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 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.

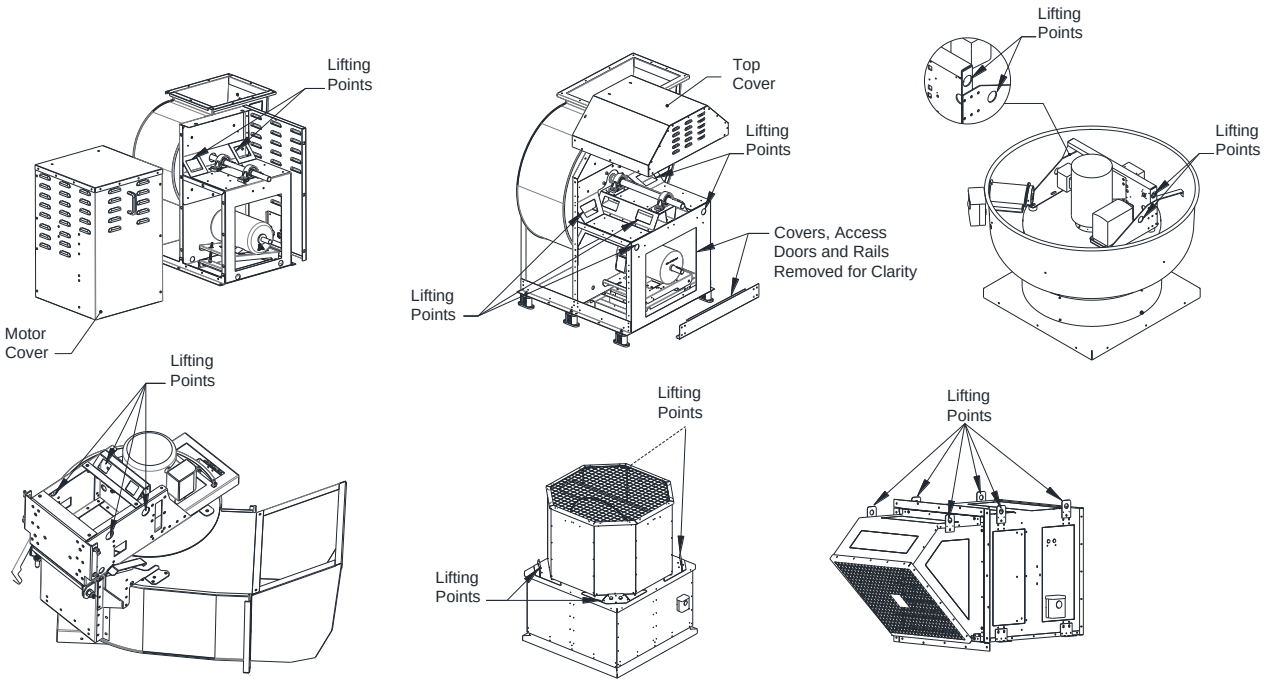
Mechanical

WARNING: DO NOT RAISE 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 at all times. If needed the fan may be wrapped to maintain the duct system fire rating.

Figure 1 – Recommended Lifting Points



Never Lift Fans From Shafts & Bearings

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) lag 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" x 2" x 1/4". 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

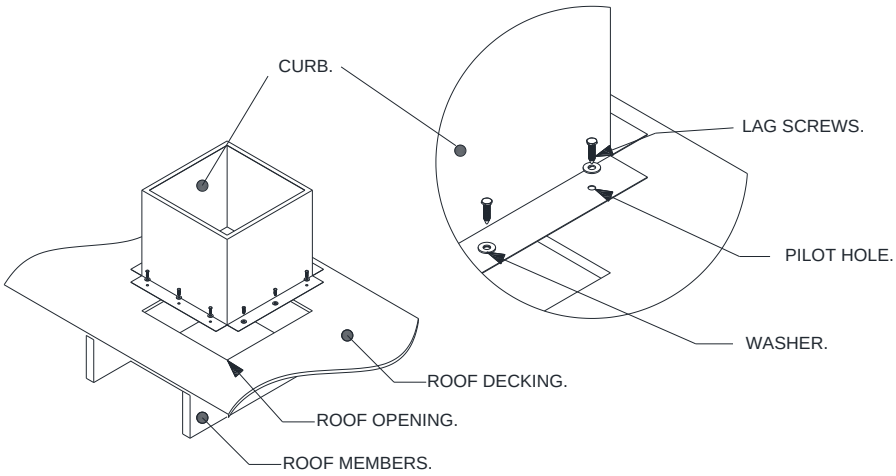
This fan was specified for a specific CFM and static pressure. The ductwork attached to this unit will significantly affect the airflow performance. Flexible ductwork and square elbows should not be used. Also, transitions and turns in ductwork near the fan inlet will cause system effect and will drastically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

An example of a curb installation: Curbs should be secured to structural roof members with at least (3) lag bolts, anchor bolts, or other suitable fasteners (not furnished) per curb flange, see **Figure 2**. Curb flanges should be caulked to roof.

The fan should be installed on a curb and/or rail. The curb should be installed to the roof and/or wall using appropriate type and size fastener, depending on roof and/or wall material.

Make sure that the duct connection and fan inlet are properly aligned and sealed. The fan base is secured to the curb using a minimum of (8) appropriately sized galvanized self-drilling screws. Shims may be required depending upon curb installation and roofing material. Check all fasteners for tightness. The diagrams below show different mechanical installation configurations.

