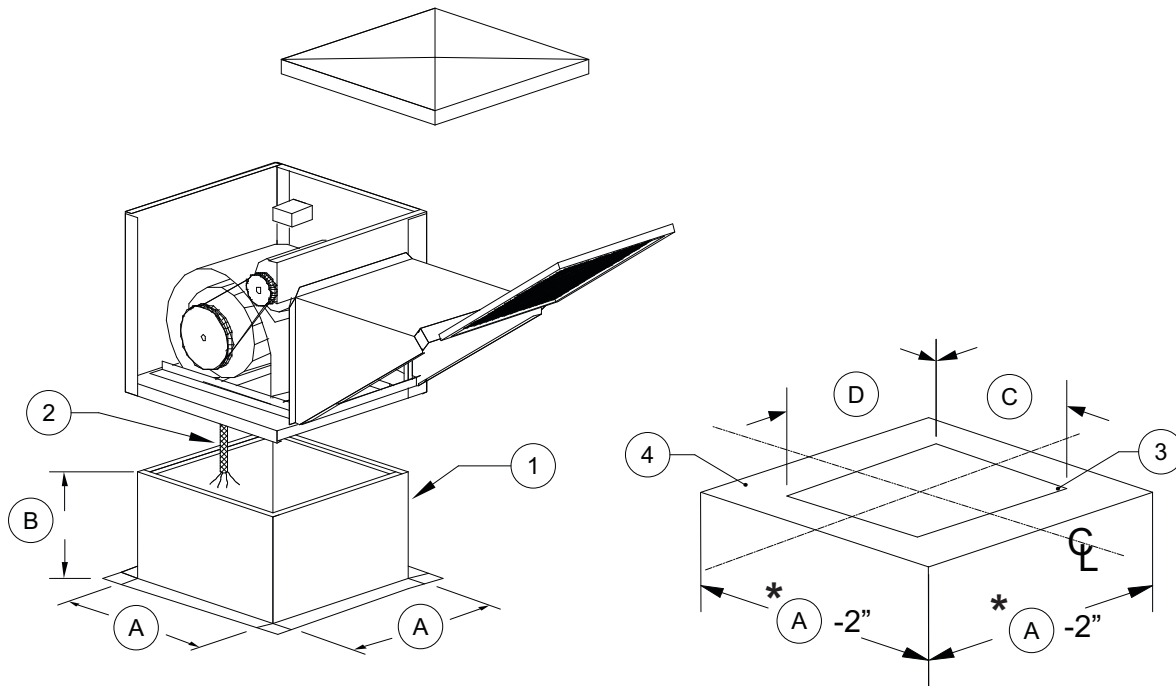
WARNING!!

Failure to properly size ductwork may cause system effects and reduce the performance of the equipment.

Roof Mount Installation

Note: Refer to submittal drawings for specific unit dimensions.

Figure 3 - Roof Mount Details



1. Curb
2. Electrical Drop
3. Blower Outlet Size
4. Roof Opening

- A. Curb Measurement, refer to **Table 2**
- B. Curb Height Measurement, refer to **Table 2**
- C. Roof Opening Measurement 1, refer to **Table 2**
- D. Roof Opening Measurement 2, refer to **Table 2**
- CL. Center Line

***Maximum roof opening 2" smaller than curb outside dimensions.**

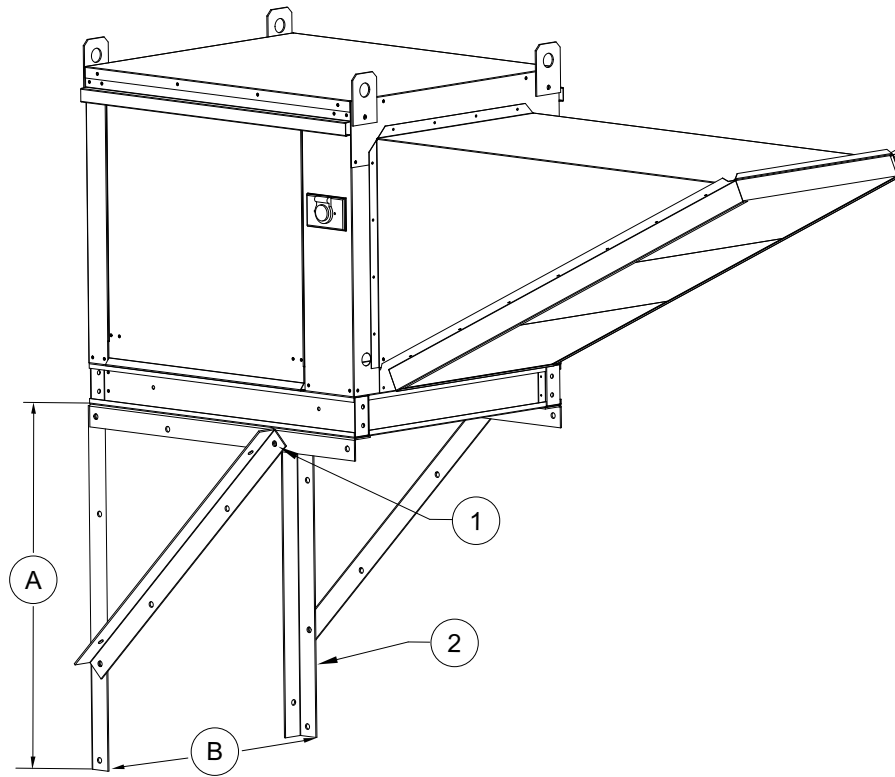
Table 2 - Curb/Roof Top Dimensional Data

| Standard Curb/Roof Top Dimensional Data | | | | | |
|--|-----------------------------|----------|----------|----------|----------|
| Model | Blower Size (Inches) | A | B | C | D |
| Size 1 | 10 | 23" | 14" | 11-3/4" | 13-1/2" |
| Size 2 | 12 | 32-1/2" | 14" | 11-3/4" | 15-7/8" |
| | 15 | | | 16-1/8" | 18-7/8" |
| Modular Curb/Roof Top Belt Drive Dimensional Data | | | | | |
| Model | Blower Size (Inches) | A | B | C | D |
| Size 1 | 10 | 21" | 20" | 11-3/4" | 13-1/2" |
| Size 2 | 12 | 31" | 20" | 13-3/4" | 15-7/8" |
| | 15 | | | 16-1/8" | 18-7/8" |
| Size 3 | 18 | 35" | 20" | 18-7/8" | 21-7/8" |
| Size 4 | 20 | 42" | 20" | 24-5/8" | 24-5/8" |
| Size 5 | 25 | 52-1/2" | 20" | 31-1/8" | 31-1/8" |
| Modular Curb/Roof Top Direct Drive Dimensional Data | | | | | |
| Model | Blower Size (Inches) | A | B | C | D |
| Size 1 | 15D, 16Z, 18Z | 21" | 20" | 11-3/4" | 13-1/2" |
| Size 2 | 20D, 20Z, 22Z | 31" | 20" | 13-3/4" | 15-7/8" |
| Size 3 | 24D, 25Z | 35" | 20" | 18-7/8" | 21-7/8" |
| Size 4 | 30D, 28Z | 42" | 20" | 24-5/8" | 24-5/8" |
| Size 5 | 36D | 52-1/2" | 20" | 31-1/8" | 31-1/8" |

Wall Mount Installation

Note: Refer to submittal drawings for specific unit dimensions.

