**Power Roof Ventilator/Fans**

# Installation, Operation, and Maintenance Manual

**Curb Mount Utility Set**

**Up-blast Centrifugal Fan**

**Square Inline**

**Down-blast Centrifugal Fan**

**Utility Set**

**Axial Fan**

## 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.

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# 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.

# 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. Inline fans can be interior mounted, motors shall be located outside of the exhaust airstream.
6. Interior mounted fans must have a grease drain that is piped to an approved grease reservoir.
7. Interior mounted fans are considered part of the duct system. Clearance to combustibles must be maintained are all time. If needed the fan may be wrapped to maintain the duct system fire rating.

### 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. If a backdraft damper is required, it should be secured within the curb using sheet metal screws, to the bottom of a damper box or damper support flanges located below the roof deck. **CAUTION: NFPA-96 RECOMMENDS THAT DAMPERS SHOULD NOT BE INSTALLED WHEN EXHAUSTER IS USED FOR REMOVAL OF SMOKE AND GREASE LADEN VAPORS FROM COMMERCIAL KITCHEN EQUIPMENT. CONSULT STATE AND LOCAL CODES FOR DETAILED REQUIREMENTS.**
3. If an up-blast fan is used for kitchen hood exhaust, ensure discharge is at least 40 inches above the roof surface in accordance with NFPA96.
4. On an up-blast fan, normally the power cord is brought through the conduit tube located on the top skirt on the outside of the unit.
5. 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).
6. Before connecting fan motor to power source verify power line wiring is de-energized.
7. 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.
8. Before powering up fan check ventilator wheel for free rotation.
9. Check all fasteners for tightness.
10. Re-install motor dome.
11. A drain pipe is provided for single-point drainage of water and residue on up-blast fans. The drain pipe should be positioned towards the roof slope. Some means for collection of this residue must be provided, either a container directly under the trough or use of an adapter and pipe to carry the residue to a remote collection point. An optional down spout and grease collection box is available as an accessory item for up-blast fans.

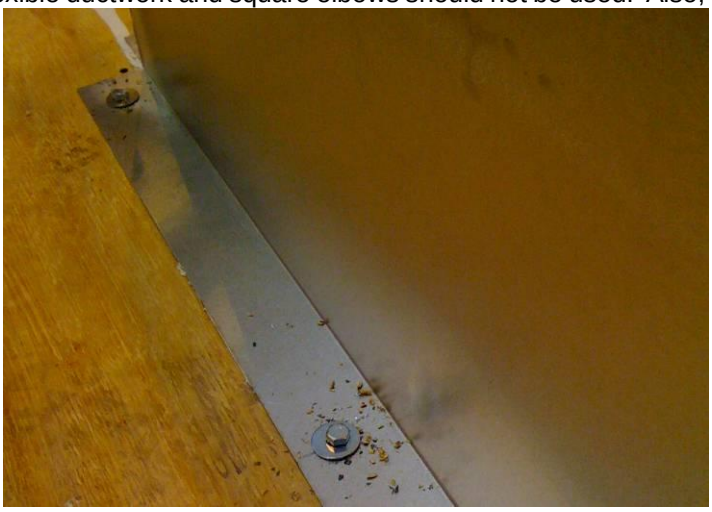
## Wall Mounting

1. The same instructions, warnings and notes found under Roof Mounting section will apply. Refer to steps 2 and 3, and steps 5 through 8.
2. **Masonry Wall:** Around the wall opening install an angle iron frame at least 2" x2" x ¼". Frame should be approximately 1/2" smaller than the inside base dimension of the ventilator. Secure the lead cinch type anchors with non-ferrous bolts (3 per side). The ventilator should be mounted to the mounting angle with self-taping sheet metal screws (3 per side).
3. **Wood Sidings:** Around the wall opening install a wooden frame 2" high x 2" wide. Frame should be approximately 1/2" smaller than the inside base dimension of the ventilator. Secure with counter-sunk expansion type lag bolts (3 per side). The ventilator should then be mounted to the mounting frame with the square head wood screws (3 per side) 3/8" minimum.
4. Steel wall mount brackets are also available as a factory option for the fan.
5. The mounting flange connections should be coated with a suitable caulking compound or an approved waterproof mastic sealer.
6. Wall mount application is not recommended from fans with wheels 30" or larger.

**IMPORTANT: OSHA REGULATIONS REQUIRE THE VENTILATOR TO BE MOUNTED AT LEAST EIGHT (8) FEET ABOVE GROUND OR FLOOR LEVEL.**

## Curb and Ductwork

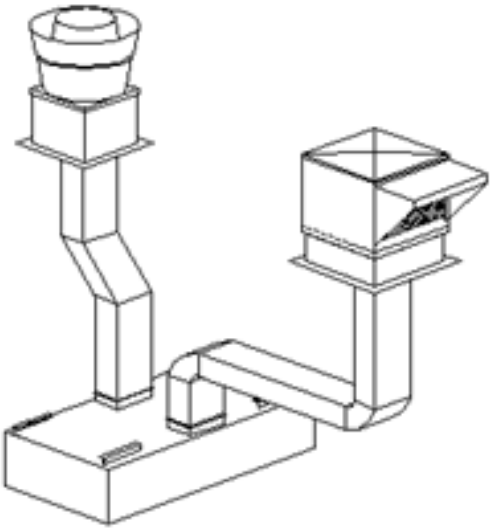
This fan was specified for a specific CFM and static pressure. The ductwork attached to this unit will significantly affect the airflow performance. Flexible ductwork and square elbows should not be used. Also, transitions and turns in ductwork near the fan inlet will cause system effect and will drastically 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.



The fan should be installed on a curb and/or rail elevated not less than 14" above any surface. 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.

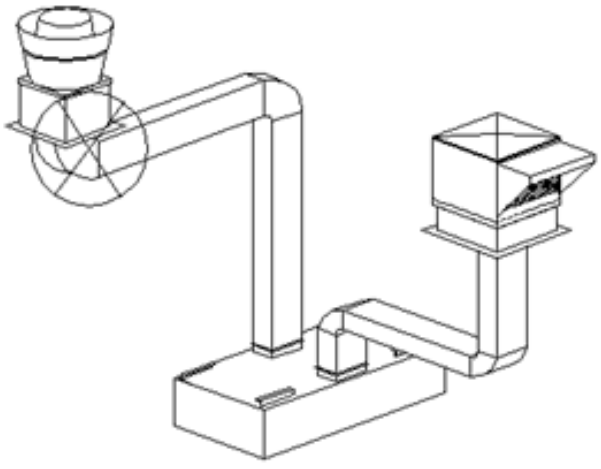
## Duct Routing Examples

### Proper Duct Routing

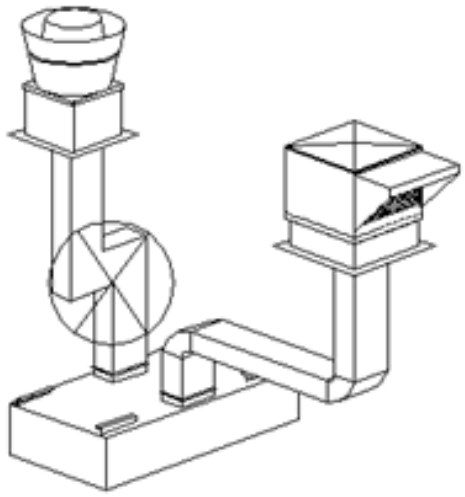


If duct cannot go straight up
use offsets

### Improper Duct Routing

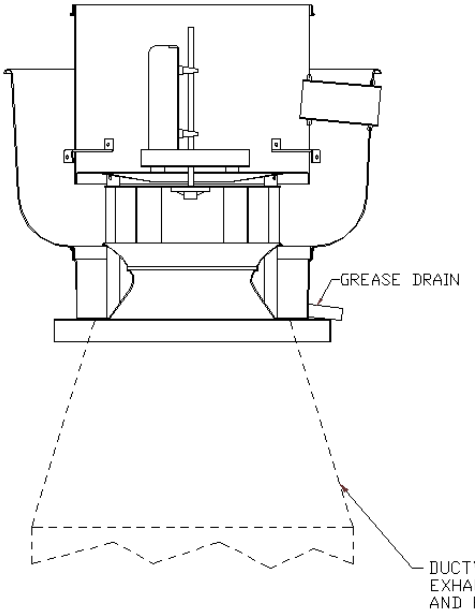


DO NOT connect Elbow DIrecty
to Fan Inlet.



DO NOT use square elbows

# Up-Blast Roof Mount Installation




FEATURES:

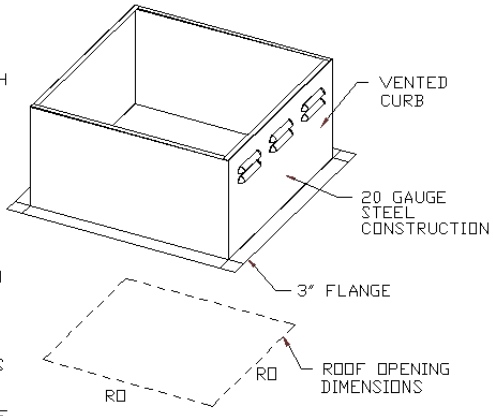
- ROOF MOUNTED FANS
- RESTAURANT MODEL
- UL762
- AMCA SOUND AND AIR CERTIFIED
- WIRING FROM MOTOR TO DISCONNECT SWITCH
- WEATHERPROOF DISCONNECT
- HIGH HEAT OPERATION 300°F (149°C)
- GREASE CLASSIFICATION TESTING

NORMAL TEMPERATURE TEST
EXHAUST FAN MUST OPERATE CONTINUOUSLY WHILE EXHAUSTING AIR AT 300°F (149°C) UNTIL ALL FAN PARTS HAVE REACHED THERMAL EQUILIBRIUM, AND WITHOUT ANY DETERIORATING EFFECTS TO THE FAN WHICH WOULD CAUSE UNSAFE OPERATION.

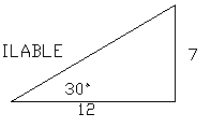
ABNORMAL FLARE-UP TEST
EXHAUST FAN MUST OPERATE CONTINUOUSLY WHILE EXHAUSTING BURNING GREASE VAPORS AT 600°F (316°C) FOR A PERIOD OF 15 MINUTES WITHOUT THE FAN BECOMING DAMAGED TO ANY EXTENT THAT COULD CAUSE AN UNSAFE CONDITION.

OPTIONS:

GREASE BOX
HINGED FAN
PITCHED CURB
INSULATED CURB



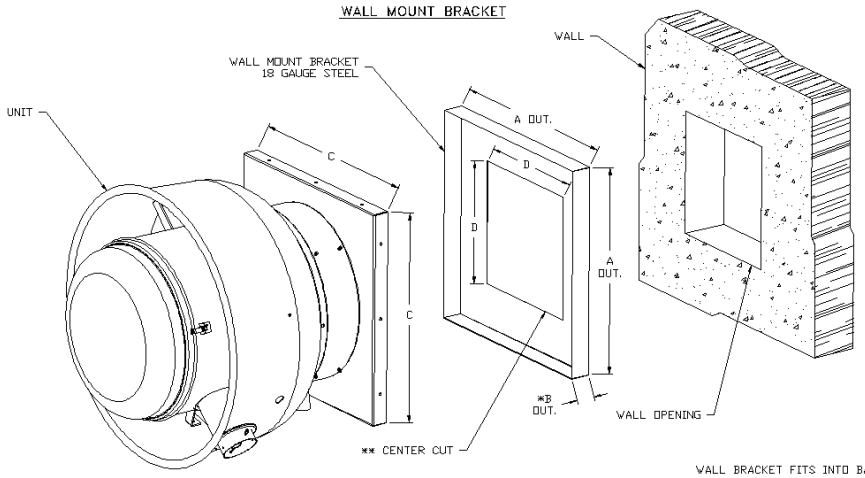

PITCHED CURBS ARE AVAILABLE FOR PITCHED ROOFS.