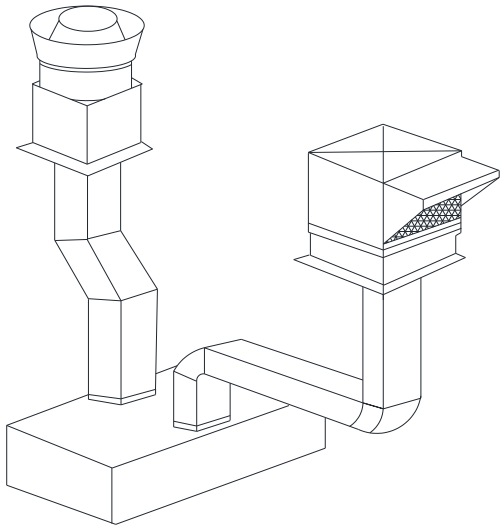
Figure 2 – Lag Bolt Installation



Duct Routing

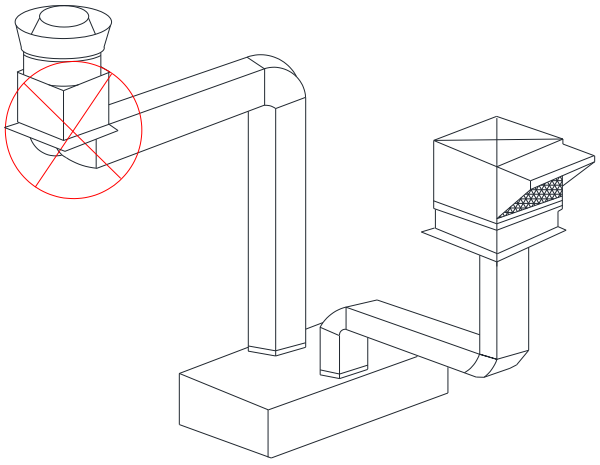
Figure 3 – Examples of Duct Routing

Proper Duct Routing

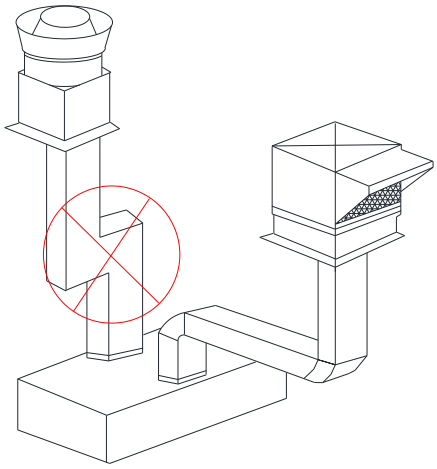


Use offsets if the duct cannot go straight up

Improper Duct Routing



DO NOT connect elbow directly to fan inlet



DO NOT use square elbows

Up-blast Wall Mount Installation

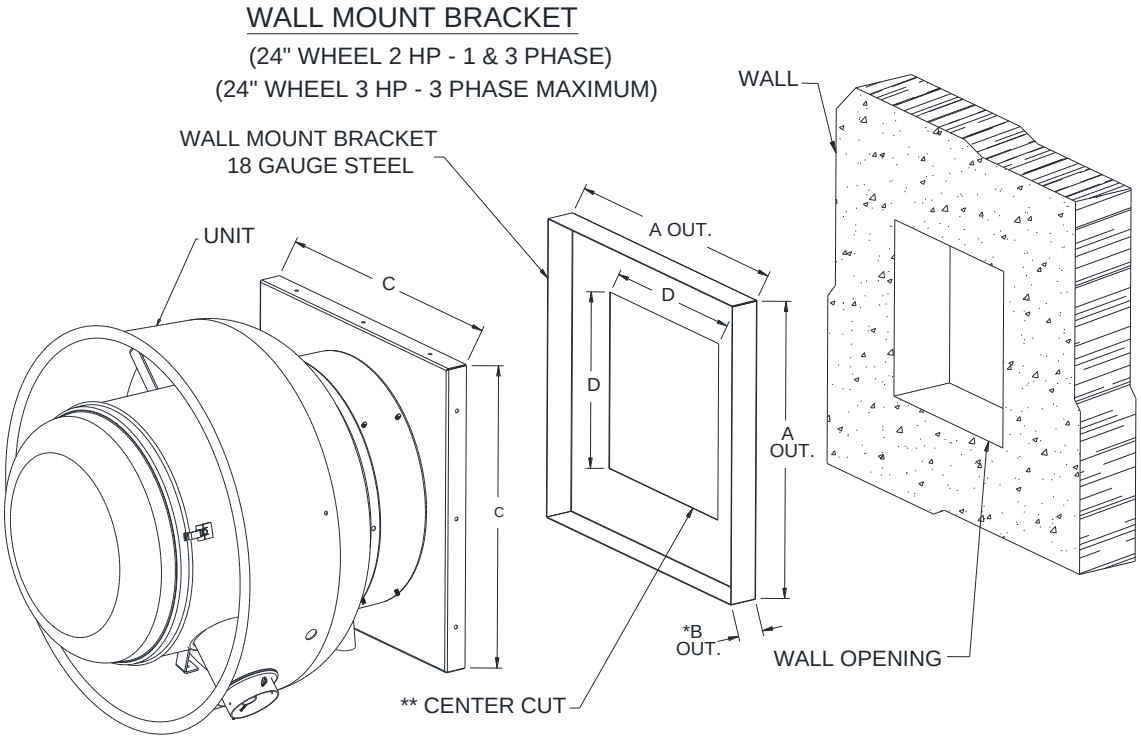
Figure 4

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

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



Up-blast Through Wall Mount Installation

Figure 5

STANDARD CURB FITS INTO BASE OF FAN

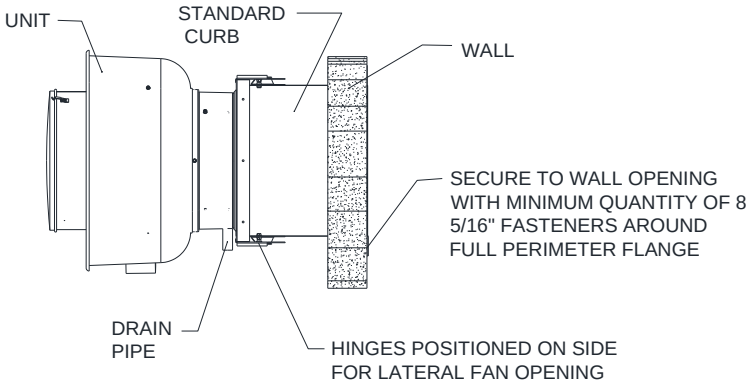
SELF DRILLING SCREWS
SHOULD BE
USED FOR UNIT
ATTACHMENT TO CURB

FLASHING AND SEALING OF WALL
PENETRATION DONE BY OTHERS

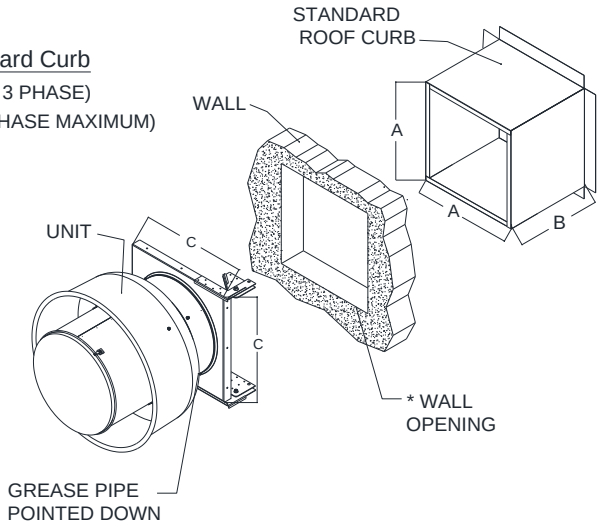