Figure 4 - Wall Mount Details



1. 1/2" Bolted Construction

2. 2" x 2" 10 Gauge Galvanized Angle

A. Mounting Height, refer to **Table 3**

B. Leg Spacing, refer to **Table 3**

Table 3 - Wall Mount Dimensional Data

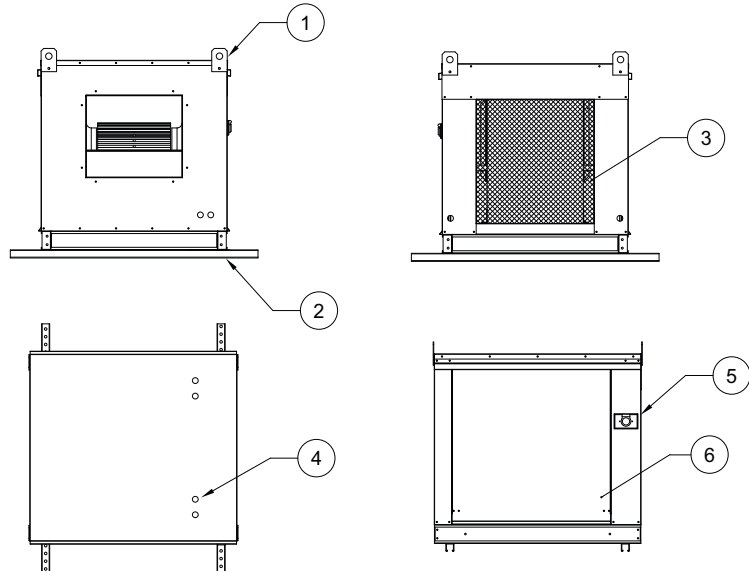
| Unit Size | Dimension A | Dimension B |
|-----------|-------------|-------------|
| 1 | 32" | 26" |
| 2 | 40" | 36" |
| 3 | 45" | 40" |

Indoor (Inline) Installation

Note: Refer to submittal drawings for specific unit dimensions.

Figure 5 - Indoor (Inline) Details

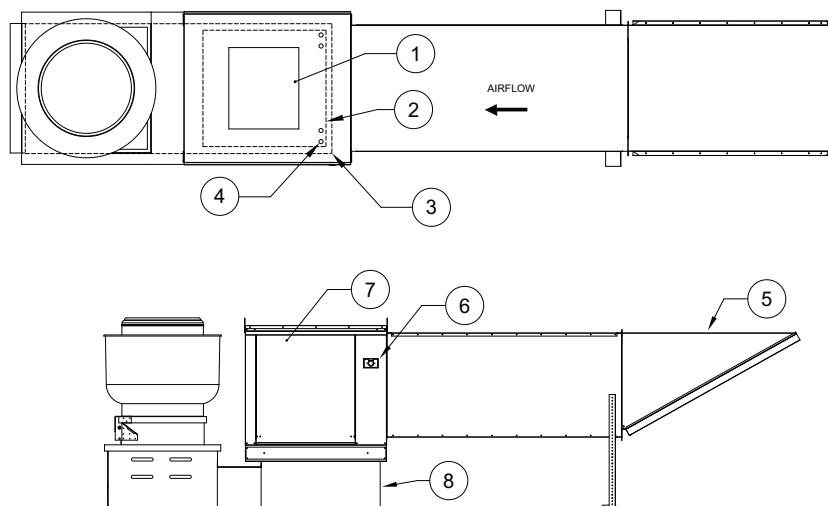
1. Lifting Lugs
2. Uni-Strut Base
3. Intake Filter
4. Flex Conduit for Field Wiring
5. Disconnect Switch
6. Blower/Motor Access Door



Installation with Exhaust Fan

Note: Refer to submittal drawings for specific unit dimensions.

Figure 6 - Exhaust Fan Details



- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Discharge Opening 2. Roof Opening 3. Curb Outer Wall 4. Flex Conduit for Field Wiring | <ol style="list-style-type: none"> 5. Sloped Intake Filter 6. Disconnect Switch 7. Blower/Motor Access Door 8. Curb with Support Legs or Rail (20" High) |
|---|--|

Electrical

WARNING!!

Disconnect power before installing or servicing control. High voltage electrical input is needed for this equipment. A qualified electrician should perform this work.

Before connecting power to the fan, read and understand the entire section of this document. As-built wiring diagrams are furnished with each control by the factory, and are attached to the module's door or provided with paperwork packet.

Electrical wiring and connections must be done in accordance with local ordinances and the National Electric Code, ANSI/NFPA70. Verify the voltage and phase of the power supply and the wire amperage capacity is in accordance with the unit 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 this equipment. Lock and tag the disconnect switch or breaker to prevent accidental power up.
2. An electrical drop containing the line voltage power wiring is shipped with every unit. The electrical drop should be brought through one of the conduit openings located in the base of the unit, run through the curb, and connected to a junction box inside the building. Refer to **Figure 3**.
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 **Figure 9**.
4. Verify 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 the fan to the building's power source, verify that the 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 the unit, make sure that the fan rotates freely. 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 THHN wire or equivalent.

Table 4 - Copper Wire Ampacity

| Wire Size AWG | Maximum Amps |
|--------------------------|-------------------------|
| 14 | 15 |
| 12 | 20 |
| 10 | 30 |
| 8 | 50 |
| 6 | 65 |
| 4 | 85 |
| 3 | 100 |
| 2 | 115 |
| 1 | 130 |

Motorized Intake Damper

On units shipped with the optional motorized intake damper, a power transformer is supplied with the unit if the main incoming voltage is greater than 120V. The damper motor is automatically energized when the main disconnect switch is in the ON position. **No external wiring to the damper motor is required.**

Permanent Split Capacitor (PSC) Motor Speed Control

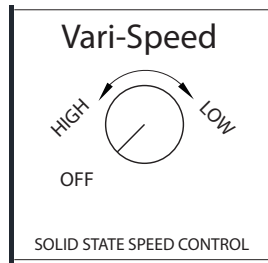
Some single phase direct drive fans contain speed controls that regulate the amount of voltage going to the motor. Specific PSC motors must be used in conjunction with speed controls. The speed control has a knob with an off position along with high to low range. At high speed, the speed control allows all of the line voltage to pass directly to the motor.

A minimum speed adjustment is provided to allow independent control of the minimum speed setting. Minimum speed adjustment ensures the motor runs with sufficient torque to prevent stalling. To adjust this:

1. Motor must be in actual operating conditions to achieve proper speed adjustment. Motor will not slow down unless proper load is applied.
2. Turn main control knob to lowest speed position.
3. Locate and adjust minimum speed setting. This can be found under the speed control faceplate. Use a small screw driver to adjust. Rotate clockwise to decrease minimum speed; counter-clockwise to increase minimum speed.
4. Motor will now operate from this preset minimum speed to full speed.

The lowest minimum voltage that may be applied to these motors is 65V AC. Running lower voltages to the motor can cause premature failure and overheating problems.

Figure 7 - PSC Motor Speed Control



Electronically Commutated Motor (ECM) Speed Control

An Electrically Commutated Motor (ECM) with speed control allows for an accurate manual adjustment of the fan's speed. The benefits of using an EC motor is exceptional efficiency, performance, and motor life.

External PWM Signal

The fan unit will be shipped with power wiring and communication wiring fed to an internal junction box. The fan is shipped with Shielded Twisted Pair (STP) wire which is used to wire to a remote PWM signal. Red wire is used to go to the positive PWM signal, black wire is used to go to the negative PWM signal. Reference schematics for all wiring connections. STP is connected to the communication wiring of the motor using wire nuts in the junction box. If a preset length of STP is provided, it will be connected to the junction box from the factory. Run the STP through any available knockout in the fan base.

Unit Mount Controller

The RTC speed controller features a 4 digit LED display with a five button interface. All parameters can be accessed through the user menu. The percent of run speed can be changed by using the **Up** and **Down** buttons followed by pressing **Enter** (middle button) to save changes. Every **ten seconds** the display will toggle between current percentage of run speed and current RPMs. The flow index has a range of **0-100%** and is typically linear with motor RPM.