SPECIFY PITCH:
EXAMPLE: 7/12 PITCH = 30° SLOPE

# Up-Blast Wall Mount Installation

WALL MOUNT BRACKET
REV.#E 09/22/03



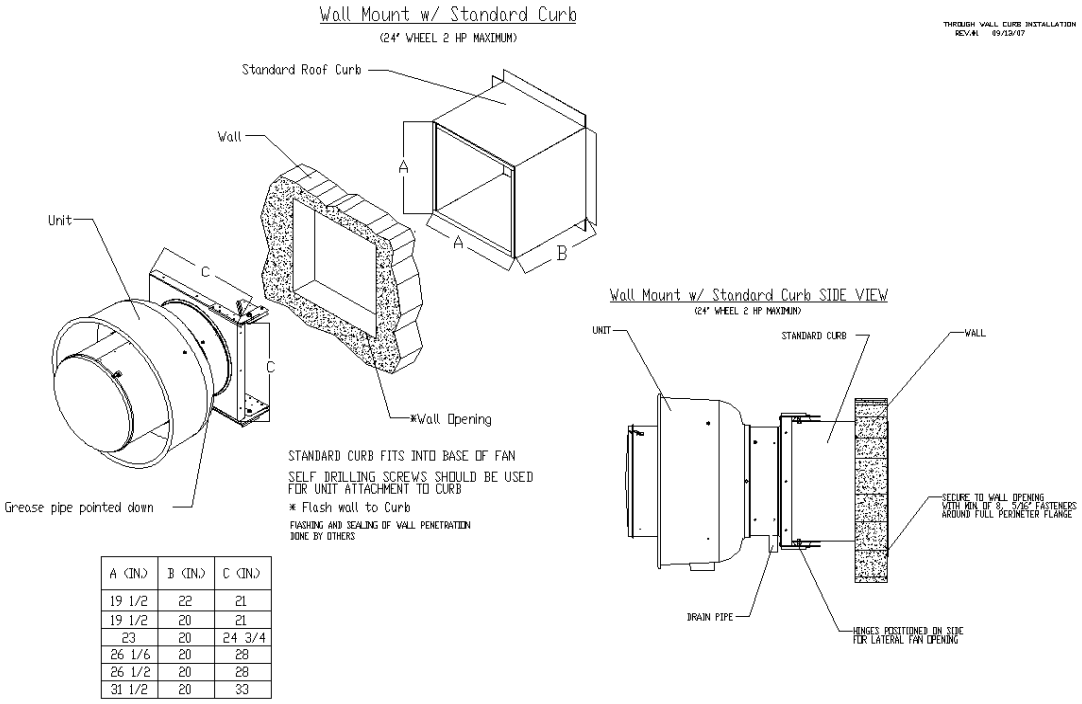

| A OUT. | B OUT. | C | D |
|---|---|---|---|
| 18 1/2 | 2 | 19 | 13 |
| 20 1/2 | 2 | 21 | 16 |
| 21 1/2 | 2 | 22 | 16 |
| 24 1/4 | 2 | 24 3/4 | 20 |
| 25 1/2 | 2 | 26 | 20 |
| 27 1/2 | 2 | 28 | 24 |
| 32 1/2 | 2 | 33 | 28 |

WALL BRACKET FITS INTO BASE OF FAN

SELF DRILLING SCREWS SHOULD BE USED FOR UNIT ATTACHMENT TO WALL MOUNT BRACKET

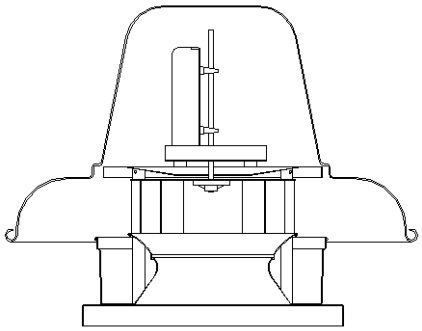
* "B" DIMENSION = 5" WHEN USED WITH DAMPER
** CENTERED IN WALL MOUNT

# Up-Blast Through Wall Mount Installation




| A (IN.) | B (IN.) | C (IN.) |
|---|---|---|
| 19 1/2 | 22 | 21 |
| 19 1/2 | 20 | 21 |
| 23 | 20 | 24 3/4 |
| 26 1/6 | 20 | 28 |
| 26 1/2 | 20 | 28 |
| 31 1/2 | 20 | 33 |

# Down-Blast Installation

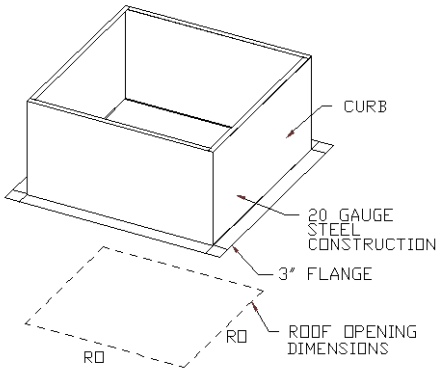


FEATURES:

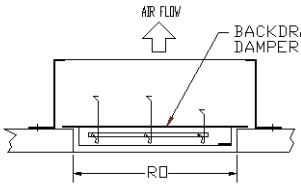
- ROOF MOUNTED FANS
- UL705
- AMCA SOUND AND AIR CERTIFIED
- WIRING FROM MOTOR TO DISCONNECT SWITCH
- DISCONNECT SWITCH
- STANDARD BIRD SCREEN

OPTIONS:

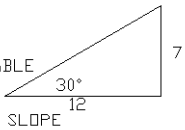
HINGED FAN
PITCHED CURB
INSULATED CURB
BACKDRAFT DAMPER



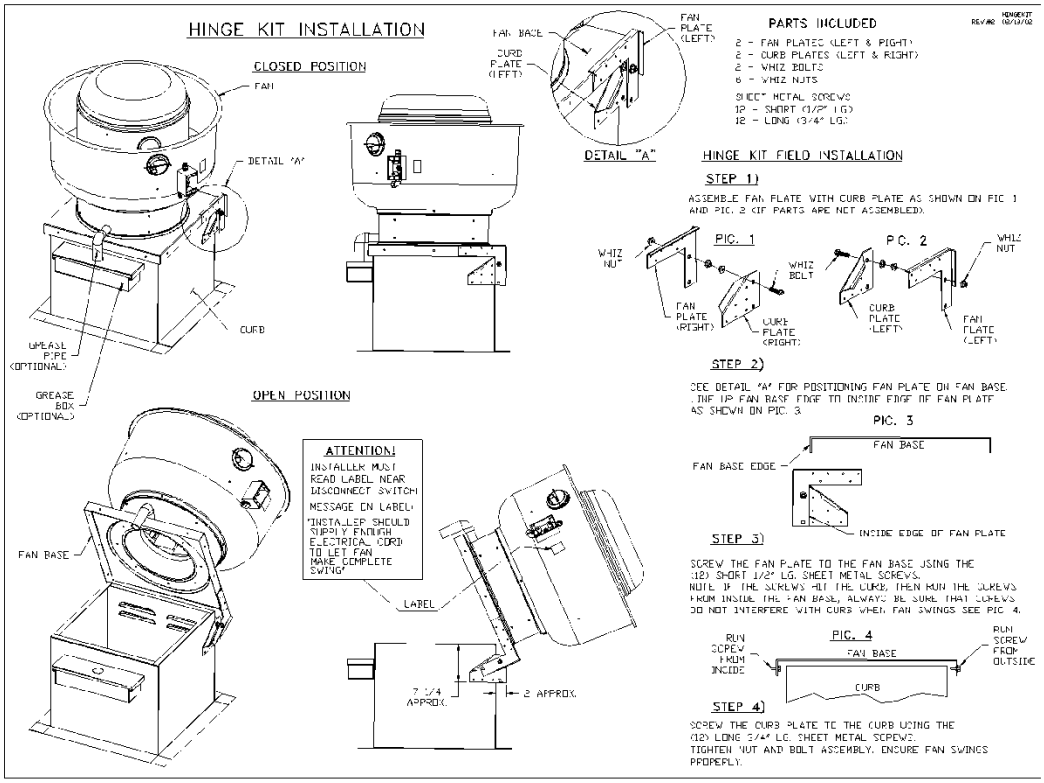

BACKDRAFT DAMPER INSTALLATION



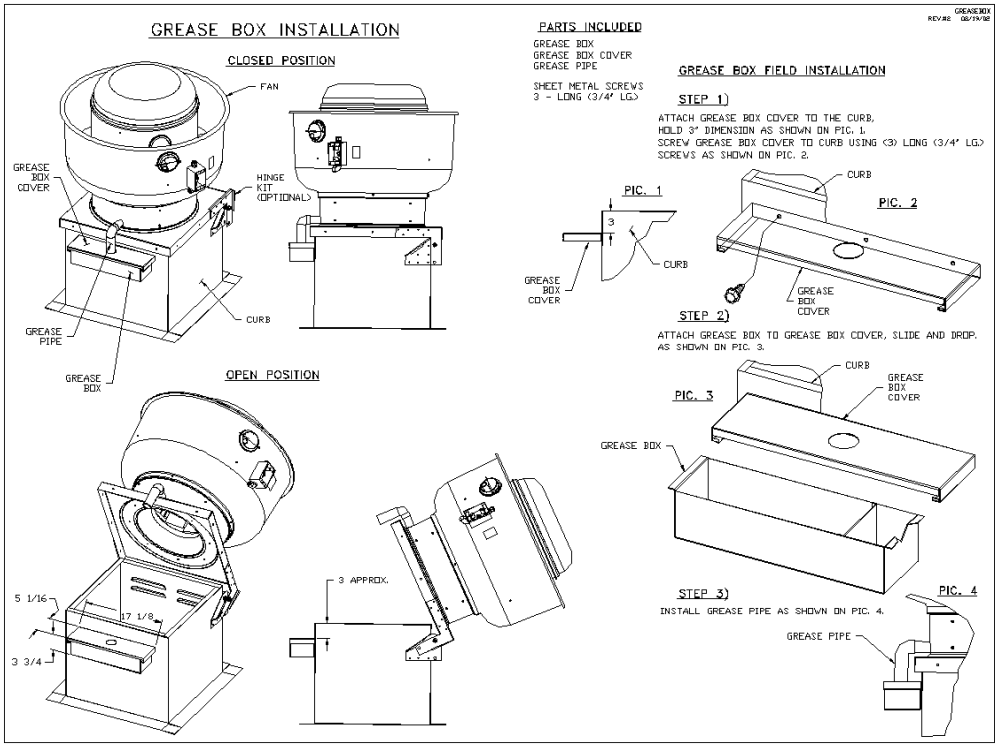

PITCHED CURBS ARE AVAILABLE FOR PITCHED ROOFS.
SPECIFY PITCH:
EXAMPLE: 7/12 PITCH = 30° SLOPE



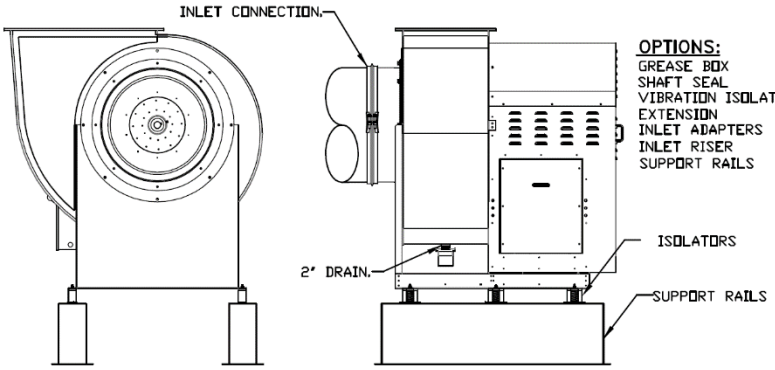
## Typical Hinge Kit – Centrifugal Upblast