* FLASH WALL TO CURB

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

Wall Mount w/ Standard Curb SIDE VIEW
(24" WHEEL 2 HP & 3 HP 1 PHASE MAXIMUM)



Wall Mount w/ Standard Curb
(24" WHEEL 2 HP - 1 & 3 PHASE)
(24" WHEEL 3 HP - 3 PHASE MAXIMUM)



Up-blast Roof Mount Installation

Normal temperature test – The 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 – The 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.

FEATURES:

- ROOF MOUNTED FANS
- RESTAURANT MODEL
- UL762
- VARIABLE SPEED CONTROL
- INTERNAL WIRING
- WEATHERPROOF DISCONNECT
- THERMAL OVERLOAD PROTECTION (SINGLE PHASE)
- HIGH HEAT OPERATION 300°F (149°C)
- GREASE CLASSIFICATION TESTING

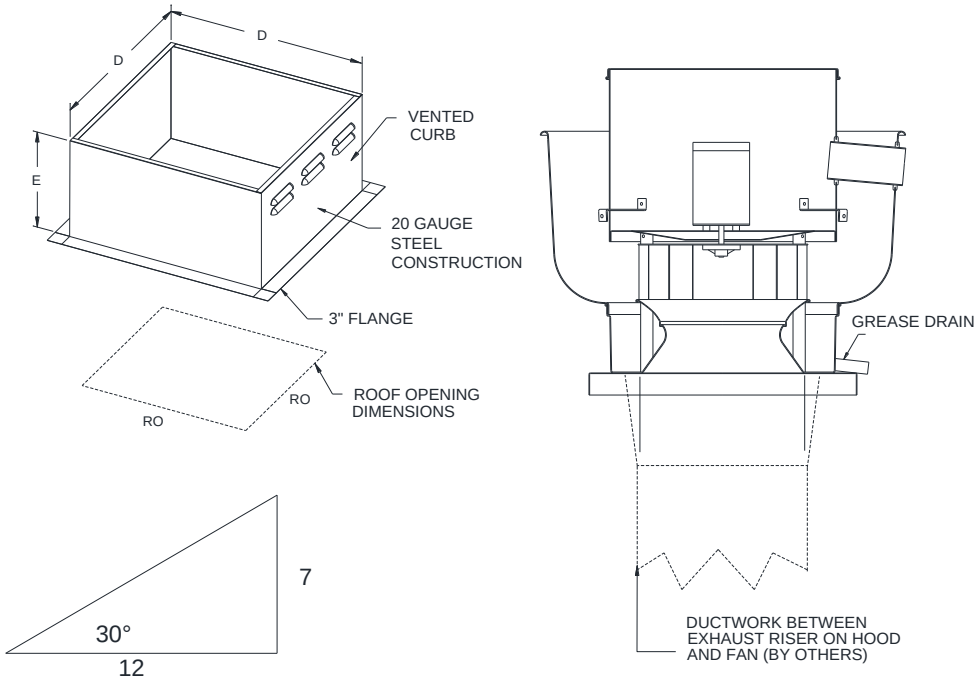
OPTIONS:

GREASE BOX
HINGED FAN
PITCHED CURB
INSULATED CURB
LOW PROFILE OPTION

PITCHED CURBS ARE AVAILABLE
FOR PITCHED ROOFS.