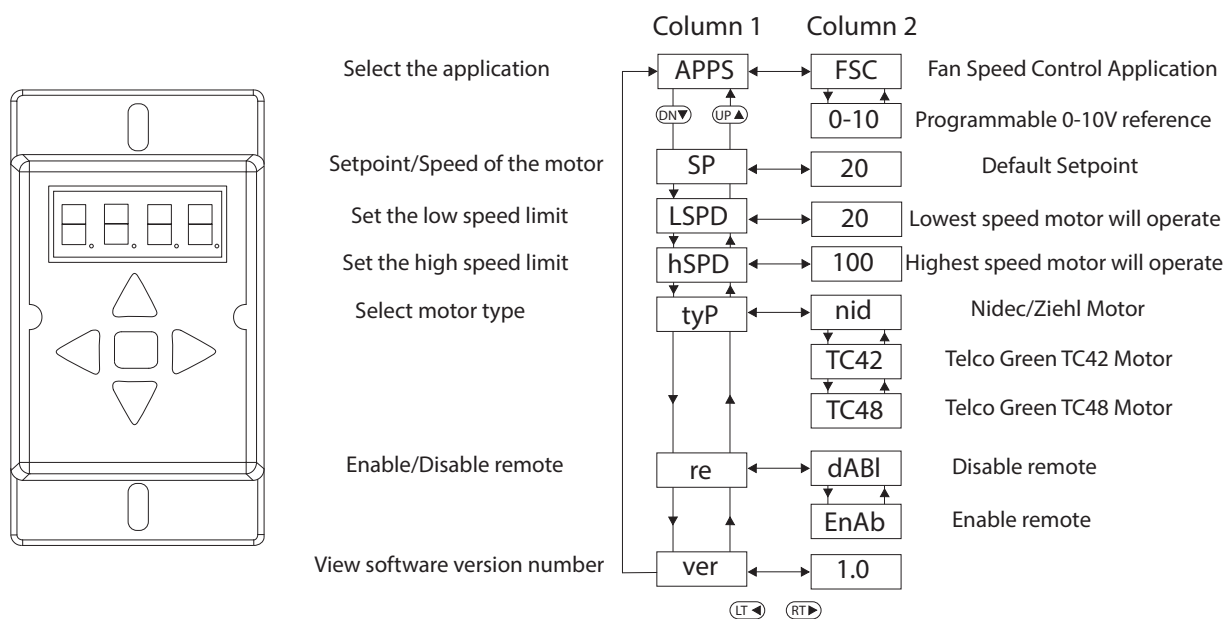
If the remote function (re) is enabled, the speed is controlled through a **0-10V** input. **0V = 0%** and **10V = 100%**, unless overridden by the low speed and high speed limits.

The speed controller requires a **24V AC** input and can locally turn the motor on and off. The motor RPM range is fully adjustable between the minimum and maximum setpoints, see LSPD and HSPD on the programming display. For more information see the control operating manual.

For all motors except 16Z, 18Z, 20Z, 22Z, 25Z, 28Z: If "oFF" is being displayed, and the speed is set above 300 RPM, the ECM is not receiving RPM feedback. Check that the ECM is wired correctly. Check that the motor "tyP" in the settings matches the motor manufacturer. 16Z, 18Z, 20Z, 22Z, 25Z, 28Z do not send RPM feedback.

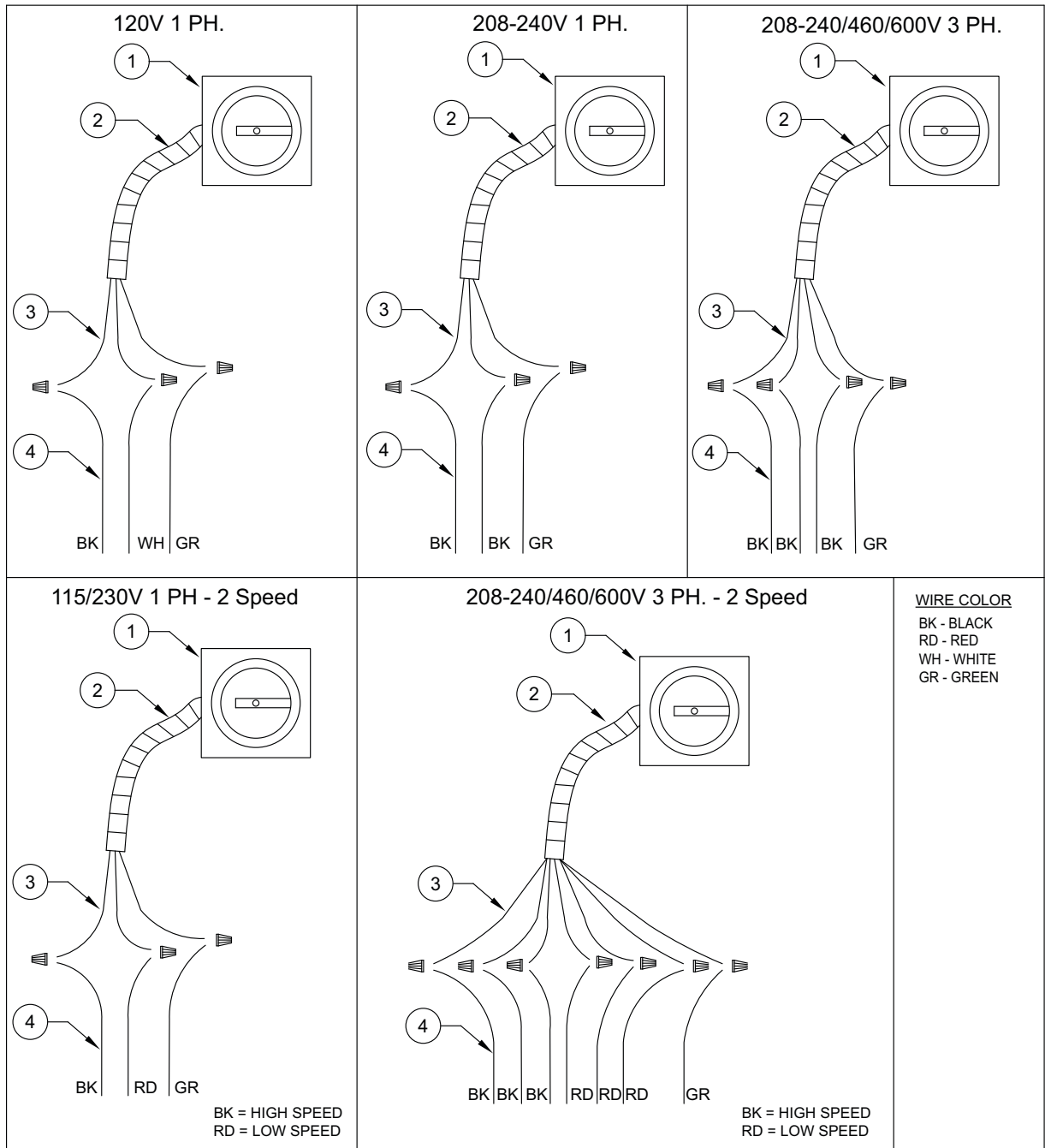
Note: A Variable Frequency Drive (VFD) is required to adjust the speed control of a non-electrically commutated 3-phase direct drive motor.

Figure 8 - RTC Speed Controller and Menu



Fan to Building Wiring Connection

Figure 9 - Wiring Connection Details



1. Disconnect Switch
2. Galflex Conduit (In Unit)
3. Factory Wiring
4. Field Supplied Wiring - From building power or pre-wired control panel.

Variable Frequency Drive (VFD) Installation Instructions

Input AC Power

- Circuit breakers feeding the VFDs are recommended to be thermal-magnetic and fast acting. They should be sized based on the VFD amperage and according to **Table 5**. Refer to the installation schematic for exact breaker sizing.
- Each VFD should be fed by its own breaker. If multiple VFDs are to be combined on the same breaker, each drive should have its own protection measure (fuses or miniature circuit breaker) downstream from the breaker.
- Input AC line wires should be routed in conduit from the breaker panel to the drives. AC input power to multiple VFDs can be run in a single conduit if needed. **Do not combine input and output power cables in the same conduit.**
- The VFD should be grounded on the terminal marked PE. A separate insulated ground wire must be provided to each VFD from the electrical panel. This will reduce the noise being radiated in other equipment.

ATTENTION!