## Typical Grease Box Installation

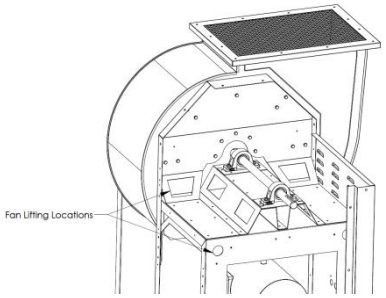


## Up-Blast Utility Set Installation




**OPTIONS:**
GREASE BOX
SHAFT SEAL
VIBRATION ISOLATORS
EXTENSION
INLET ADAPTERS
INLET RISER
SUPPORT RAILS

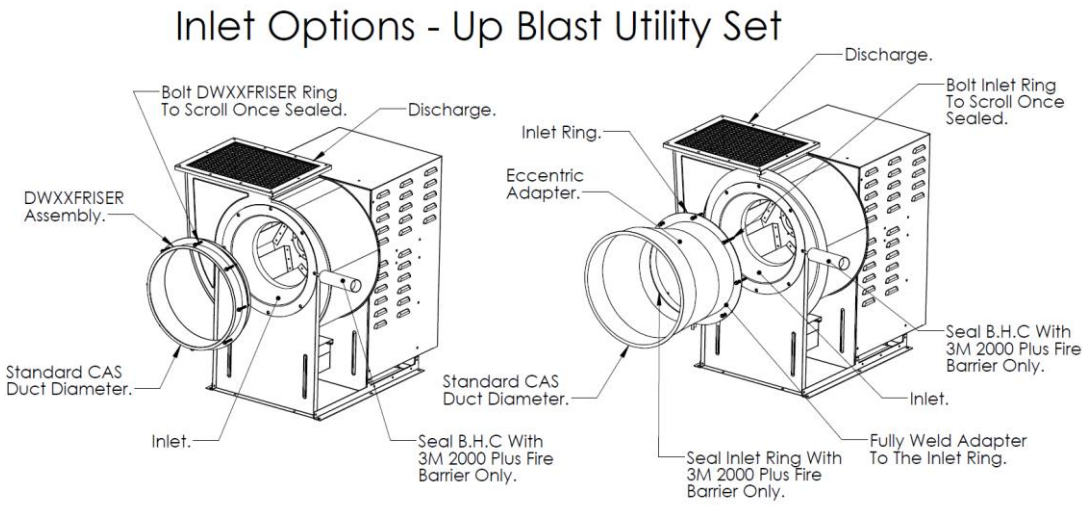
**FEATURES:**
- ROOF MOUNTED FANS
- RESTAURANT MODEL
- UL705
- UL762
- HIGH HEAT OPERATION DIRECT DRIVE 350°F (176°C)
- HIGH HEAT OPERATION BELT DRIVE 350°F (176°C)
- HEAT SLINGER
- GREASE CLASSIFICATION TESTING
- 2" DRAIN
- MOTOR WEATHER COVER
- FULLY SEALED SCROLL HOUSING
- SCROLL ACCESS DOOR
- FLANGE 1 1/4" - 11 THRU 20.
- FLANGE 2" - 24 THRU 36.




NORMAL TEMPERATURE TEST BELT DRIVE
EXHAUST FAN MUST OPERATE CONTINUOUSLY WHILE EXHAUSTING AIR AT 350°F (176°C) UNTIL ALL FAN PARTS HAVE REACHED THERMAL EQUILIBRIUM, AND WITHOUT ANY DETERIORATING EFFECTS TO THE FAN WHICH WOULD CAUSE UNSAFE OPERATION.

NORMAL TEMPERATURE TEST DIRECT DRIVE
EXHAUST FAN MUST OPERATE CONTINUOUSLY WHILE EXHAUSTING AIR AT 350°F (176°C) UNTIL ALL FAN PARTS HAVE REACHED THERMAL EQUILIBRIUM, AND WITHOUT ANY DETERIORATING EFFECTS TO THE FAN WHICH WOULD CAUSE UNSAFE OPERATION.

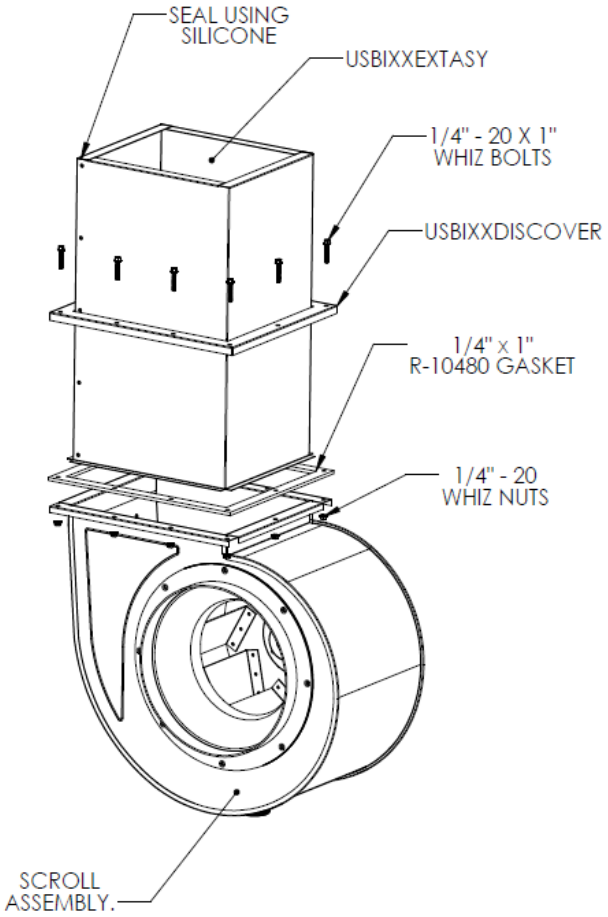
## Up-Blast Utility Set Inlet Options




| Inlet Connections | | | | | | |
|---|---|---|---|---|---|---|
| Fan Size | Duct Diameter | Inlet Connection | B.H.C. | Inlet Ring OD | Hardware # | Hardware Qty |
| 11 | 12" | DW12FRISER | 13.375" | 12.500" | 1/4" - 20 x 1 1/2" (92323A523) | 8 |
| 13 | 14" | DW14FRISER | 15.375" | 13.500" | 1/4" - 20 x 1 1/2" (92323A523) | 8 |
| 15 | 16" | DW16FRISER | 17.375" | 15.250" | 1/4" - 20 x 1 1/2" (92323A523) | 8 |
| 18 | 20" | DW20FRISER | 21.375" | 18.500" | 1/4" - 20 x 1 1/2" (92323A523) | 8 |
| 20 | 20" | DW20FRISERUSBI20 | 22.375" | 19.625" | 1/4" - 20 x 1 1/2" (92323A523) | 8 |
| 24 | 24" | DW24FRISERUSBI24 | 28.000" | 25.375" | 3/8" - 16 X 1 1/2" (92323A558) | 8 |
| 30 | 24" | DW24FRISERUSBI30 | 26.962" | 24.375" | 3/8" - 16 X 1 1/2" (92323A558) | 8 |
| 36 | 24" | DW307524ADPEC | N/A | 30.500" | 3/8" - 16 X 1 1/2" (92323A558) | 8 |

**Up-Blast Utility Set**

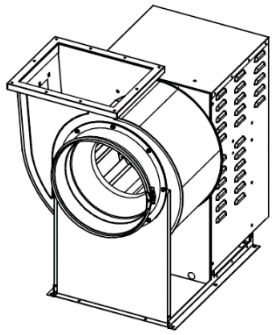
# Discharge Extension Options - Up Blast Utility Set




| Hardware Counts | |
|---|---|
| Hardware # Bolt / Nut | Hardware Qty |
| 1/4" - 20 x 1" (92323A518) / 1/4" - 20 (94831A029) | 8 |
| 1/4" - 20 x 1" (92323A518) / 1/4" - 20 (94831A029) | 8 |
| 1/4" - 20 x 1" (92323A518) / 1/4" - 20 (94831A029) | 8 |
| 1/4" - 20 x 1" (92323A518) / 1/4" - 20 (94831A029) | 12 |
| 1/4" - 20 x 1" (92323A518) / 1/4" - 20 (94831A029) | 12 |
| 1/4" - 20 x 1" (92323A518) / 1/4" - 20 (94831A029) | 12 |
| 1/4" - 20 x 1" (92323A518) / 1/4" - 20 (94831A029) | 12 |
| 1/4" - 20 x 1" (92323A518) / 1/4" - 20 (94831A029) | 14 |

| USBI - Discharge Extension | | | | | |
|---|---|---|---|---|---|
| Fan Size | Extension # | "L" | "W" | "H" | Cover # |
| 11 | USBI11EXTASY | 12" | 11" | 24" | USBI11DISCOVER |
| 13 | USBI13EXTASY | 14" | 12" | 24" | USBI13DISCOVER |
| 15 | USBI15EXTASY | 16" | 13" | 24" | USBI15DISCOVER |
| 18 | USBI18EXTASY | 19" | 15" | 24" | USBI18DISCOVER |
| 20 | USBI20EXTASY | 21" | 15" | 24" | USBI120DISCOVER |
| 24 | USBI24EXTASY | 26" | 17" | 24" | USBI24DISCOVER |
| 30 | USBI30EXTASY | 32" | 19" | 24" | USBI30DISCOVER |
| 36 | USBI36EXTASY | 39" | 23" | 24" | USBI36DISCOVER |

## Up-Blast Utility Set Indoor Installation



Some situations prevent the installation of exhaust fans on the roof or other outdoor location. An indoor installation may be the only alternative.

Of the various types of fans that might be employed, utility sets seem most appropriate because they readily accommodate the inlet and outlet duct connections. Fans designed for curb mounting would present outlet duct connection difficulties.

Most jurisdictions having authority comply IMC, NFPA96 and with UL762 standards. Standard UL762 “Power Roof Ventilators for Restaurant Exhaust Appliances”, covers the utility set high temperature and grease fire testing. NFPA96 “Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations”, covers the installation of the duct connections to the inlet and out of the exhaust fan.

**Standard UL762:**
This standard has two primary tests. The first test has the fan exhaust air for several hours at the maximum temperature the manufacturer wishes to list the fan, such as 300 degrees F. The second part imitates a grease fire by igniting grease in a pan near an inlet duct. If the fan keeps running and does not display any unsafe results it passes those tests. They also examine the fan for any characteristics that might be unsuitable.