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

Figure 6



Down-blast Installation

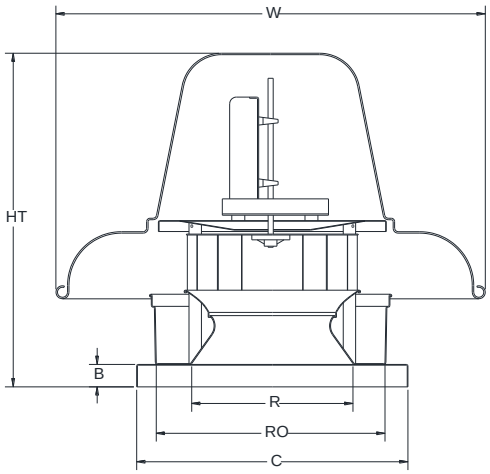
FEATURES
ROOF MOUNTED FANS
UL705
AMCA SOUND AND AIR CERTIFIED
WIRING FROM MOTOR TO DISCONNECT SWITCH
DISCONNECT SWITCH
STANDARD BIRD SCREEN

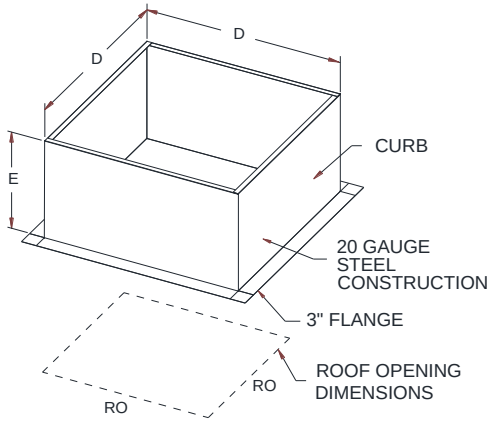
OPTIONS
HINGED FAN
PITCHED CURB
INSULATED CURB
BACKDRAFT DAMPER

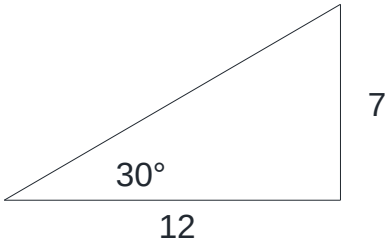
PITCHED CURBS ARE AVAILABLE FOR PITCHED ROOFS.

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

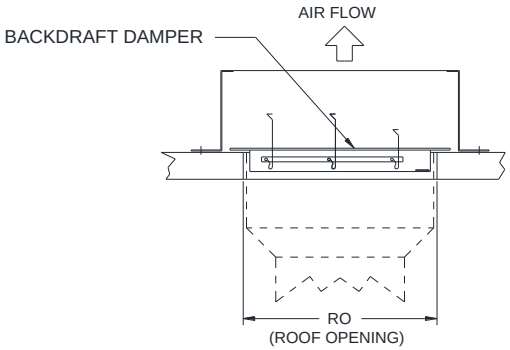
Figure 7







BACKDRAFT DAMPER INSTALLATION



Typical Hinge Kit – Centrifugal Up-blast

Parts List	
Left and Right Fan Plates – Qty 2	Left and Right Curb Plates – Qty 2
Whiz Nuts – Qty 6	Whiz Bolts – Qty 2
Sheet Metal Screws (#14 x 3/4") – Qty 24	

Hinge Kit Field Installation

1. If the parts are not assembled, refer to **Figure 8** for assembly instructions. Assemble the fan plate and curb plate with hardware as shown in Detail “A” and Detail “B”.
2. Line up fan base edge to inside edge of fan plate as shown in **Figure 8** Detail “C”. Refer to **Figure 9** Detail A for positioning fan plate on fan base.
3. Secure the fan plate to the fan base using sheet metal screws (#14 x 3/4" – qty 12), **Figure 8** Detail “D”.
   Note: If the screws hit the curb, then run the screws from inside the fan base. Always verify that hardware does not interfere with curb when fan swings open or closed.
4. Secure the curb plate to the curb using sheet metal screws (#14 x 3/4" – qty 12), **Figure 8** Detail “C”. Verify all parts and hardware are secure and tight. Verify that the fan and base swings open properly, see **Figure 9**.