DO NOT CONNECT INCOMING AC POWER TO OUTPUT TERMINALS U, V, W. SEVERE DAMAGE TO THE DRIVE WILL RESULT. INPUT POWER MUST ALWAYS BE WIRED TO THE INPUT L TERMINAL CONNECTIONS (L1, L2, L3)

VFD Output Power

- Motor wires from each VFD to its respective motor **MUST** be routed in a **separate steel** conduit away from control wiring and incoming AC power wiring. This is to avoid noise and crosstalk between drives. An insulated ground must be run from each VFD to its respective motor. Do not run different fan output power cables in the same conduit.
- VFD mounted in ECP: A load reactor should be used and sized accordingly when the distance between the VFD and motor is greater than specified below. The load reactor should be installed within 10 feet of the VFD output:
 - 208/230V** - Load reactor should be used when distance exceeds 250 feet.
 - 460/480V** - Load reactor should be used when distance exceeds 50 feet.
 - 575/600V** - Load reactor should be used when distance exceeds 25 feet.
- VFD mounted in fan: The load reactor should be sized accordingly when the VFD is mounted in the fan.
 - 208/230V** - Load reactor is optional but recommended for 15 HP and above motors.
 - 460/480V** - Load reactor is optional but recommended for 7.5 HP and above motors.
 - 575/600V** - Load reactor should be used when distance exceeds 25 feet.
- If the distance between the VFD and the motor is extremely long, up to 1000 FT, a dV/dT filter should be used and the VFD should be increased by 1 HP or to the next size VFD. The dV/dT filter should be sized accordingly and installed within 10 feet of the output of the VFD.
 - 208/230V** – dV/dT filter should be used when distance exceeds 400 feet.
 - 460/480V** – dV/dT filter should be used when distance exceeds 250 feet.
 - 575/600V** – dV/dT filter should be used when distance exceeds 150 feet.
- Do not install a contactor between the drive and the motor. Operating such a device while the drive is running can potentially cause damage to the power components of the drive.
- When a disconnect switch is installed between the drive and motor, the disconnect should only be operated when the drive is in a STOP state.

VFD Programming

Programming

1. The Drive should be programmed for the proper motor voltage. P107 is set to 0 (Low) if motor voltage is 120V AC, 208V AC or 400V AC. P107 is set to 1 (High) if motor voltage is 230V AC, 480V AC or 575V AC.
2. The Drive should be programmed for the proper motor overload value. P108 is calculated as Motor FLA x 100 / Drive Output Rating (available in **Table 5**).

To enter the PROGRAM mode to access the parameters:

1. Press the Mode (M) button. This will activate the password prompt (PASS).
2. Use the Up and Down buttons to scroll to the password value (the factory default password is "0225") and press the Mode (M) button. Once the correct password is entered, the display will read "P100", which indicates that the PROGRAM mode has been accessed at the beginning of the parameter menu.
3. Use the Up and Down buttons to scroll to the desired parameter number.
4. Once the desired parameter is found, press the Mode (M) button to display the present parameter setting. The parameter value will begin blinking, indicating that the present parameter setting is being displayed. The value of the parameter can be changed by using the Up and Down buttons.
5. Pressing the Mode (M) button will store the new setting and also exit the PROGRAM mode. To change another parameter, press the Mode (M) button again to re-enter the PROGRAM mode. If the Mode button is pressed within 1 minute of exiting the PROGRAM mode, the password is not required to access the parameters. After one minute, the password must be re-entered in order to access the parameters again.

P500 parameter provides a history of the last 8 faults on the drive. It can be accessed without getting into PROGRAM mode.

ACTECH SMV VFD

Table 5 - Cross Reference Table

| HP | Part Number | Volts | 1Ø Input | 3Ø Input | Input Amps 1Ø 120V AC | Input Amps 1Ø 240V AC | Output Amps | Breaker 1Ø 120V AC | Breaker 1Ø 240V AC |
|------|--------------|----------|----------|----------|--------------------------|--------------------------|----------------|-----------------------|-----------------------|
| 0.33 | ESV251N01SXB | 120/240V | X | | 6.8 | 3.4 | 1.7 | 15 | 15 |
| 0.5 | ESV371N01SXB | 120/240V | X | | 9.2 | 4.6 | 2.4 | 15 | 15 |
| 1 | ESV751N01SXB | 120/240V | X | | 16.6 | 8.3 | 4.2 | 25 | 15 |
| 1.5 | ESV112N01SXB | 120/240V | X | | 20 | 10 | 6 | 30 | 20 |

| HP | Part Number | Volts | 1Ø Input | 3Ø Input | Input Amps 1Ø | Input Amps 3Ø | Output Amps | Breaker 1Ø | Breaker 3Ø |
|-----|--------------|-------|----------|----------|---------------|---------------|----------------|------------|------------|
| 0.5 | ESV371N02YXB | 240V | X | X | 5.1 | 2.9 | 2.4 | 15 | 15 |
| 1 | ESV751N02YXB | 240V | X | X | 8.8 | 5 | 4.2 | 15 | 15 |
| 1.5 | ESV112N02YXB | 240V | X | X | 12 | 6.9 | 6 | 20 | 15 |
| 2 | ESV152N02YXB | 240V | X | X | 13.3 | 8.1 | 7 | 25 | 15 |
| 3 | ESV222N02YXB | 240V | X | X | 17.1 | 10.8 | 9.6 | 30 | 20 |
| 5 | ESV402N02TXB | 240V | | X | | 18.6 | 16.5 | | 30 |
| 7.5 | ESV552N02TXB | 240V | | X | | 26 | 23 | | 40 |
| 10 | ESV752N02TXB | 240V | | X | | 33 | 29 | | 50 |
| 15 | ESV113N02TXB | 240V | | X | | 48 | 42 | | 80 |
| 20 | ESV153N02TXB | 240V | | X | | 59 | 54 | | 90 |
| | | | | | | | | | |
| 1 | ESV751N04TXB | 480V | | X | | 2.5 | 2.1 | | 15 |
| 1.5 | ESV112N04TXB | 480V | | X | | 3.6 | 3 | | 15 |
| 2 | ESV152N04TXB | 480V | | X | | 4.1 | 3.5 | | 15 |
| 3 | ESV222N04TXB | 480V | | X | | 5.4 | 4.8 | | 15 |
| 5 | ESV402N04TXB | 480V | | X | | 9.3 | 8.2 | | 15 |
| 7.5 | ESV552N04TXB | 480V | | X | | 12.4 | 11 | | 20 |
| 10 | ESV752N04TXB | 480V | | X | | 15.8 | 14 | | 25 |
| 15 | ESV113N04TXB | 480V | | X | | 24 | 21 | | 40 |
| 20 | ESV153N04TXB | 480V | | X | | 31 | 27 | | 50 |
| 25 | ESV183N04TXB | 480V | | X | | 38 | 34 | | 70 |
| 30 | ESV223N04TXB | 480V | | X | | 45 | 40 | | 80 |
| 40 | ESV303N04TXB | 480V | | X | | 59 | 52 | | 100 |
| 50 | ESV373N04TXB | 480V | | X | | 74 | 65 | | 125 |
| 60 | ESV453N04TXB | 480V | | X | | 87 | 77 | | 150 |
| | | | | | | | | | |
| 1 | ESV751N06TXB | 600V | | X | | 2 | 1.7 | | 15 |
| 2 | ESV152N06TXB | 600V | | X | | 3.2 | 2.7 | | 15 |
| 3 | ESV222N06TXB | 600V | | X | | 4.4 | 3.9 | | 15 |
| 5 | ESV402N06TXB | 600V | | X | | 6.8 | 6.1 | | 15 |
| 7.5 | ESV552N06TXB | 600V | | X | | 10.2 | 9 | | 20 |
| 10 | ESV752N06TXB | 600V | | X | | 12.4 | 11 | | 20 |
| 15 | ESV113N06TXB | 600V | | X | | 19.7 | 17 | | 30 |
| 20 | ESV153N06TXB | 600V | | X | | 25 | 22 | | 40 |
| 25 | ESV183N06TXB | 600V | | X | | 31 | 27 | | 50 |
| 30 | ESV223N06TXB | 600V | | X | | 36 | 32 | | 60 |
| 40 | ESV303N06TXB | 600V | | X | | 47 | 41 | | 70 |
| 50 | ESV373N06TXB | 600V | | X | | 59 | 52 | | 90 |
| 60 | ESV453N06TXB | 600V | | X | | 71 | 62 | | 110 |

OPERATION

Prior to starting up or operating the ventilator, verify all fasteners are secure and tight. 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 the unit to power, turn the fan wheel by hand to verify it is not striking the inlet or any obstructions. Re-center if necessary.