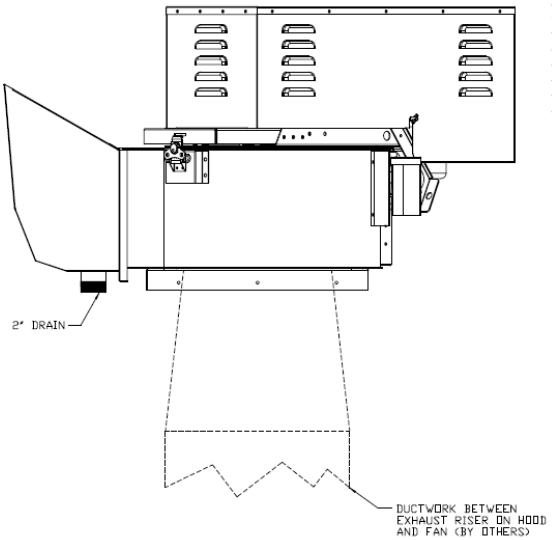
In the scope, section 1.1, it says “these requirements cover roof or wall-mounted ventilators for restaurant exhaust appliances”. It would seem at first that the phrase “roof or wall mounted” would preclude applicability of the label indoors. However, in the very next paragraph it goes on to say “Power ventilators…covered by these requirements are intended or installation in accordance with … NFPA 96”. NFPA 96 clearly defines how to install a traditional ventilator indoors.

**Standard NFPA 96 – 8.1.4* Utility Set Exhaust Fans.**
**8.1.4.2** Utility set exhaust fans installed within the building shall be located in an accessible area of adequate size to allow for service or removal.
**8.1.4.3** Where the duct system connected to the fan is in an enclosure, the space or room in which the exhaust fan is located shall have the same fire resistance rating as the enclosure.
**8.1.4.4** The fan shall be connected to the exhaust duct by flanges securely bolted as shown in Figure 8.1.3.2 (a) through Figure 8.1.3.2 (d) or by a system specifically listed for such use, such as UL1978 or UL2221 listed duct systems.
**8.1.4.5** Flexible connectors shall not be used.
**8.1.4.6** Exhaust fans shall have a drain directed to a readily accessible and visible grease receptacle not to exceed 3.8 L (1 gallon).

**Manufactures Recommendations for Indoor Installation:**

1. The fan inlet and outlet must be connected to the ducts using companion flanges and high temperature (1500F) gaskets or by a system specifically listed for such use, such as UL1978 or UL2221 listed duct systems.
2. Install the fan where there is room for service and removal.
3. Usually the duct to the fan is in a shaft and the shaft walls have a fire resistance rating. The space where the fan is located must have the same fire resistance rating as the shaft.
4. Flexible connectors are not allowed.
5. There must be a drain in the fan that is directed to a readily accessible and visible grease receptacle, ideally piped to the building grease trap.
6. The exhaust housing constructed of carbon steel not less than 1.52 mm (.060 in.), unless listed in accordance with the terms of the listing.
7. Inlet and outlet ducts will have access doors installed 3 feet from the fan for service and maintenance.
8. Minimum clearances are 18” inches to combustible, 3” inches to limited, 0” inches to non-combustibles.
9. All wiring and electrical equipment must comply with NFPA 70, National Electrical Code.

# Up-Blast Curb Mount Utility Set Installation



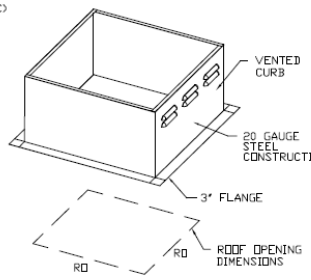

**FEATURES:**

- ROOF MOUNTED FANS
- RESTAURANT MODEL
- UL762
- HIGH HEAT OPERATION DIRECT DRIVE 300°F (149°C)
- HIGH HEAT OPERATION BELT DRIVE 500°F (260°C)
- HEAT SLINGER
- GREASE CLASSIFICATION TESTING
- TILT OUT WHEEL
- LOCKING PIN FOR POWER PACK
- MOTOR WEATHER COVER

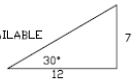
NORMAL TEMPERATURE TEST BELT DRIVE
EXHAUST FAN MUST OPERATE CONTINUOUSLY WHILE EXHAUSTING AIR AT 500°F (260°C) UNTIL ALL FAN PARTS HAVE REACHED THERMAL EQUILIBRIUM, AND WITHOUT ANY DETERIORATING EFFECTS TO THE FAN WHICH WOULD CAUSE UNSAFE OPERATION.

NORMAL TEMPERATURE TEST DIRECT DRIVE
EXHAUST FAN MUST OPERATE CONTINUOUSLY WHILE EXHAUSTING AIR AT 300°F (149°C) UNTIL ALL FAN PARTS HAVE REACHED THERMAL EQUILIBRIUM, AND WITHOUT ANY DETERIORATING EFFECTS TO THE FAN WHICH WOULD CAUSE UNSAFE OPERATION.

ABNORMAL FLARE-UP TEST BELT & DIRECT DRIVE
EXHAUST FAN MUST OPERATE CONTINUOUSLY WHILE EXHAUSTING BURNING GREASE VAPORS AT 600°F (316°C) FOR A PERIOD OF 15 MINUTES WITHOUT THE FAN BECOMING DAMAGED TO ANY EXTENT THAT COULD CAUSE AN UNSAFE CONDITION.

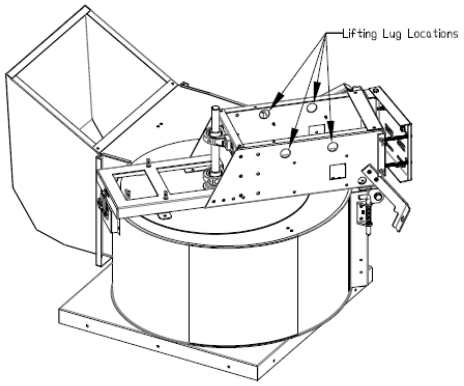



PITCHED CURBS ARE AVAILABLE FOR PITCHED ROOFS.