Figure 8 – Typical Hinge Kit Fan Plate and Curb Plate Details

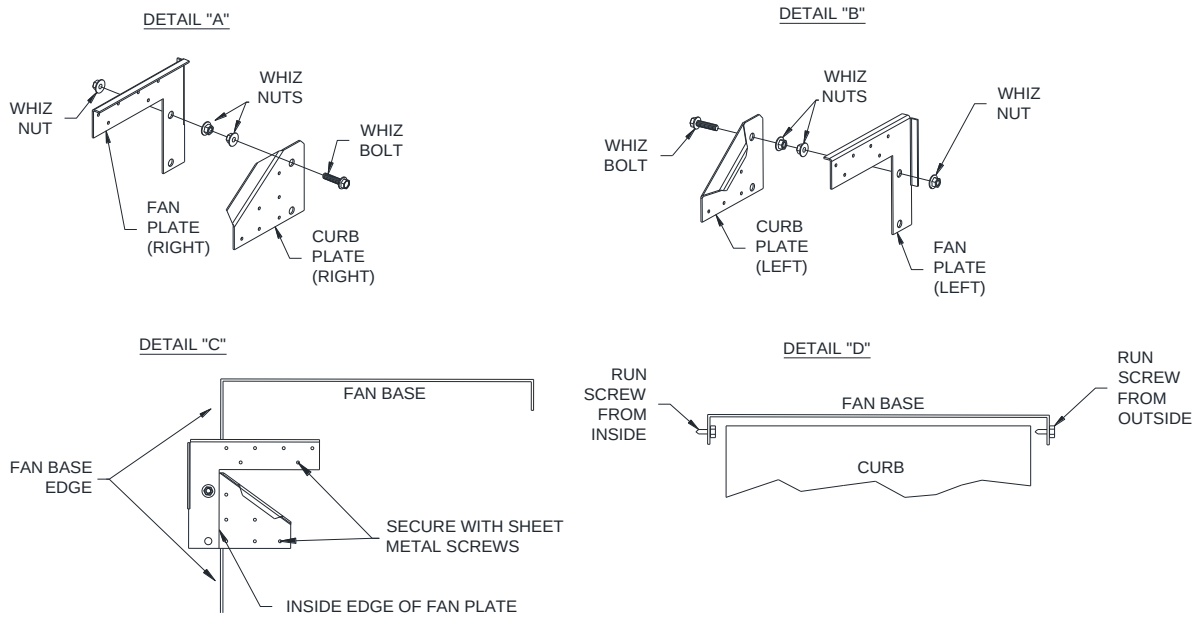
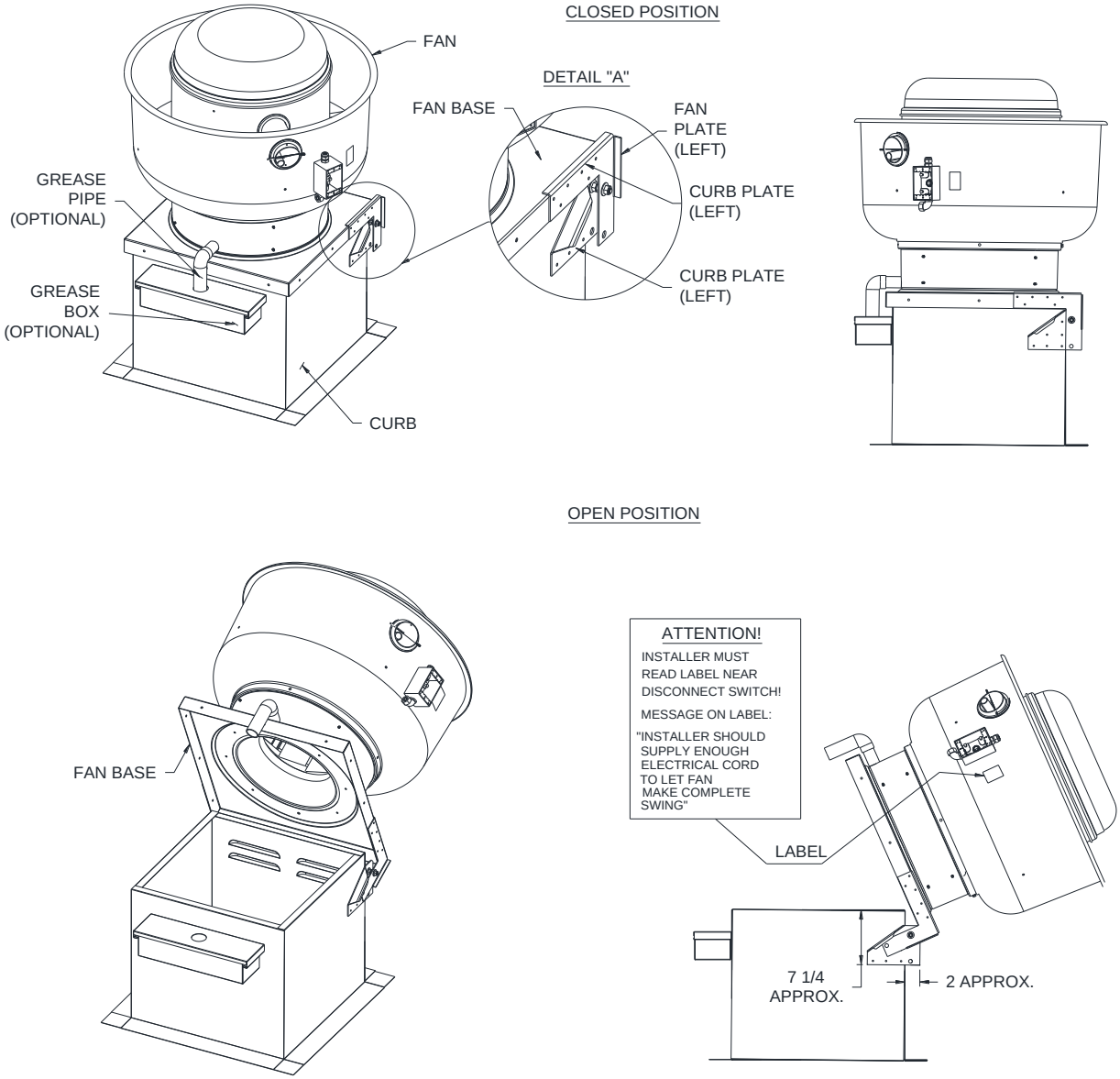


Figure 9 - Centrifugal Up-blast Hinge Kit Installation Details



Heavy Duty (HD) Hinge Kit Installation

Parts List	
Left and Right Fan Plates – Qty 2	Left and Right Curb Plates – Qty 2
3/8”-16 Whiz Nuts – Qty 6	3/8”-16 Whiz Bolts – Qty 2
1/4”-20 Whiz Nuts – Qty 20	1/4”-20 Whiz Bolts – Qty 20

Hinge Kit Field Installation

1. If the parts are not assembled, refer to **Figure 10** for assembly instructions. Assemble the fan plate and curb plate with hardware as shown in Detail “A” and Detail “B”.
2. Secure the hinge back plate to the curb with provided hardware, refer to **Figure 11** Detail “B”.
3. Line up fan base edge to inside edge of fan plate as shown in **Figure 10** Detail “C”. Refer to **Figure 11** Detail A for positioning fan plate on fan base.
4. Bolt the fan plate to the fan base using provided hardware (1/4"-20 – qty 11), **Figure 10** Detail “C”.