Start-Up

Special Tools Required:

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

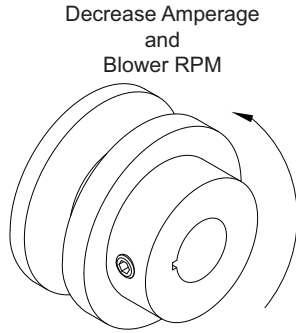
Start-Up Procedure

1. Check all electrical connections are secure and tight.
2. Check pulley alignment and belt tension as shown in “**Pulley Alignment/Belt Tension**” on page 21.
3. Inspect the condition of the intake damper and damper linkage, if applicable.
4. Remove intake filters if not already installed, inspect the air-stream for obstructions. Install intake filters.
5. Compare the supplied **motor voltage** with the fan’s nameplate voltage. If this does not match, correct the problem.
6. Start the fan by turning the external disconnect to the **ON** position, and shut it **OFF** immediately. **Check the 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, observe the operation and check for any unusual noises.
8. Place the external disconnect switch back to the **ON** position. The system should be in full operation with all ducts attached. Measure the system airflow. The motor sheave (pulley) is variable pitch and allows for an increase or decrease of the fan RPM. If an adjustment is needed, refer to “**Pulley Adjustment**” on page 20. Refer to **Table 6** and “**Pulley Combination Chart**” on page 22 for adjustment specifications.
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. Compare with the motor’s nameplate to determine if the motor is operating under safe load conditions.
11. Once the RPM of the ventilator has been properly set, disconnect power. Re-check belt tension and pulley alignment as shown in “**Pulley Alignment/Belt Tension**” on page 21.

Pulley Adjustment

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 set screws according to the torque specifications shown in **Figure 10**.

Figure 10 - Adjustable Pulley



| Setscrew Thread Size | Torque (in-lbs) |
|----------------------|-----------------|
| No. 10 (bushing) | 32 |
| 1/4" (bushing) | 72 |
| 5/16" | 130 |

Table 6 - Maximum RPM and HP Chart

| Belt Drive | | |
|-------------|----------|---------|
| Blower Size | Max. RPM | Max. HP |
| 10" | 1800 | 2 |
| 12" | 1500 | 3 |
| 15" | 1400 | 5 |
| 18" | 1200 | 5 |
| 20" | 1000 | 10 |
| 25" | 900 | 20 |

| Direct Drive | | |
|--------------|----------|---------|
| Blower Size | Max. RPM | Max. HP |
| 15D | 1800 | 2 |
| 20D | 1500 | 3 |
| 24D | 1400 | 5 |
| 30D | 1200 | 5 |
| 36D | 1000 | 10 |
| 16Z | 2400 | 4 |
| 18Z | 3200 | 5 |
| 20Z | 2300 | 5 |
| 22Z | 1900 | 5 |
| 25Z | 1800 | 8 |
| 28Z | 1400 | 7 |

Pulley Alignment/Proper Belt Tension

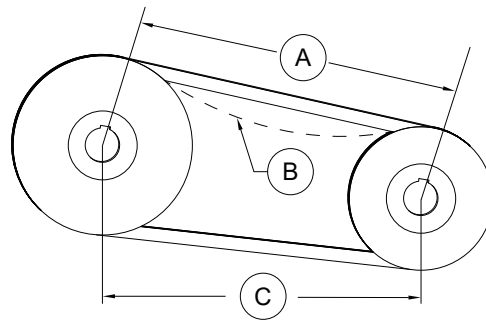
1. Belts tend to stretch and settle into pulleys after an initial start-up sequence. **Do not tension belts by changing the setting of the motor pulley**, this will change the fan speed and may damage the motor.
 - To re-tension belts, turn OFF power to the fan motor.
 - Loosen the fasteners that hold the blower scroll plate to the blower.
 - Rotate 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. Use 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 preformed prior to restarting unit.

Belt tension examples:

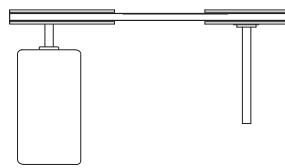
- Belt span 12" = 3/16" deflection
- Belt span 32" = 1/2" deflection

Figure 11 - Pulley Alignment/Belt Tension

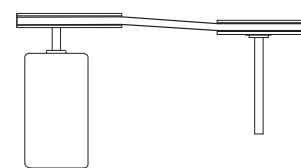
- A. Belt Span Length
- B. Deflection
- C. Center Distance