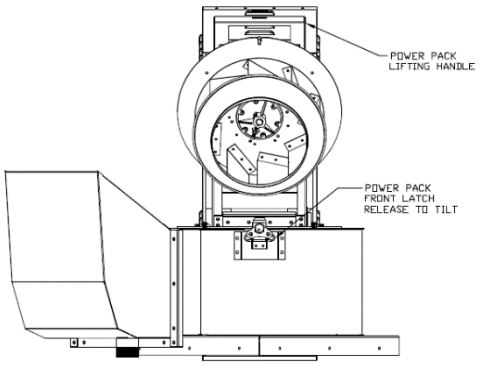


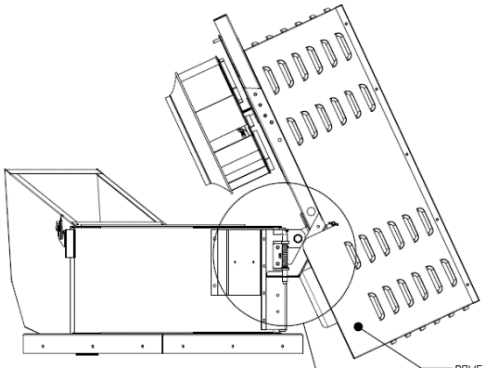

SPECIFY PITCH:
EXAMPLE: 7/12 PITCH = 30° SLOPE

**OPTIONS:**
GREASE BOX
PITCHED CURB
INSULATED CURB
RAIN CAP

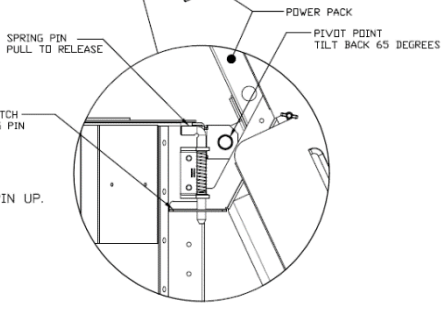



# Up-Blast Curb Mounted Utility Set Hinging Instructions



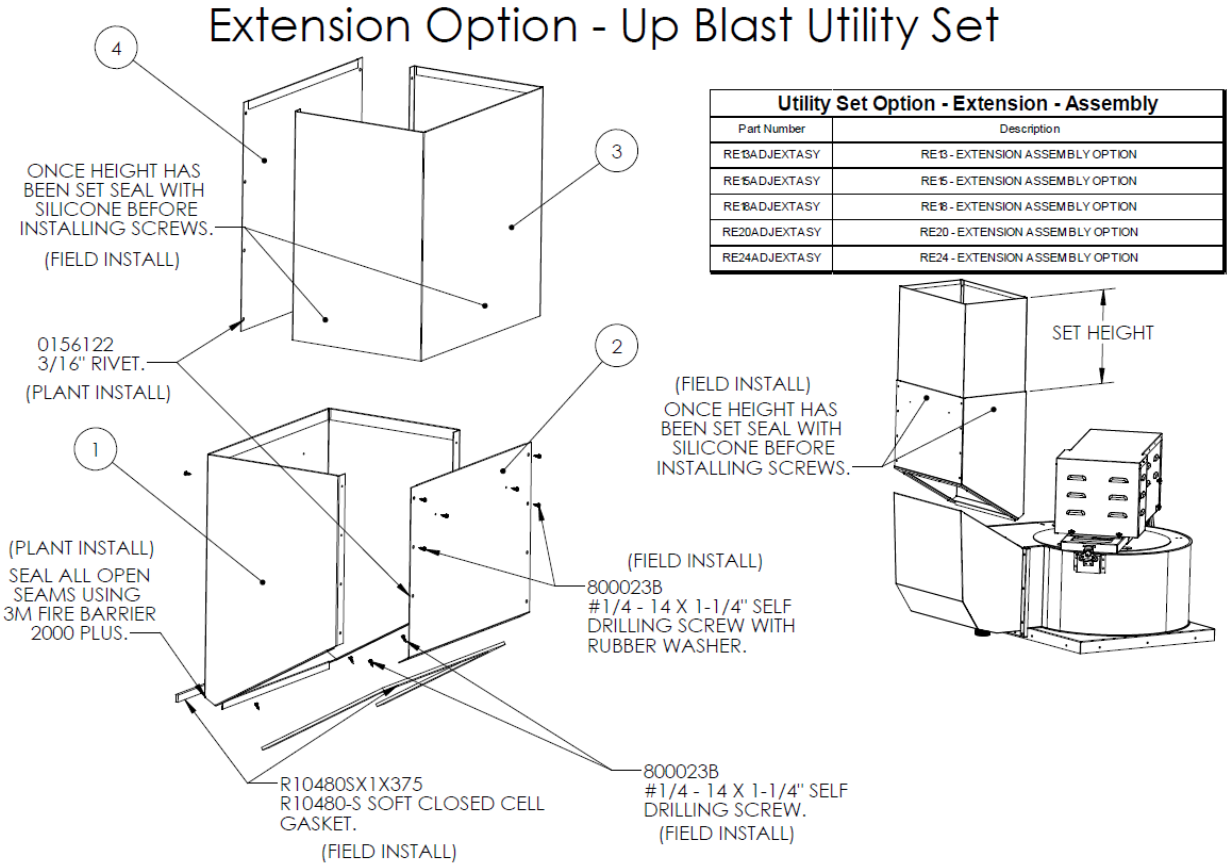
UTILITY SETS MAY NOT BE WALL MOUNTED




**HINGING INSTRUCTIONS:**

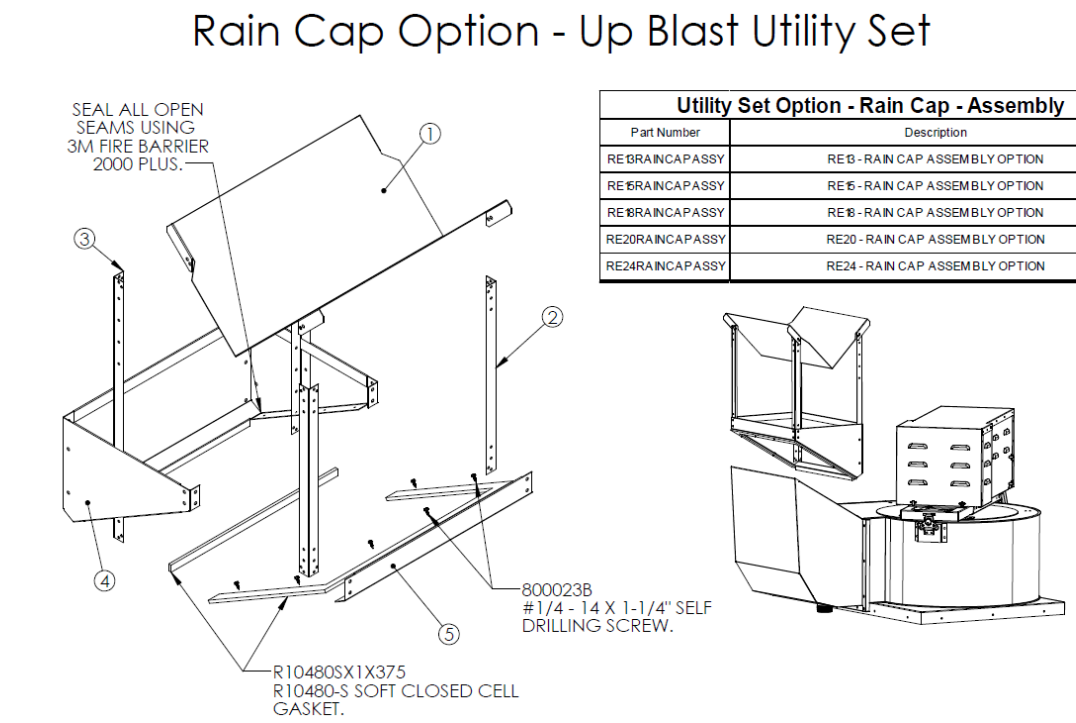
1 - TURN THE DISCONNECT TO THE OFF POSITION.
2 - TURN AND RELEASE THE LATCH FROM THE POWER PACK HANDLE.
3 - LIFT THE POWER PACK USING THE FRONT HANDLE.
4 - THE POWER PACK WILL TILT BACK 65 DEGREES.
5 - THE POWER PACK LATCH WILL AUTOMATICALLY ENGAGE THE SPRING PIN.
6 - TO CLOSE THE POWER PACK, HOLD THE LIFTING HANDLE AND PULL THE SPRING PIN UP.
7 - LOWER THE POWER PACK DOWN.
8 - ENGAGE THE FRONT LATCH INTO THE LIFTING HANDLE AND TWIST TO LOCK.
9 - INSPECT THE POWER PACK. TOP PLATE SHOULD BE SEALED WITH TOP GASKET.
10 - TURN THE WHEEL TO MAKE SURE THERE ISN'T ANY INTERFERENCE.

## Up-Blast Curb Mounted Utility Set Discharge Extension Option




| Utility Set Option - Extension - Assembly | |
|---|---|
| Part Number | Description |
| RE13ADJEXTASY | RE13 - EXTENSION ASSEMBLY OPTION |
| RE15ADJEXTASY | RE15 - EXTENSION ASSEMBLY OPTION |
| RE18ADJEXTASY | RE18 - EXTENSION ASSEMBLY OPTION |
| RE20ADJEXTASY | RE20 - EXTENSION ASSEMBLY OPTION |
| RE24ADJEXTASY | RE24 - EXTENSION ASSEMBLY OPTION |

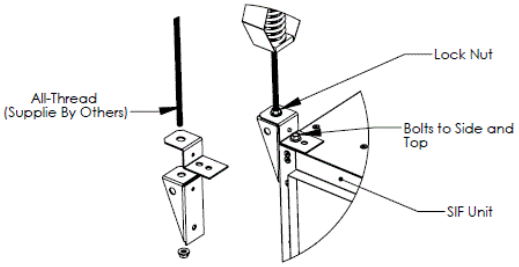
## Up-Blast Curb Mounted Utility Set Rain Cap Option



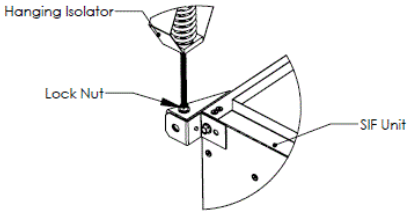

| Utility Set Option - Rain Cap - Assembly | |
|---|---|
| Part Number | Description |
| RE13RAINCAPASSY | RE13 - RAIN CAP ASSEMBLY OPTION |
| RE15RAINCAPASSY | RE15 - RAIN CAP ASSEMBLY OPTION |
| RE18RAINCAPASSY | RE18 - RAIN CAP ASSEMBLY OPTION |
| RE20RAINCAPASSY | RE20 - RAIN CAP ASSEMBLY OPTION |
| RE24RAINCAPASSY | RE24 - RAIN CAP ASSEMBLY OPTION |

## Square Inline Mounting Bracket Detail

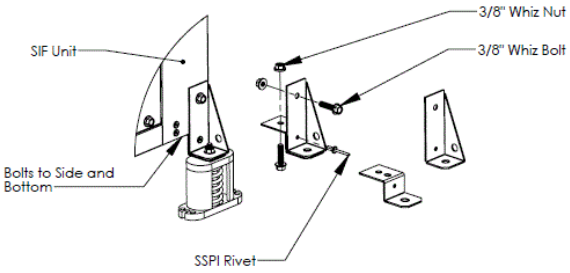
Horizontal Overhead Mount



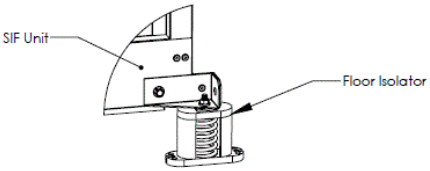

Vertical Overhead Mount




Horizontal Floor Mount

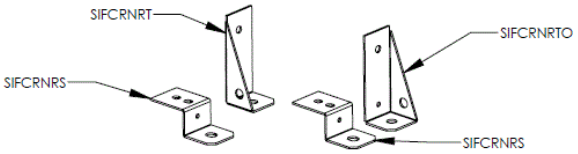



Vertical Floor Mount



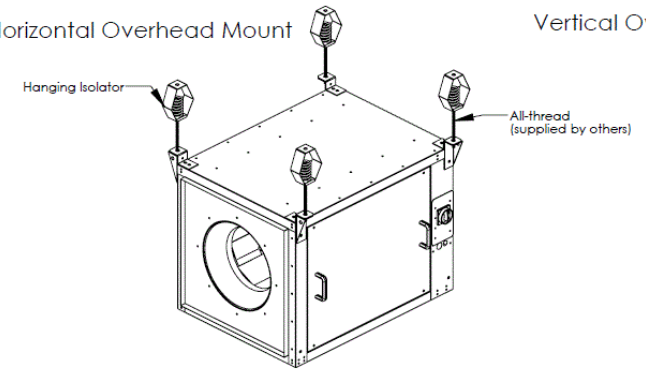

Each Mounting configuration requires:

- (2) SIFCRNRT
- (2) SIFCRNRTO
- (4) SIFCRNRS

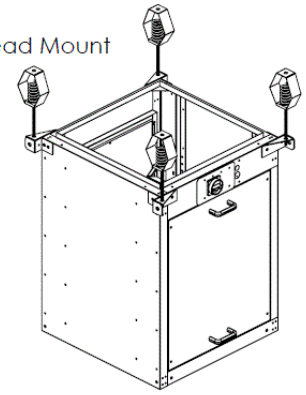


## Square Inline Mounting Configurations

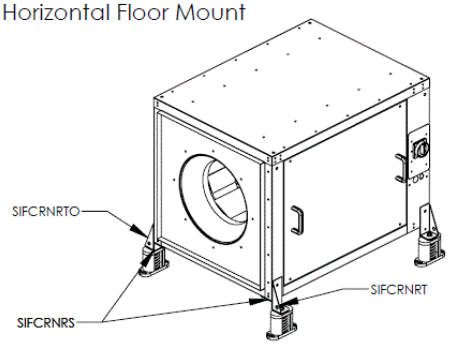
Horizontal Overhead Mount



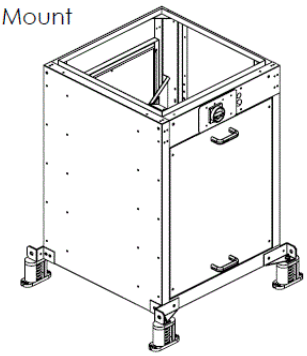

Vertical Overhead Mount



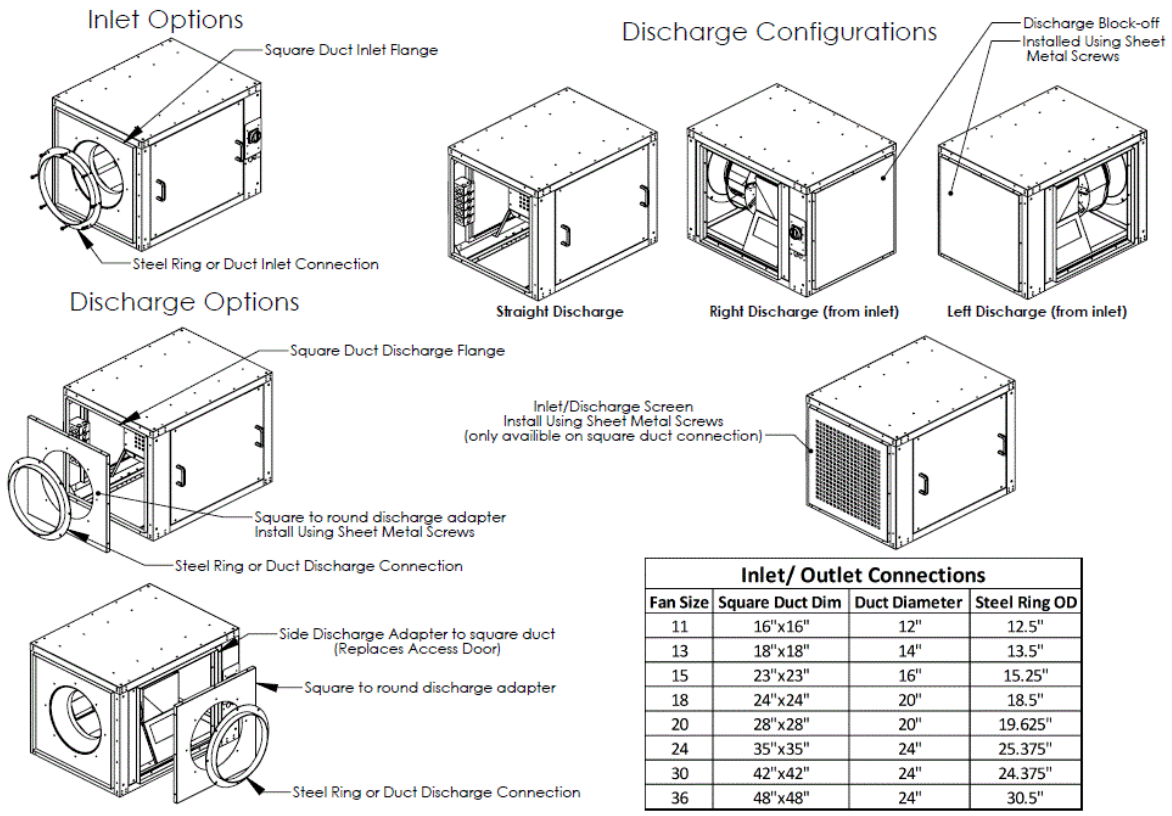
Horizontal Floor Mount




Vertical Floor Mount

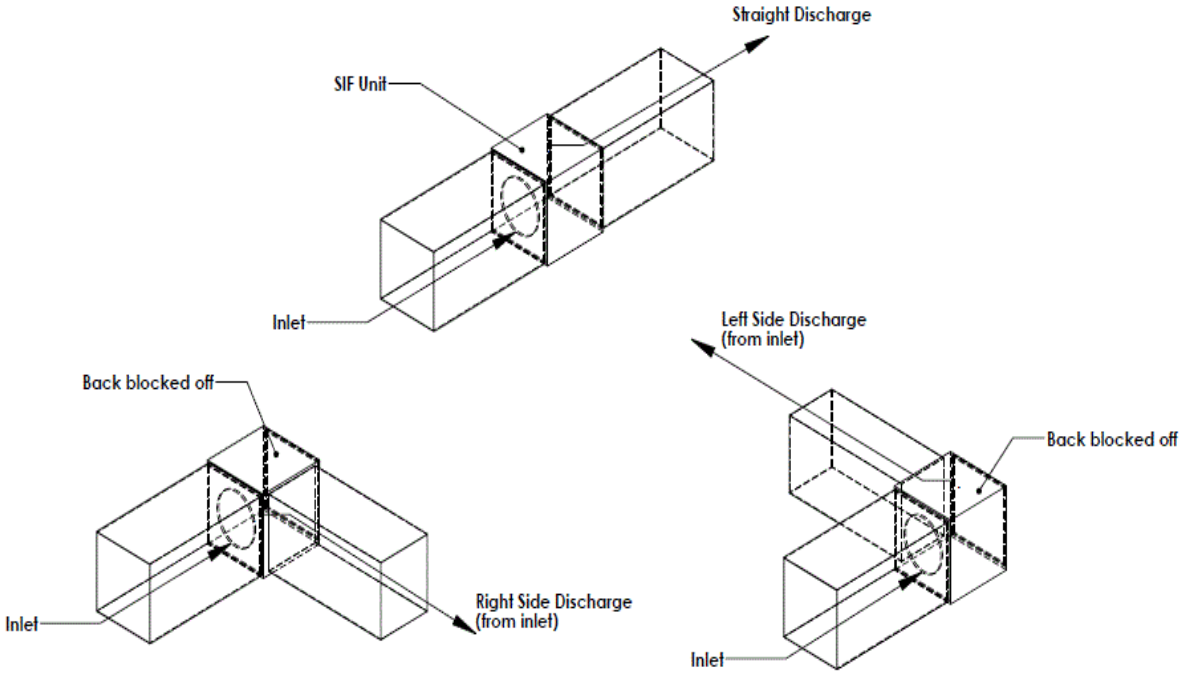


## Square Inline Discharge Options




| Inlet/ Outlet Connections | | | |
|---|---|---|---|
| Fan Size | Square Duct Dim | Duct Diameter | Steel Ring OD |
| 11 | 16"x16" | 12" | 12.5" |
| 13 | 18"x18" | 14" | 13.5" |
| 15 | 23"x23" | 16" | 15.25" |
| 18 | 24"x24" | 20" | 18.5" |
| 20 | 28"x28" | 20" | 19.625" |
| 24 | 35"x35" | 24" | 25.375" |
| 30 | 42"x42" | 24" | 24.375" |
| 36 | 48"x48" | 24" | 30.5" |

## Square Inline Discharge Configurations



## 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.*

**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.**

**Copper Wire Ampacity**

| Wire Size AWG | Maximum Amps |
|---|---|
| 14 | 15 |
| 12 | 20 |
| 10 | 30 |
| 8 | 50 |
| 6 | 65 |
| 4 | 85 |

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.

**IMPORTANT: FANS WITH HINGE KITS REQUIRE ENOUGH SLACK IN THE WIRING TO THE FAN TO ALLOW FAN TO TILT BACK TO THE OPEN POSITION. ELECTRICIAN MUST CHECK THIS AND ACCOUNT FOR THE RANGE OF MOTION OF THE FAN.**

## Motorized Damper

On units shipped with the optional motorized damper, power must be supplied to the damper according to the damper nameplate. The damper motor is controlled external to the fan. E**xternal wiring to the damper motor is required**.

## PSC (Permanent Split Capacitor) 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, and high to low range. At high speed, the speed control allows all of the line voltage to pass right to the motor.

A minimum speed adjustment is provided to allow independent control of the minimum speed setting. Minimum speed adjustment ensures 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 and adjust with small screw driver. This can be found under the speed control faceplate, (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 65VAC. Running lower voltages to the motor can cause premature failure and overheating problems.**

## Electronically Commutated Motor (ECM) Speed Control

EC Motors and controls allow accurate manual adjustment of fan speed. The benefits of using an EC Motor are exceptional efficiency, performance, and motor life.

**NOTE: To adjust the speed of 3 phase direct drive motors, a variable frequency drive is required.**

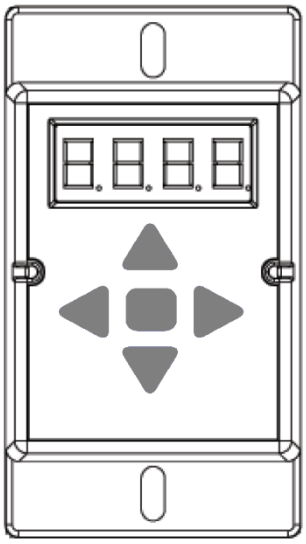
### EVO EC Motor Control

The control unit features a 4 digit LED numerical display. The knob on the unit allows the user to set the flow index with a screwdriver. Twenty seconds later, the display shows the motor RPM. Then, the display periodically alternates between the flow index and motor RPM. The flow index has a range of 0 to 100% and is typically linear with motor RPM.


The EC Motor control requires a **24VAC** input and can locally turn the motor on and off. The motor can be adjusted between 300 RPM and maximum speed with this control.

### RTC FSC-1 Motor Control

The control unit 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.

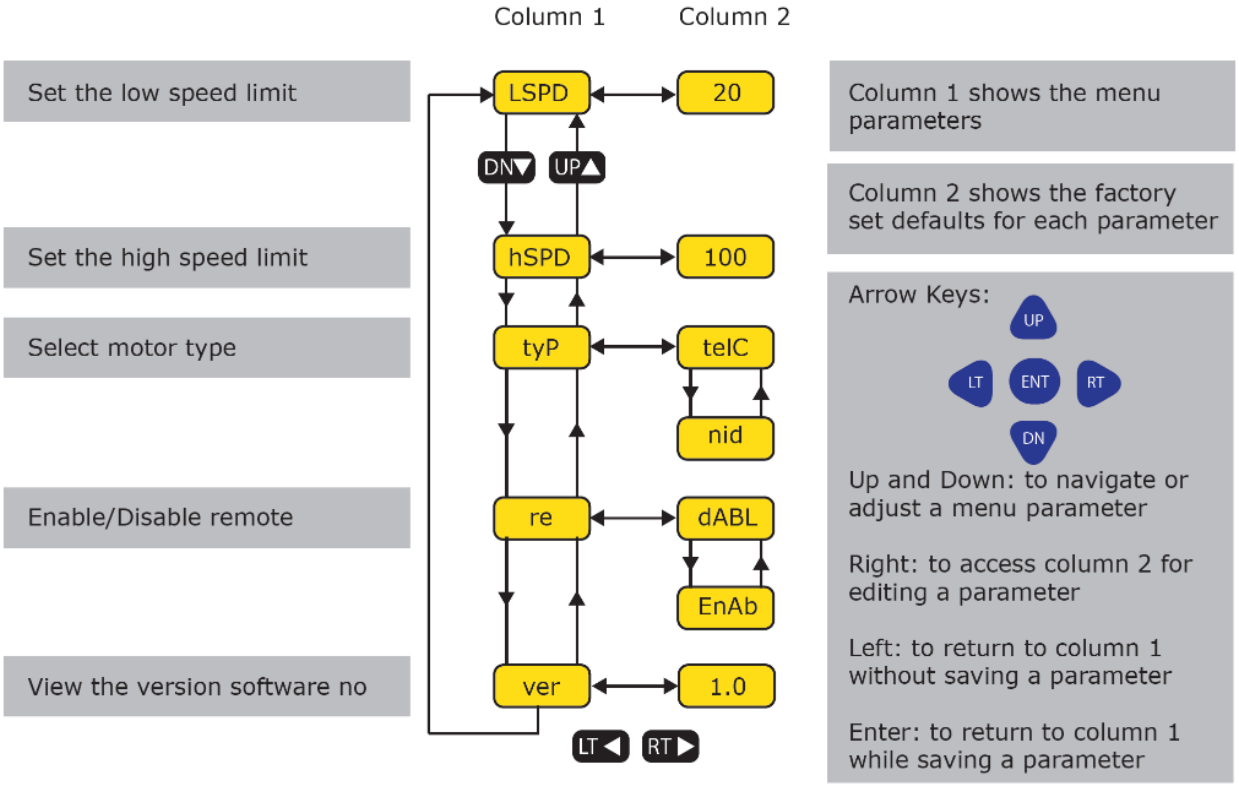


If the remote function (re) is enabled, the speed is controlled through a **0-10V** input. **0V = 0%** and **10V = 100%**, unless overridden by the low speed and high speed limits.