   Note: Run the bolts from inside the fan base, Figure 10 Detail “D”. Always verify that hardware does not interfere with curb when fan swings open or closed.
5. Bolt the curb plate to the curb using provided hardware (1/4"-20 – qty 9). Verify all parts and hardware are secure and tight. Verify the fan and base swings open properly, see **Figure 11**.

Figure 10 – HD Hinge Kit Fan Plate and Curb Plate Details

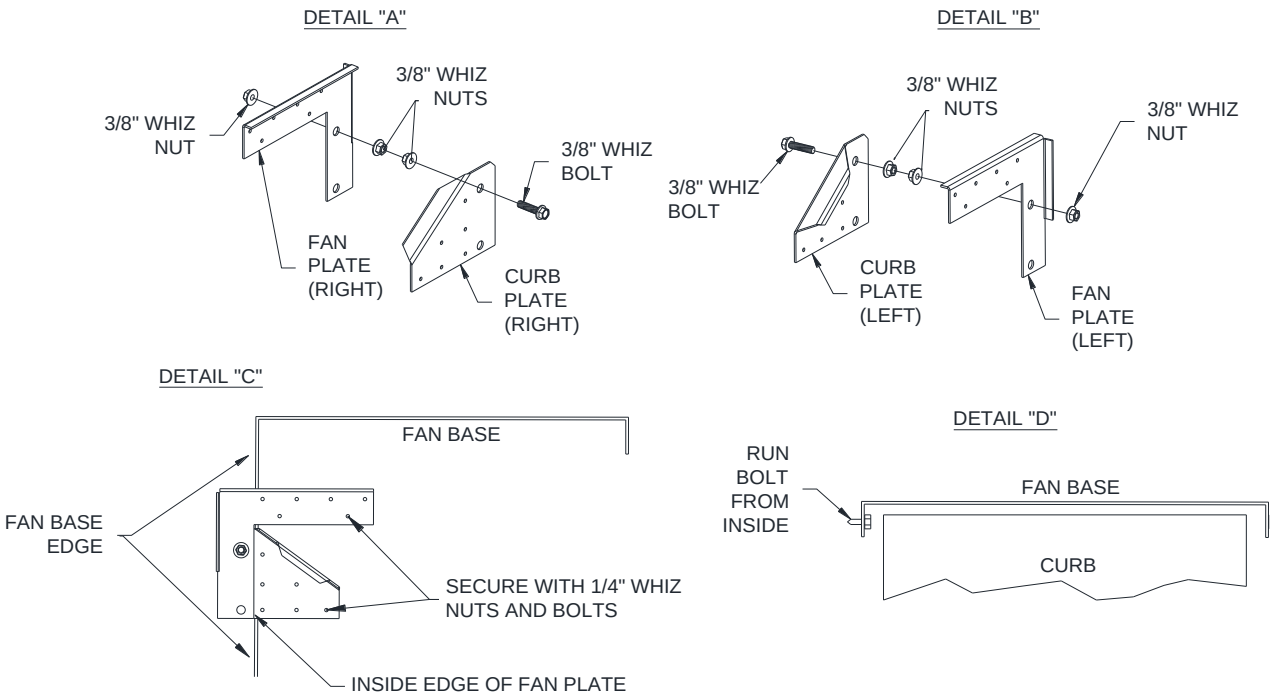
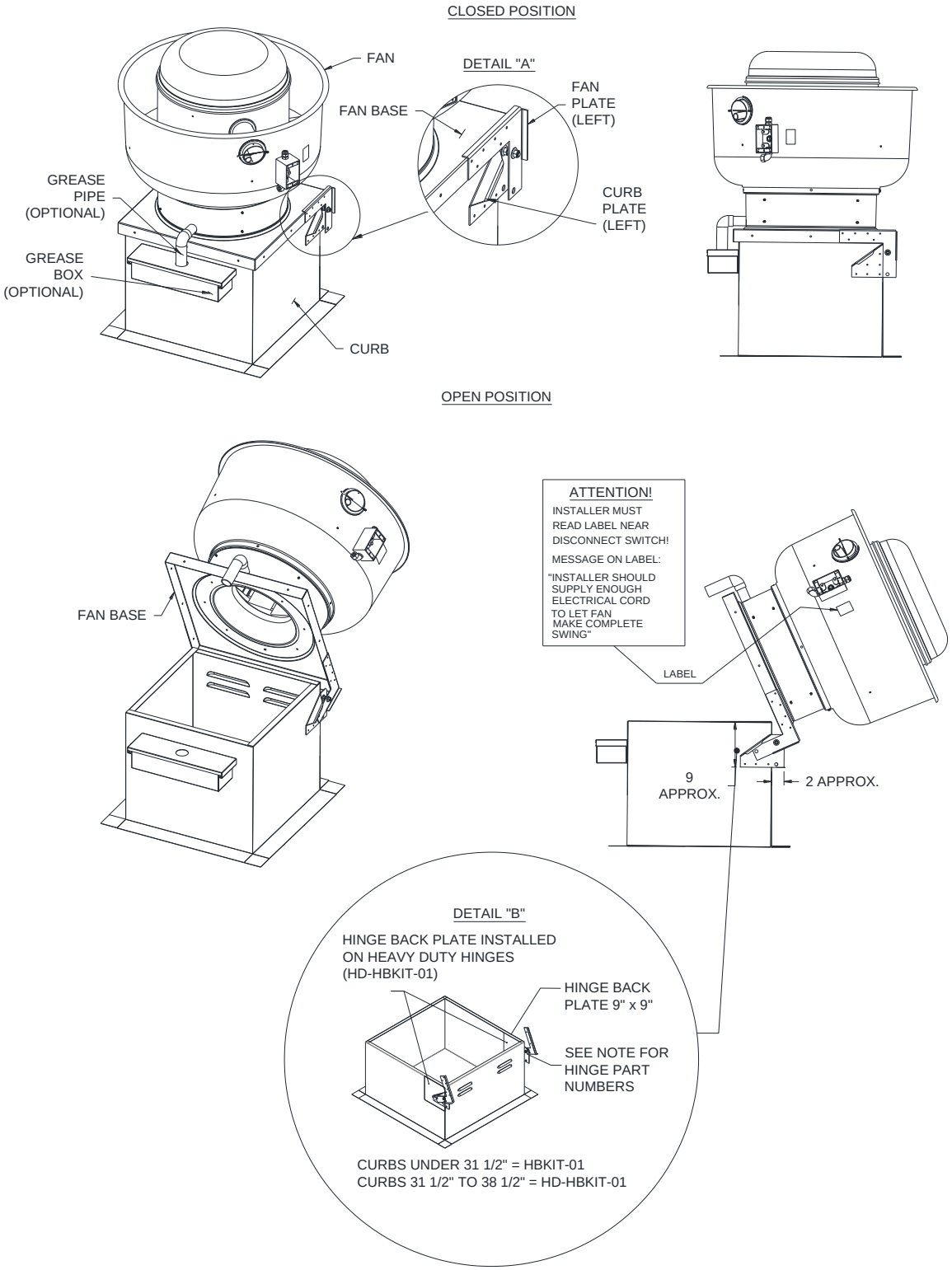