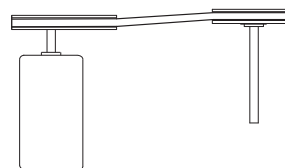
Correct



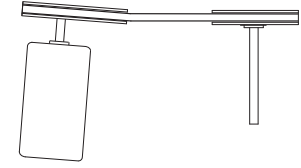
Incorrect



Incorrect



Incorrect



Pulley Combination Chart

| Motor RPM | | 1725 | | | | | | | | | | | | | | | |
|--------------------------------|---------------------------------|--------------------|-----------------------|-----------------------|---------|---------|---------|---------|-------|-------|-------|-------|-------|------|--------|--------|--------|
| 10 - 20 IN. BLOWER** | 1/3 to 1-1/2 HP AX BELTS | | MOTOR PULLEY 1VL34 | | Dd1 1.9 | Dd2 2.9 | Pd1 2 | Pd2 3 | | | | | | | | | |
| | | | | Open | | | | | | | | | | | | | |
| | | | | TURNS ON MOTOR PULLEY | | | | | | | | | | | | | |
| | BLOWER PULLEY | DATUM DIAMETER | PITCH DIAMETER | 5 | 4 1/2 | 4 | 3 1/2 | 3 | 2 1/2 | 2 | 1 1/2 | 1 | 1/2 | 0 | Closed | | |
| | AK114 | 11 | 11.2 | 308 | 323 | 339 | 354 | 370 | 385 | 400 | 416 | 431 | 447 | 462 | | | |
| | 1/3 to 2 HP AX BELTS | | MOTOR PULLEY 1VL40 | | Dd1 2.4 | Dd2 3.4 | Pd1 2.6 | Pd2 3.6 | | | | | | | | | |
| | | | | Open | | | | | | | | | | | | | |
| | | | | TURNS ON MOTOR PULLEY | | | | | | | | | | | | | |
| | BLOWER PULLEY | DATUM DIAMETER | PITCH DIAMETER | 5 | 4 1/2 | 4 | 3 1/2 | 3 | 2 1/2 | 2 | 1 1/2 | 1 | 1/2 | 0 | Closed | | |
| | AK114 | 11 | 11.2 | 400 | 416 | 431 | 447 | 462 | 477 | 493 | 508 | 524 | 539 | 554 | | | |
| | AK94 | 9 | 9.2 | 488 | 506 | 525 | 544 | 563 | 581 | 600 | 619 | 638 | 656 | 675 | | | |
| | AK79 | 7.5 | 7.7 | 582 | 605 | 627 | 650 | 672 | 694 | 717 | 739 | 762 | 784 | 806 | | | |
| | AK66 | 6.2 | 6.4 | 701 | 728 | 755 | 782 | 809 | 836 | 863 | 889 | 916 | 943 | 970 | | | |
| | AK54 | 5 | 5.2 | 863 | 896 | 929 | 962 | 995 | 1028 | 1062 | 1095 | 1128 | 1161 | 1194 | | | |
| | AK46 | 4.2 | 4.4 | 1019 | 1059 | 1098 | 1137 | 1176 | 1215 | 1255 | 1294 | 1333 | 1372 | 1411 | | | |
| AK39 | 3.5 | 3.7 | 1212 | 1259 | 1305 | 1352 | 1399 | 1445 | 1492 | 1539 | 1585 | 1632 | 1678 | | | | |
| AK32 | 3 | 3.2 | 1402 | 1455 | 1509 | 1563 | 1617 | 1671 | 1725 | 1779 | 1833 | 1887 | 1941 | | | | |
| 3 to 5 HP BX BELTS | | MOTOR PULLEY 2VP42 | | Dd1 2.9 | Dd2 3.9 | Pd1 3 | Pd2 4 | | | | | | | | | | |
| | | | Open | | | | | | | | | | | | | | |
| | | | TURNS ON MOTOR PULLEY | | | | | | | | | | | | | | |
| BLOWER PULLEY | DATUM DIAMETER | PITCH DIAMETER | 6 | 5 1/2 | 5 | 4 1/2 | 4 | 3 1/2 | 3 | 2 1/2 | 2 | 1 1/2 | 1 | 1/2 | 0 | Closed | |
| 2BK160H | 15.4 | 15.7 | 330 | 339 | 348 | 357 | 366 | 375 | 385 | 394 | 403 | 412 | 421 | 430 | 439 | | |
| 2BK140H | 13.4 | 13.7 | 378 | 388 | 399 | 409 | 420 | 430 | 441 | 451 | 462 | 472 | 483 | 493 | 504 | | |
| 2BK120H | 11.4 | 11.7 | 442 | 455 | 467 | 479 | 491 | 504 | 516 | 528 | 541 | 553 | 565 | 577 | 590 | | |
| 2BK110H | 10.4 | 10.7 | 484 | 497 | 511 | 524 | 537 | 551 | 564 | 578 | 591 | 605 | 618 | 631 | 645 | | |
| 2BK100H | 9.4 | 9.7 | 534 | 548 | 563 | 578 | 593 | 608 | 622 | 637 | 652 | 667 | 682 | 697 | 711 | | |
| 2BK90H | 8.4 | 8.7 | 595 | 611 | 628 | 644 | 661 | 677 | 694 | 710 | 727 | 744 | 760 | 777 | 793 | | |
| 2BK80H | 7.4 | 7.7 | 672 | 691 | 709 | 728 | 747 | 765 | 784 | 803 | 821 | 840 | 859 | 877 | 896 | | |
| 2BK70H | 6.4 | 6.7 | 772 | 794 | 815 | 837 | 858 | 880 | 901 | 923 | 944 | 965 | 987 | 1008 | 1030 | | |
| 2BK60H | 5.4 | 5.7 | 908 | 933 | 958 | 984 | 1009 | 1034 | 1059 | 1084 | 1110 | 1135 | 1160 | 1185 | 1211 | | |
| 2BK55H | 4.9 | 5.2 | 995 | 1023 | 1050 | 1078 | 1106 | 1133 | 1161 | 1189 | 1216 | 1244 | 1272 | 1299 | 1327 | | |
| 2BK50H | 4.4 | 4.7 | 1101 | 1132 | 1162 | 1193 | 1223 | 1254 | 1285 | 1315 | 1346 | 1376 | 1407 | 1438 | 1468 | | |
| 7-1/2 to 10 HP BX BELTS | | MOTOR PULLEY 2VP60 | | Dd1 4.3 | Dd2 5.5 | Pd1 4.7 | Pd2 5.9 | | | | | | | | | | |
| | | | Open | | | | | | | | | | | | | | |
| | | | TURNS ON MOTOR PULLEY | | | | | | | | | | | | | | |
| BLOWER PULLEY | DATUM DIAMETER | PITCH DIAMETER | 6 | 5 1/2 | 5 | 4 1/2 | 4 | 3 1/2 | 3 | 2 1/2 | 2 | 1 1/2 | 1 | 1/2 | 0 | Closed | |
| 2BK160H | 15.4 | 15.7 | 516 | 527 | 538 | 549 | 560 | 571 | 582 | 593 | 604 | 615 | 626 | 637 | 648 | | |
| 2BK140H | 13.4 | 13.7 | 592 | 604 | 617 | 630 | 642 | 655 | 667 | 680 | 693 | 705 | 718 | 730 | 743 | | |
| 2BK120H | 11.4 | 11.7 | 693 | 708 | 722 | 737 | 752 | 767 | 781 | 796 | 811 | 826 | 840 | 855 | 870 | | |
| 2BK110H | 10.4 | 10.7 | 758 | 774 | 790 | 806 | 822 | 838 | 854 | 871 | 887 | 903 | 919 | 935 | 951 | | |
| 2BK100H | 9.4 | 9.7 | 836 | 854 | 871 | 889 | 907 | 925 | 943 | 960 | 978 | 996 | 1014 | 1031 | 1049 | | |
| 2BK90H | 8.4 | 8.7 | 932 | 952 | 972 | 991 | 1011 | 1031 | 1051 | 1071 | 1091 | 1110 | 1130 | 1150 | 1170 | | |
| 2BK80H | 7.4 | 7.7 | 1053 | 1075 | 1098 | 1120 | 1143 | 1165 | 1187 | 1210 | 1232 | 1255 | 1277 | 1299 | 1322 | | |
| 25 IN. BLOWER | 3 to 5 HP BX BELTS | | MOTOR PULLEY 2VP42 | | Dd1 2.9 | Dd2 3.9 | Pd1 3 | Pd2 4 | | | | | | | | | |
| | | | | Open | | | | | | | | | | | | | |
| | | | | TURNS ON MOTOR PULLEY | | | | | | | | | | | | | |
| | BLOWER PULLEY | DATUM DIAMETER | PITCH DIAMETER | 6 | 5 1/2 | 5 | 4 1/2 | 4 | 3 1/2 | 3 | 2 1/2 | 2 | 1 1/2 | 1 | 1/2 | 0 | Closed |
| | 2BSV278 | 27.8 | 28.1 | 184 | 189 | 194 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | 246 | |
| | 2BSV250 | 25 | 25.3 | 205 | 210 | 216 | 222 | 227 | 233 | 239 | 244 | 250 | 256 | 261 | 267 | 273 | |
| | 2BSV234 | 23.4 | 23.7 | 218 | 224 | 230 | 237 | 243 | 249 | 255 | 261 | 267 | 273 | 279 | 285 | 291 | |
| | 2BSV200 | 20 | 20.3 | 255 | 262 | 269 | 276 | 283 | 290 | 297 | 304 | 312 | 319 | 326 | 333 | 340 | |
| | 2BSV184 | 18.4 | 18.7 | 277 | 284 | 292 | 300 | 307 | 315 | 323 | 331 | 338 | 346 | 354 | 361 | 369 | |
| | 2BSV160 | 16 | 16.3 | 317 | 326 | 335 | 344 | 353 | 362 | 370 | 379 | 388 | 397 | 406 | 414 | 423 | |
| | 2BSV154 | 15.4 | 15.7 | 330 | 339 | 348 | 357 | 366 | 375 | 385 | 394 | 403 | 412 | 421 | 430 | 439 | |
| | 2BSV136 | 12.6 | 12.9 | 401 | 412 | 423 | 435 | 446 | 457 | 468 | 479 | 490 | 501 | 513 | 524 | 535 | |
| | 2BSV124 | 12.4 | 12.7 | 407 | 419 | 430 | 441 | 453 | 464 | 475 | 487 | 498 | 509 | 521 | 532 | 543 | |
| | 2BSV110 | 11 | 11.3 | 458 | 471 | 483 | 496 | 509 | 522 | 534 | 547 | 560 | 572 | 585 | 598 | 611 | |
| | 7-1/2 to 10 HP BX BELTS | | MOTOR PULLEY 2VP60 | | Dd1 4.3 | Dd2 5.5 | Pd1 4.7 | Pd2 5.9 | | | | | | | | | |
| | | | Open | | | | | | | | | | | | | | |
| | | | TURNS ON MOTOR PULLEY | | | | | | | | | | | | | | |
| BLOWER PULLEY | DATUM DIAMETER | PITCH DIAMETER | 6 | 5 1/2 | 5 | 4 1/2 | 4 | 3 1/2 | 3 | 2 1/2 | 2 | 1 1/2 | 1 | 1/2 | 0 | Closed | |
| 2BSV278 | 27.8 | 28.1 | 289 | 295 | 301 | 307 | 313 | 319 | 325 | 331 | 338 | 344 | 350 | 356 | 362 | | |
| 2BSV250 | 25 | 25.3 | 320 | 327 | 334 | 341 | 348 | 355 | 361 | 368 | 375 | 382 | 389 | 395 | 402 | | |
| 2BSV234 | 23.4 | 23.7 | 342 | 349 | 357 | 364 | 371 | 378 | 386 | 393 | 400 | 408 | 415 | 422 | 429 | | |
| 2BSV200 | 20 | 20.3 | 399 | 408 | 416 | 425 | 433 | 442 | 450 | 459 | 467 | 476 | 484 | 493 | 501 | | |
| 2BSV184 | 18.4 | 18.7 | 434 | 443 | 452 | 461 | 470 | 480 | 489 | 498 | 507 | 517 | 526 | 535 | 544 | | |
| 2BSV160 | 16 | 16.3 | 497 | 508 | 519 | 529 | 540 | 550 | 561 | 571 | 582 | 593 | 603 | 614 | 624 | | |
| 2BSV154 | 15.4 | 15.7 | 516 | 527 | 538 | 549 | 560 | 571 | 582 | 593 | 604 | 615 | 626 | 637 | 648 | | |
| 2BSV136 | 12.6 | 12.9 | 628 | 642 | 655 | 669 | 682 | 695 | 709 | 722 | 735 | 749 | 762 | 776 | 789 | | |
| 2BSV124 | 12.4 | 12.7 | 638 | 652 | 666 | 679 | 693 | 706 | 720 | 733 | 747 | 761 | 774 | 788 | 801 | | |
| 2BSV110 | 11 | 11.3 | 717 | 733 | 748 | 763 | 779 | 794 | 809 | 824 | 840 | 855 | 870 | 885 | 901 | | |
| 15 to 20 HP BX BELTS | | MOTOR PULLEY 2VP75 | | Dd1 5.8 | Dd2 7 | Pd1 6.2 | Pd2 7.4 | | | | | | | | | | |
| | | | Open | | | | | | | | | | | | | | |
| | | | TURNS ON MOTOR PULLEY | | | | | | | | | | | | | | |
| BLOWER PULLEY | DATUM DIAMETER | PITCH DIAMETER | 6 | 5 1/2 | 5 | 4 1/2 | 4 | 3 1/2 | 3 | 2 1/2 | 2 | 1 1/2 | 1 | 1/2 | 0 | Closed | |
| 2BSV278 | 27.8 | 28.1 | 381 | 387 | 393 | 399 | 405 | 411 | 417 | 424 | 430 | 436 | 442 | 448 | 454 | | |
| 2BSV250 | 25 | 25.3 | 423 | 430 | 436 | 443 | 450 | 457 | 464 | 470 | 477 | 484 | 491 | 498 | 505 | | |
| 2BSV234 | 23.4 | 23.7 | 451 | 459 | 466 | 473 | 480 | 488 | 495 | 502 | 509 | 517 | 524 | 531 | 539 | | |
| 2BSV200 | 20 | 20.3 | 527 | 535 | 544 | 552 | 561 | 569 | 578 | 586 | 595 | 603 | 612 | 620 | 629 | | |
| 2BSV184 | 18.4 | 18.7 | 572 | 581 | 590 | 600 | 609 | 618 | 627 | 636 | 646 | 655 | 664 | 673 | 683 | | |
| 2BSV160 | 16 | 16.3 | 656 | 667 | 677 | 688 | 698 | 709 | 720 | 730 | 741 | 751 | 762 | 773 | 783 | | |
| 2BSV154 | 15.4 | 15.7 | 681 | 692 | 703 | 714 | 725 | 736 | 747 | 758 | 769 | 780 | 791 | 802 | 813 | | |
| 2BSV136 | 12.6 | 12.9 | 829 | 842 | 856 | 869 | 883 | 896 | 909 | 923 | 936 | 949 | 963 | 976 | 990 | | |