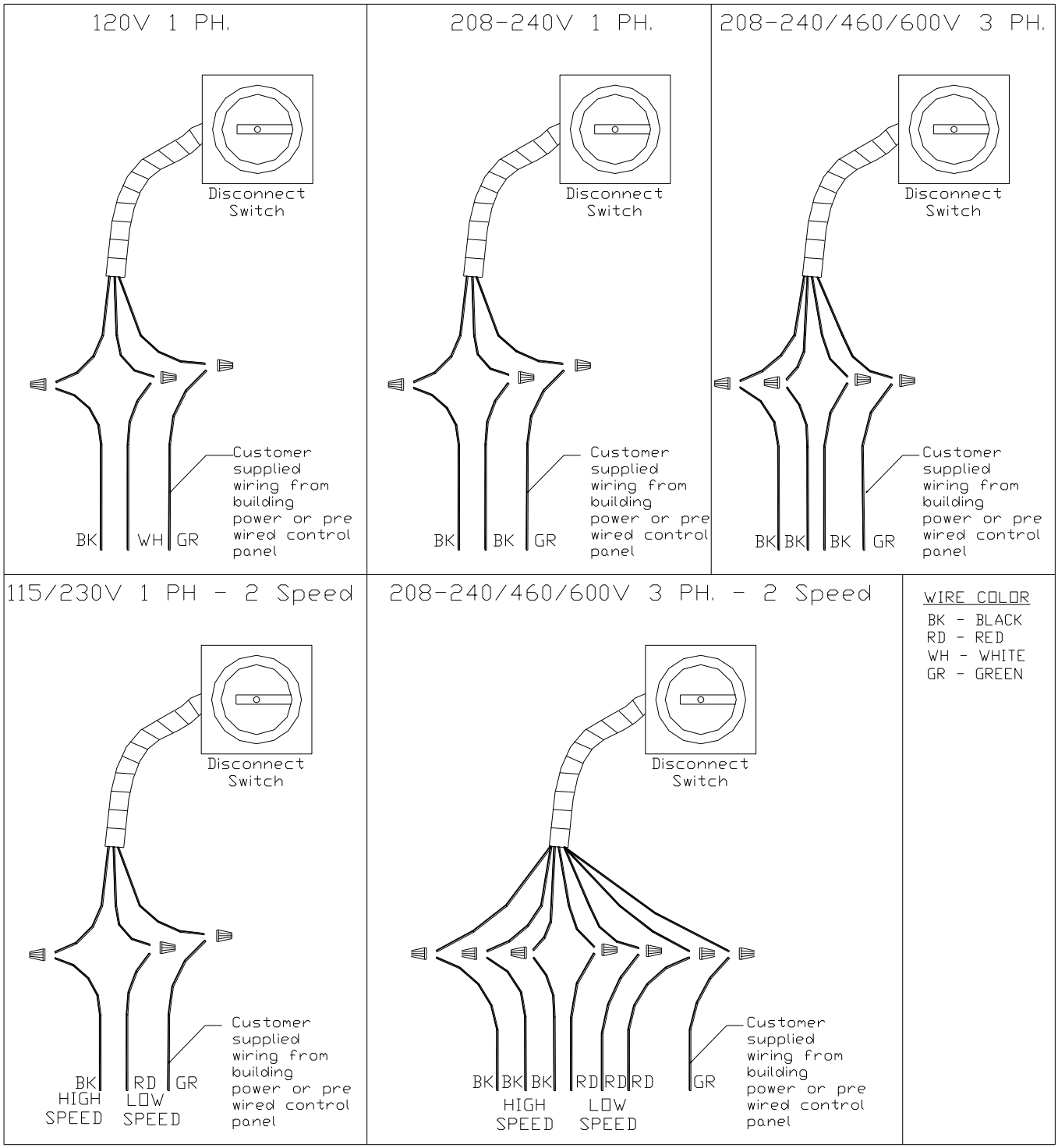
The EC Motor control requires a **24VAC** input and can locally turn the motor on and off. The motor RPM range is fully adjustable between the minimum and maximum set points, see LSPD and HSPD on the programming display. For more information see the control operating manual.

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.

## Programming Map RTC FSC-1



## Fan to Building Wiring Connection



# Variable Frequency Drive (VFD) Installation Instructions

## Input AC Power

1. 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 the table below. Refer to the installation schematic for exact breaker sizing.
2. 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.
3. Input AC line wires should be run 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.**
4. 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

1. Motor wires from each VFD to its respective motor MUST be run in a **separate steel** conduit away from control wiring and incoming AC power wiring to avoid noise and crosstalk between drives. An insulated ground must be run from each VFD to its respective motor. Do not run different fans output power cables in the same conduit.
2. Load reactors: If the distance between the VFD and the motor is great, a load reactor should be used between the VFD and the motor. The output reactor should be sized accordingly and installed within 10 feet of the output of the VFD. 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.
3. 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.
4. No contactor should be installed 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.
5. 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 120 VAC, 208 VAC or 400 VAC. P107 is set to 1 (High) if motor voltage is 230 VAC,480 VAC or 575 VAC.
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 below).

## 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 CROSS-REFERENCE TABLE

| Model Number | Volts | 1Ø input | 3Ø input | HP | Input Amps 1Ø 120VAC | Input Amps 1Ø 240VAC | Output Amps | Breaker 1Ø 120VAC | Breaker 1Ø 240VAC |
|---|---|---|---|---|---|---|---|---|---|
| ESV251N01SXB | 120/240V | X | | 0.33 | 6.8 | 3.4 | 1.7 | 15 | 15 |
| ESV371N01SXB | 120/240V | X | | 0.5 | 9.2 | 4.6 | 2.4 | 15 | 15 |
| ESV751N01SXB | 120/240V | X | | 1 | 16.6 | 8.3 | 4.2 | 25 | 15 |
| ESV112N01SXB | 120/240V | X | | 1.5 | 20 | 10 | 6 | 30 | 20 |
| | | | | | Input Amps 1Ø | input Amps 3Ø | | Breaker 1Ø | Breaker 3Ø |
| ESV371N02YXB | 240V | X | X | 0.5 | 5.1 | 2.9 | 2.4 | 15 | 15 |
| ESV751N02YXB | 240V | X | X | 1 | 8.8 | 5 | 4.2 | 15 | 15 |
| ESV112N02YXB | 240V | X | X | 1.5 | 12 | 6.9 | 6 | 20 | 15 |
| ESV152N02YXB | 240V | X | X | 2 | 13.3 | 8.1 | 7 | 25 | 15 |
| ESV222N02YXB | 240V | X | X | 3 | 17.1 | 10.8 | 9.6 | 30 | 20 |
| ESV402N02TXB | 240V | | X | 5 | | 18.6 | 16.5 | | 30 |
| ESV552N02TXB | 240V | | X | 7.5 | | 26 | 23 | | 40 |
| ESV752N02TXB | 240V | | X | 10 | | 33 | 29 | | 50 |
| ESV113N02TXB | 240V | | X | 15 | | 48 | 42 | | 80 |
| ESV153N02TXB | 240V | | X | 20 | | 59 | 54 | | 90 |
| | | | | | | | | | |
| ESV751N04TXB | 480V | | X | 1 | | 2.5 | 2.1 | | 15 |
| ESV112N04TXB | 480V | | X | 1.5 | | 3.6 | 3 | | 15 |
| ESV152N04TXB | 480V | | X | 2 | | 4.1 | 3.5 | | 15 |
| ESV222N04TXB | 480V | | X | 3 | | 5.4 | 4.8 | | 15 |
| ESV402N04TXB | 480V | | X | 5 | | 9.3 | 8.2 | | 15 |
| ESV552N04TXB | 480V | | X | 7.5 | | 12.4 | 11 | | 20 |
| ESV752N04TXB | 480V | | X | 10 | | 15.8 | 14 | | 25 |
| ESV113N04TXB | 480V | | X | 15 | | 24 | 21 | | 40 |
| ESV153N04TXB | 480V | | X | 20 | | 31 | 27 | | 50 |
| ESV183N04TXB | 480V | | X | 25 | | 38 | 34 | | 70 |
| ESV223N04TXB | 480V | | X | 30 | | 45 | 40 | | 80 |
| ESV303N04TXB | 480V | | X | 40 | | 59 | 52 | | 100 |
| ESV373N04TXB | 480V | | X | 50 | | 74 | 65 | | 125 |
| ESV453N04TXB | 480V | | X | 60 | | 87 | 77 | | 150 |
| | | | | | | | | | |
| ESV751N06TXB | 600V | | X | 1 | | 2 | 1.7 | | 15 |
| ESV152N06TXB | 600V | | X | 2 | | 3.2 | 2.7 | | 15 |
| ESV222N06TXB | 600V | | X | 3 | | 4.4 | 3.9 | | 15 |
| ESV402N06TXB | 600V | | X | 5 | | 6.8 | 6.1 | | 15 |
| ESV552N06TXB | 600V | | X | 7.5 | | 10.2 | 9 | | 20 |
| ESV752N06TXB | 600V | | X | 10 | | 12.4 | 11 | | 20 |
| ESV113N06TXB | 600V | | X | 15 | | 19.7 | 17 | | 30 |
| ESV153N06TXB | 600V | | X | 20 | | 25 | 22 | | 40 |
| ESV183N06TXB | 600V | | X | 25 | | 31 | 27 | | 50 |
| ESV223N06TXB | 600V | | X | 30 | | 36 | 32 | | 60 |
| ESV303N06TXB | 600V | | X | 40 | | 47 | 41 | | 70 |
| ESV373N06TXB | 600V | | X | 50 | | 59 | 52 | | 90 |
| ESV453N06TXB | 600V | | X | 60 | | 71 | 62 | | 110 |

# 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

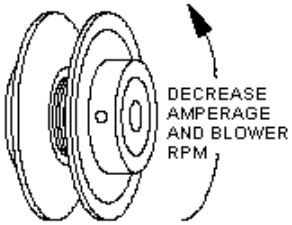
### Start Up Procedure

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.

### Pulley Setscrew Torque

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

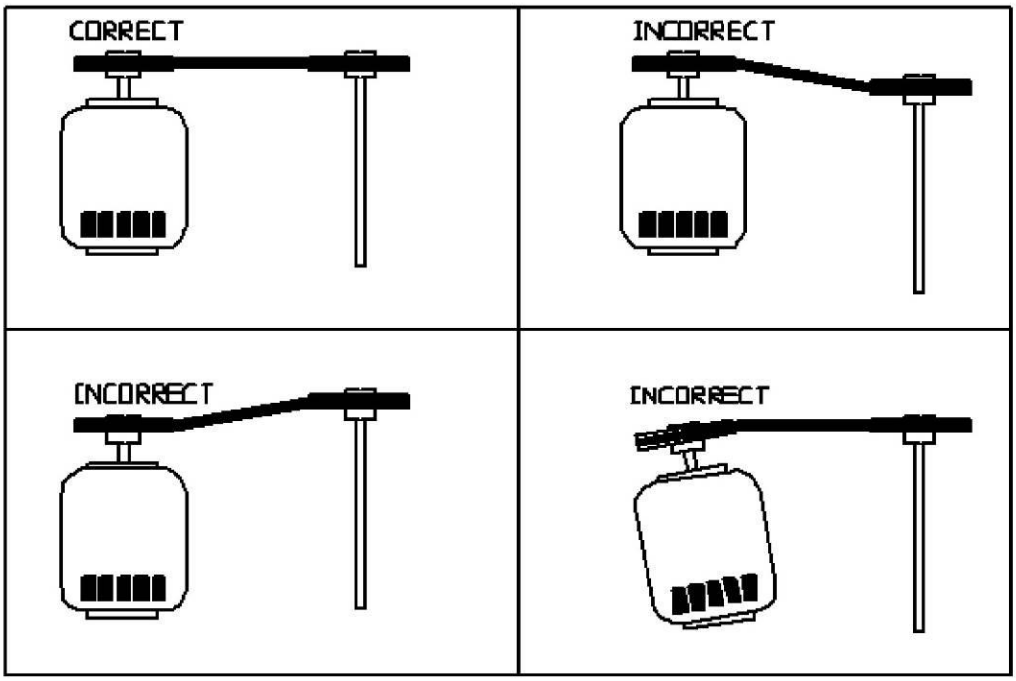
### Pulley Adjustment Illustration



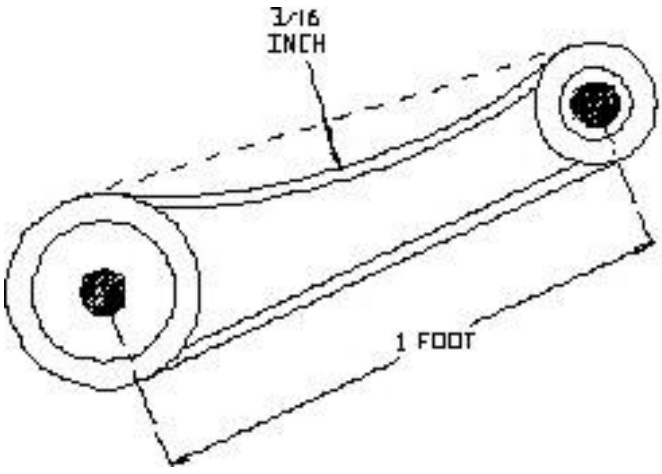
## Pulley Adjustment (Belt Drive Fans)

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.