Figure 11 – Heavy Duty (HD) Hinge Kit Installation Details



Heavy Duty (HD) Locking Hinge Kit Installation

Parts List	
Left and Right Fan Plates – Qty 2	Left and Right Curb Plates – Qty 2
3/8”-16 Whiz Nuts – Qty 6	3/8”-16 Whiz Bolts – Qty 2
1/4”-20 Whiz Nuts – Qty 22	1/4”-20 Whiz Bolts – Qty 22

Hinge Kit Field Installation

1. If the parts are not assembled, refer to **Figure 12** for assembly instructions. Assemble the fan plate and curb plate with hardware as shown in **Figure 12** Detail “A” and Detail “B”.
2. Secure the hinge back plate to the curb with provided hardware, refer to **Figure 13** Detail “B”.
3. Line up fan base/curb edges with notches in hinge plates as shown in **Figure 12** Detail “C”. Refer to **Figure 13** Detail A for positioning fan plate on fan base.
4. Bolt the fan plate to the fan base using provided hardware (1/4"-20 – qty 11), **Figure 12** Detail “C”.

   Note: Run the bolts from inside the fan base, Figure 12 Detail “D”. Always verify that hardware does not interfere with curb when fan swings open or closed.
5. Bolt the curb plate to the curb using provided hardware (1/4"-20 – qty 9). Verify all parts and hardware are secure and tight. Verify the fan and base swings open properly, see **Figure 13**.