** 2HP Motors on 20 IN Blowers use 2VP42 Pulleys

Re-Circulating Control Options

Manual Positioning Control (Potentiometer)

The dampers can be controlled at a remote location by a manual potentiometer to any position from 20% to 100% fresh air. This will allow manually setting the dampers to match the building ventilation requirements. It will take an extra 3 control wires at the remote location. On a power failure, or if the unit is turned off, the return air damper will close by spring return.

Two Position Control

The dampers can be controlled by a two position switch (a field supplied switching device) to open the fresh air to 100%. On opening of the circuit, power failure, or if the unit is shutoff, the return air damper will close by spring return.

Building Signal Damper Control

When this option is ordered, the supply and return dampers will modulate based on a 0-10V DC signal from the Building Automation System.

Static Pressure Control (Photohelic)

The dampers can be controlled by a building static pressure control. This controller will sense the difference between pressure inside the building, and pressure outside the building (sensed at the A-306 outdoor sensor), and position the dampers to maintain the pressure setting on the controller. The controller has two setpoints and an indicator. The two setpoints are a minimum desired static pressure point and a maximum static pressure point.

The actual building static pressure will be shown by a visual indicator between these two settings. The controller will modulate the dampers to maintain a static pressure between these setpoints.

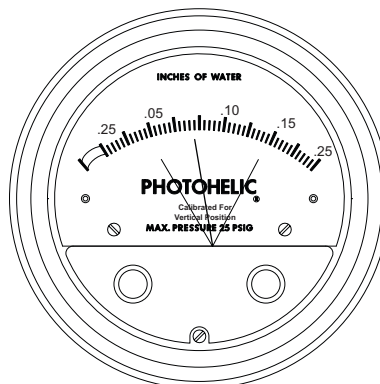
When the building's static pressure is below the minimum setting, the damper motor will proportionally open the fresh air damper and close the return air damper until static increases above the minimum setting. At this point, the damper motor will stop and hold this proportion.

If the building's static pressure continues to climb and goes above maximum setting, the damper motor will reverse proportion, closing the fresh air damper and opening the return air damper until static drops below maximum setting.

During the "OFF" or "Night" cycle of the unit, an internal switching circuit will close the return air damper.

See additional wiring and installation information on the static pressure controller and A-306 outdoor sensor.

Figure 12 - Photohelic Gauge



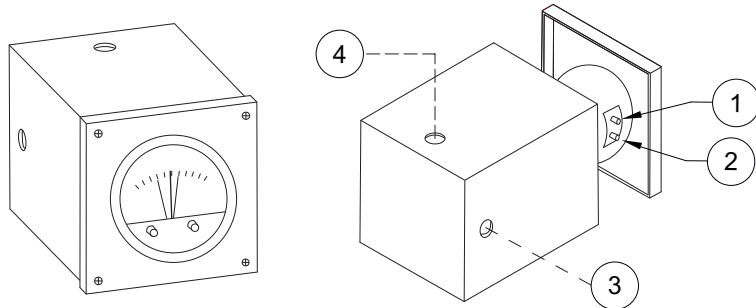
Static Pressure Controller Installation Instructions

Avoid locating the front of the static pressure controller in sun light or other areas with high ambient light or corrosive levels. Bright light shining on the photocells can cause false actuation of the load relays. The static pressure controller should be zeroed out before attaching the low and high pressure hoses. The zero adjustment is located between the minimum and maximum dials.

Using the supplied rubber tubing, plumb the high side of the static pressure controller to the inside of the building. The low side of the static pressure controller should be plumbed to the A-306 outdoor sensor. See the A-306 installation instructions.