## Pulley Alignment




## Proper Belt Tension



# Pulley Combination Chart

| Motor RPM | | 1725 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1/3 to 1-1/2 HP** | | MOTOR PULLEY | Dd1 | Dd2 | Pd1 | Pd2 | | | | | | | | |
| **AX BELTS** | | 1VL34 | 1.9 | 2.9 | 2 | 3 | | | | | | | | |
| | | | Open | | | | | | TURNS ON MOTOR PULLEY | | | | | Closed |
| 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 | |
| AK114 | 11 | 11.2 | 308 | 323 | 339 | 354 | 370 | 385 | 400 | 416 | 431 | 447 | 462 | |

| **1/3 to 1-1/2 HP** | | MOTOR PULLEY | Dd1 | Dd2 | Pd1 | Pd2 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **AX BELTS** | | 1VL40 | 2.4 | 3.4 | 2.6 | 3.6 | | | | | | | | |
| | | | Open | | | | | | TURNS ON MOTOR PULLEY | | | | | Closed |
| 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 | |
| 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 | |

| **2 to 5 HP** | | MOTOR PULLEY | Dd1 | Dd2 | Pd1 | Pd2 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BX BELTS** | | 2VP42 | 2.9 | 3.9 | 3 | 4 | | | | | | | | | |
| | | | Open | | | | | | | TURNS ON MOTOR PULLEY | | | | | Closed |
| 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 |
| 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** | | MOTOR PULLEY | Dd1 | Dd2 | Pd1 | Pd2 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BX BELTS** | | 2VP60 | 4.3 | 5.5 | 4.7 | 5.9 | | | | | | | | | |
| | | | Open | | | | | | | TURNS ON MOTOR PULLEY | | | | | Closed |
| 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 |
| 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 |

| **3 to 5 HP** | | MOTOR PULLEY | Dd1 | Dd2 | Pd1 | Pd2 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BX BELTS** | | 2VP42 | 2.9 | 3.9 | 3 | 4 | | | | | | | | | |
| | | | Open | | | | | | | TURNS ON MOTOR PULLEY | | | | | Closed |
| 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 |
| 2B5V278 | 27.8 | 28.1 | 184 | 189 | 194 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | 246 |
| 2B5V250 | 25 | 25.3 | 205 | 210 | 216 | 222 | 227 | 233 | 239 | 244 | 250 | 256 | 261 | 267 | 273 |
| 2B5V234 | 23.4 | 23.7 | 218 | 224 | 230 | 237 | 243 | 249 | 255 | 261 | 267 | 273 | 279 | 285 | 291 |
| 2B5V200 | 20 | 20.3 | 255 | 262 | 269 | 276 | 283 | 290 | 297 | 304 | 312 | 319 | 326 | 333 | 340 |
| 2B5V184 | 18.4 | 18.7 | 277 | 284 | 292 | 300 | 307 | 315 | 323 | 331 | 338 | 346 | 354 | 361 | 369 |
| 2B5V160 | 16 | 16.3 | 317 | 326 | 335 | 344 | 353 | 362 | 370 | 379 | 388 | 397 | 406 | 414 | 423 |
| 2B5V154 | 15.4 | 15.7 | 330 | 339 | 348 | 357 | 366 | 375 | 385 | 394 | 403 | 412 | 421 | 430 | 439 |
| 2B5V136 | 12.6 | 12.9 | 401 | 412 | 423 | 435 | 446 | 457 | 468 | 479 | 490 | 501 | 513 | 524 | 535 |
| 2B5V124 | 12.4 | 12.7 | 407 | 419 | 430 | 441 | 453 | 464 | 475 | 487 | 498 | 509 | 521 | 532 | 543 |
| 2B5V110 | 11 | 11.3 | 458 | 471 | 483 | 496 | 509 | 522 | 534 | 547 | 560 | 572 | 585 | 598 | 611 |

| **7-1/2 to 10 HP** | | MOTOR PULLEY | Dd1 | Dd2 | Pd1 | Pd2 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BX BELTS** | | 2VP60 | 4.3 | 5.5 | 4.7 | 5.9 | | | | | | | | | |
| | | | Open | | | | | | | TURNS ON MOTOR PULLEY | | | | | Closed |
| 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 |
| 2B5V278 | 27.8 | 28.1 | 289 | 295 | 301 | 307 | 313 | 319 | 325 | 331 | 338 | 344 | 350 | 356 | 362 |
| 2B5V250 | 25 | 25.3 | 320 | 327 | 334 | 341 | 348 | 355 | 361 | 368 | 375 | 382 | 389 | 395 | 402 |
| 2B5V234 | 23.4 | 23.7 | 342 | 349 | 357 | 364 | 371 | 378 | 386 | 393 | 400 | 408 | 415 | 422 | 429 |
| 2B5V200 | 20 | 20.3 | 399 | 408 | 416 | 425 | 433 | 442 | 450 | 459 | 467 | 476 | 484 | 493 | 501 |
| 2B5V184 | 18.4 | 18.7 | 434 | 443 | 452 | 461 | 470 | 480 | 489 | 498 | 507 | 517 | 526 | 535 | 544 |
| 2B5V160 | 16 | 16.3 | 497 | 508 | 519 | 529 | 540 | 550 | 561 | 571 | 582 | 593 | 603 | 614 | 624 |
| 2B5V154 | 15.4 | 15.7 | 516 | 527 | 538 | 549 | 560 | 571 | 582 | 593 | 604 | 615 | 626 | 637 | 648 |
| 2B5V136 | 12.6 | 12.9 | 628 | 642 | 655 | 669 | 682 | 695 | 709 | 722 | 735 | 749 | 762 | 776 | 789 |
| 2B5V124 | 12.4 | 12.7 | 638 | 652 | 666 | 679 | 693 | 706 | 720 | 733 | 747 | 761 | 774 | 788 | 801 |
| 2B5V110 | 11 | 11.3 | 717 | 733 | 748 | 763 | 779 | 794 | 809 | 824 | 840 | 855 | 870 | 885 | 901 |

| **15 to 25 HP** | | MOTOR PULLEY | Dd1 | Dd2 | Pd1 | Pd2 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BX BELTS** | | 2VP75 | 5.8 | 7 | 6.2 | 7.4 | | | | | | | | | |
| | | | Open | | | | | | | TURNS ON MOTOR PULLEY | | | | | Closed |
| 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 |
| 2B5V278 | 27.8 | 28.1 | 381 | 387 | 393 | 399 | 405 | 411 | 417 | 424 | 430 | 436 | 442 | 448 | 454 |
| 2B5V250 | 25 | 25.3 | 423 | 430 | 436 | 443 | 450 | 457 | 464 | 470 | 477 | 484 | 491 | 498 | 505 |
| 2B5V234 | 23.4 | 23.7 | 451 | 459 | 466 | 473 | 480 | 488 | 495 | 502 | 509 | 517 | 524 | 531 | 539 |
| 2B5V200 | 20 | 20.3 | 527 | 535 | 544 | 552 | 561 | 569 | 578 | 586 | 595 | 603 | 612 | 620 | 629 |
| 2B5V184 | 18.4 | 18.7 | 572 | 581 | 590 | 600 | 609 | 618 | 627 | 636 | 646 | 655 | 664 | 673 | 683 |
| 2B5V160 | 16 | 16.3 | 656 | 667 | 677 | 688 | 698 | 709 | 720 | 730 | 741 | 751 | 762 | 773 | 783 |
| 2B5V154 | 15.4 | 15.7 | 681 | 692 | 703 | 714 | 725 | 736 | 747 | 758 | 769 | 780 | 791 | 802 | 813 |
| 2B5V136 | 12.6 | 12.9 | 829 | 842 | 856 | 869 | 883 | 896 | 909 | 923 | 936 | 949 | 963 | 976 | 990 |

## 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 |

# 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. Bearings should be lubricated every 2 months. The type of grease and the amount of grease can is shown below. **Caution: Bearings are sealed and over-greasing bearings can cause damage to the bearings. Do not grease until grease comes out of seals. Only add the appropriate amount of grease.**
3. All fasteners should be checked for tightness each time maintenance checks are preformed 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.

## Bearing Grease Charge

| Ball Bearings | |
|---|---|
| **Shaft Size (Inches)** | **Grease Charge (Ounces)** |
| 1/2 to 3/4 | 0.03 |
| 7/8 to 1 3/16 | 0.10 |
| 1 1/4 to 1 1/2 | 0.15 |
| 1 11/16 to 1 15/16 | 0.20 |
| 2 to 2 7/16 | 0.30 |
| 2 1/2 to 2 15/16 | 0.50 |
| 3 to 3 7/16 | 0.85 |
| 3 1/2 to 4 | 1.50 |

## Bearing Grease Type

| | |
|---|---|
| Thickener | Lithium Complex |
| Oil | Petroleum |
| Thickness | NLGI 2 |
| Operating Temperature | -20 F to 200 F<br>Intermittent to 250 F |

## 2 weeks after startup

1. Belt tension should be checked after the first 2 weeks of fan operation on belt drive fans. 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 preformed prior to restarting unit.

## Every 3 months

1. Belt tension should be checked quarterly for belt drive fans. 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.

## Yearly

1. Inspect bearings for wear and deterioration. Replace/grease if necessary.
2. Inspect belt wear and replace torn or worn belts on belt drive fans.
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 | University Plaza |
| Address | 5728 University Blvd. (Roof) |
| City | Vancouver |
| State | BC |
| Zip | V7P 2M4 |
| Phone Number | (604) 725-8313 |
| Fax Number | |
| Contact | Rob Bubek |
| Purchase Date | March 1, 2016 |

| | |
|---|---|
| Service Company | Grease Ducks Ltd. |
| Address | 200 - 100 Park Royal |
| City | West Vancouver |
| State | BC |
| Zip | V7T 1A2 |
| Phone Number | (604) 628-8881 |
| Fax Number | (604) 628-8882 |
| Contact | Alex Collins |
| Start-Up Date | June 22, 2016 |

## Fan Unit Information

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

| Name Plate and Unit Information | |
|---|---|
| Model Number | VXBI30BD-RM |
| Serial Number | 2547668 |
| Volts | 208V |
| Hertz | 60Hz |
| Phase | 3 |
| FLA | 21.1 |
| HP | 7.5 |
| Blower Pulley | 4″ |
| Motor Pulley | 10″ |
| Belt Number | B41 x 2 |

| Field Measured Information | |
|---|---|
| Voltage | 203v |
| Amperage** | University Plaza |
| RPM | 876 |

| | | |
|---|---|---|
| Blower Rotation | Correct | Clockwise / Inlet |
| | Incorrect | Counter Clock |

**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 |
|---|---|
| June 22, 2016 | Installation completed by Grease Ducks Ltd. Supervisor Alex Collins |
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**Factory Service Department**
Phone: 1-866-784-6900
Fax: 1-919-554-9374

**Maintenance & Repairs**
Phone: 1-800-646-0887
Fax: 1-604-628-8882