Figure 13 - Static Pressure Controller

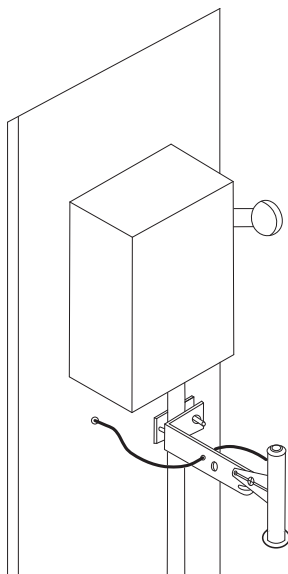
1. High Pressure Port
2. Low Pressure Port
3. Low Pressure to A-306 Outdoor Sensor
4. High Pressure to the Building



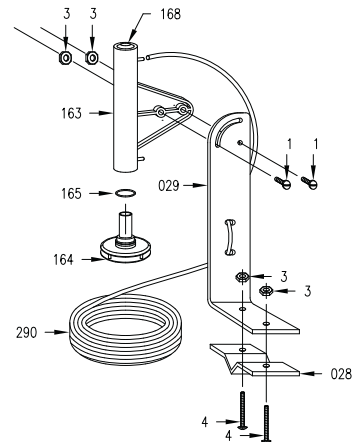
A-306 Outdoor Sensor

Use the installation instructions shipped with the A-306 Outdoor Sensor.

Figure 14 - A-306 Outdoor Sensor



| Item Number | Description |
|-------------|----------------------------------|
| 1 | 10-32 x 1/2" Machine Screw (2) |
| 3 | 10-32 Nut (4) |
| 4 | 10-32 x 1-3/4" Machine Screw (2) |
| 028 | Antenna Clamp |
| 029 | Mounting Bracket |
| 163 | Pick Up Body |
| 164 | Static Pressure Plates |
| 165 | "O" Ring Seal |
| 168 | Hole Plug |
| 290 | Tubing - 50' |



Troubleshooting

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

Table 7 - Troubleshooting Chart

| Problem | Potential Cause | Corrective Action |
|-------------------------------|--|---|
| Fan Inoperative | Blown fuse/Open circuit breaker | Check amperage. |
| | | Check fuse, replace if needed. |
| | | Check circuit breaker. |
| | Disconnect switch in "OFF" position | Place switch to the "ON" position. |
| | Incorrect wiring to motor | Inspect motor wiring. Verify connections with wiring diagram located on fan motor. |
| | Broken fan belt | Replace belt. |
| Motor starter overloaded | | Check amperage. |
| | | Reset starter. |
| Motor Overload | Incorrect fan rotation | Verify that the fan is rotating in the direction shown on rotation label. |
| | Fan speed is too high | Reduce fan RPM. |
| | Incorrect wiring to motor | Inspect motor wiring. Verify connections with wiring diagram located on fan motor. |
| | Overload in starter set too low | Set overload to motor's FLA value. |
| | Motor HP too low | Determine if HP is sufficient for job. |
| | Duct static pressure lower than design | Reduce fan RPM. |
| Insufficient Airflow | Incorrect fan rotation | Verify that the fan is rotating in the direction shown on rotation label. |
| | Poor outlet conditions | Check duct and connections. There should be a straight duct connection to the outlet. |
| | Intake damper not fully open | Inspect damper linkage. If the linkage is damaged, replace damper motor. |
| | Duct static pressure higher than design | Check ductwork. Adjust/resize to eliminate or reduce duct losses. |
| | Blower speed too low | Increase fan RPM. Do not overload motor. |
| | Supply grills or registers closed | Open/Adjust. |
| | Dirty/clogged filters | Clean filters. Replace filters if they cannot be cleaned or are damaged. |
| | Belt slippage | Adjust belt tension. |
| Excessive Airflow | Blower speed too high | Reduce fan RPM. |
| | Filters not installed | Install filters. |
| | Duct static pressure lower than design | Reduce fan RPM. |
| Excessive Vibration and Noise | Misaligned Pulleys | Align pulleys. |
| | Damaged/Unbalanced wheel | Replace wheel. |
| | Fan is operating in unstable region of fan curve | Refer to performance curve for fan. |
| | Bearings need lubrication/Damaged bearing | Lubricate bearings, replace if damaged. |
| | Fan speed is too high | Reduce fan RPM. |
| | Dirty/oily belt(s) | Clean belt(s). |
| | Belt(s) too loose | Adjust, replace if necessary. |
| | Worn belt(s) | Replace belt(s). |

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 IS COMPLETELY DISCONNECTED.

General Maintenance

1. Fan inlet 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 and lubricate the unit while rotating with your hand. **Caution: Use care when touching the exterior of an operating motor. Motors normally run hot and may be hot enough to burn or cause injury.**
3. All fasteners should be checked for tightness each time maintenance checks are performed prior to restarting unit.
4. Blowers 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 Start-up

1. Belt tension should be checked after the first 2 weeks of fan operation. **See “Pulley Alignment/Belt Tension” on page 21.**
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 “Pulley Alignment/Belt Tension” on page 21.** Over-tightening will cause excessive bearing wear and noise. Too little tension will cause slippage at start-up and uneven wear.
2. Filters need to be cleaned and/or replaced quarterly, and more often in severe conditions. Washable filters can be washed in warm soapy water. When re-installing filters, be sure to install with the **airflow in the correct direction** as indicated on the filter.

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.

Unit Filters

Table 8 - Filter Quantity

| Intake | 16" x 20" | 20" x 25" |
|------------------------|------------------|------------------|
| Size 1 Standard Sloped | 2 | |
| Size 2 Standard Sloped | | 2 |
| Size 1 Modular Sloped | 3 | |
| Size 2 Modular Sloped | | 3 |
| Size 3 Modular Sloped | 6 | |
| Size 4 Modular Sloped | 10 | |
| Size 5 Modular Sloped | | 8 |
| Size 1 V-Bank | | 3 |
| Size 2 V-Bank | 8 | |
| Size 3 V-Bank | | 8 |
| Size 4 V-Bank | 15 | |
| Size 5 V-Bank | | 12 |
| Size 1 Inline | 1 | |
| Size 2 Inline | | 1 |
| Size 3 Inline | | 2 |

Optional Mixing Box Filters

Table 9 - Diagonal Filters

| Unit Size | Quantity | Size |
|------------------|-----------------|-------------|
| 1 | 4 | 10" x 16" |
| 2 | 2 | 20" x 25" |
| 3 | 4 | 15" x 20" |
| 4 | 4 | 18" x 25" |
| 5 | 9 | 14.5" x 19" |

Table 10 - Vertical Filters

| Unit Size | Quantity | Size |
|------------------|-----------------|-------------|
| 1 | 1 | 10" x 16" |
| 2 | 1 | 16" x 25" |
| 3 | 2 | 15" x 15" |
| 4 | 2 | 16" x 20" |
| 5 | 3 | 14.5" x 19" |

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 | |
| Address | |
| City | |
| State | |
| Zip | |
| Phone Number | |
| Fax Number | |
| Contact | |
| Purchase Date | |

| | |
|-----------------|--|
| Service Company | |
| Address | |
| City | |
| State | |
| Zip | |
| Phone Number | |
| Fax Number | |
| Contact | |
| Start-up Date | |

Fan Unit Information

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

| Name Plate and Unit Information | |
|---------------------------------|--|
| Model Number | |
| Serial Number | |
| Volts | |
| Hertz | |
| Phase | |
| FLA | |
| HP | |
| Blower Pulley | |
| Motor Pulley | |
| Belt Number | |

| Field Measure Information | |
|---------------------------|--|
| Voltage | |
| Amperage** | |
| RPM | |

| 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.

CLEANING & MAINTENANCE RECORD

| Date | Service Performed |
|------|-------------------|
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |

Factory Service Department
 Phone: 1-866-784-6900
 Fax: 1-919-554-2415