Figure 12 – HD Locking Hinge Kit Fan Plate and Curb Plate Details

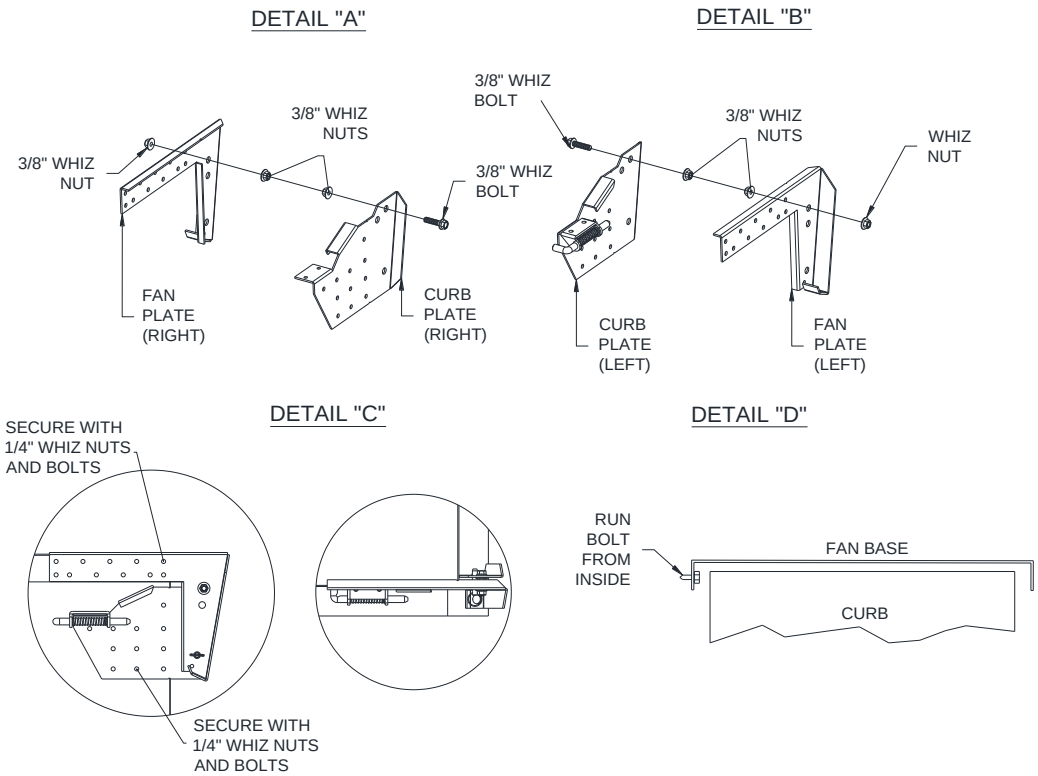
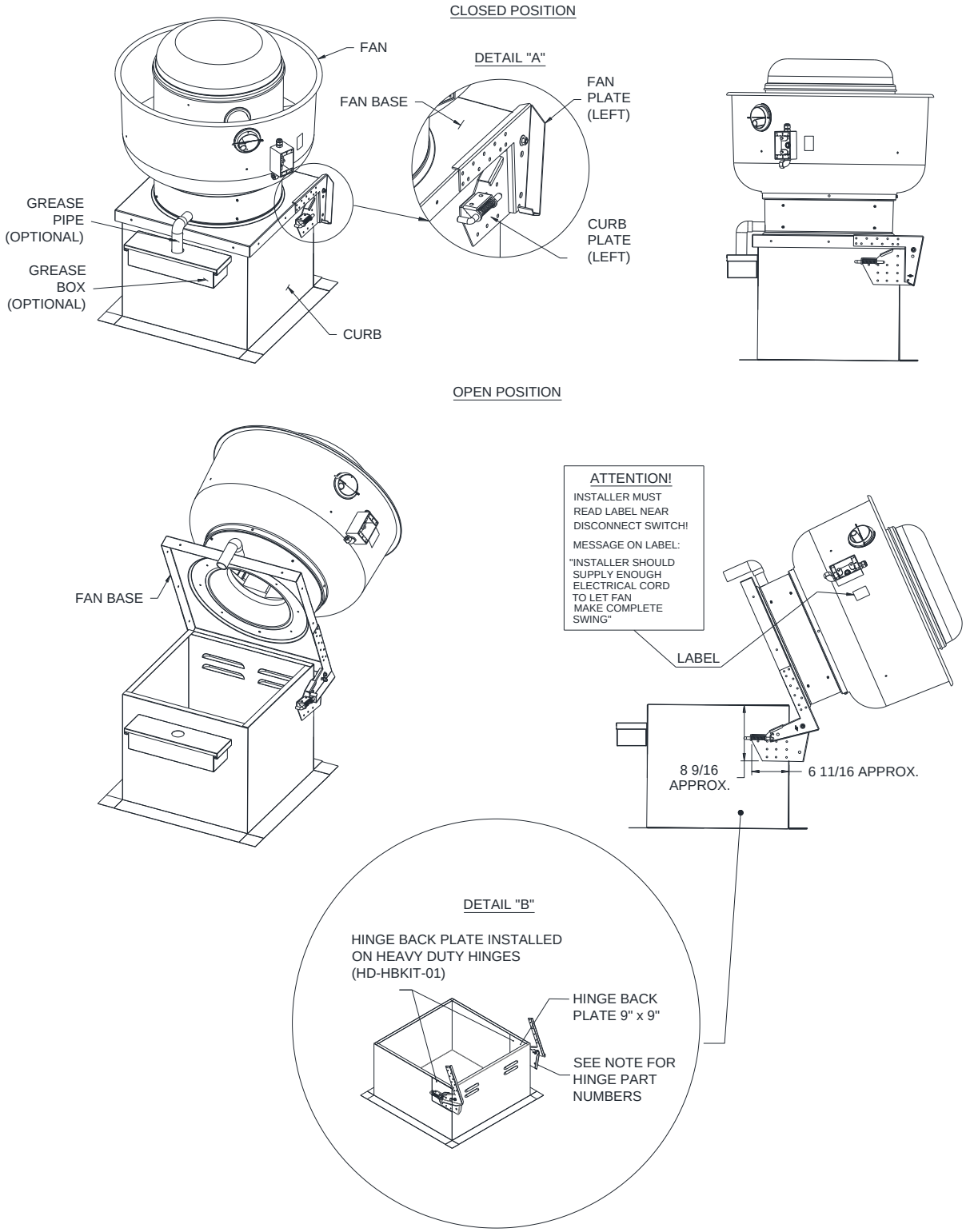


Figure 13 - Heavy Duty (HD) Locking Hinge Kit Installation Details



Typical Grease Box Installation

Parts List	
Grease Box	Grease Box Cover
Grease Pipe	Sheet Metal Screws – Qty 3

Grease Box Field Installation

1. Mark a mounting location 3” from the top of the curb for the grease box cover, refer to **Figure 14** Detail “A”.
2. Secure grease box cover to the curb using provided sheet metal screws (qty 3), refer to **Figure 14** Detail “B”.
3. Slide the grease box into the grease box cover lip, **Figure 14** Detail “C”.
4. Install grease pipe into grease box cover, **Figure 14** Detail “D”.

Figure 14 – Typical Grease Box Installation

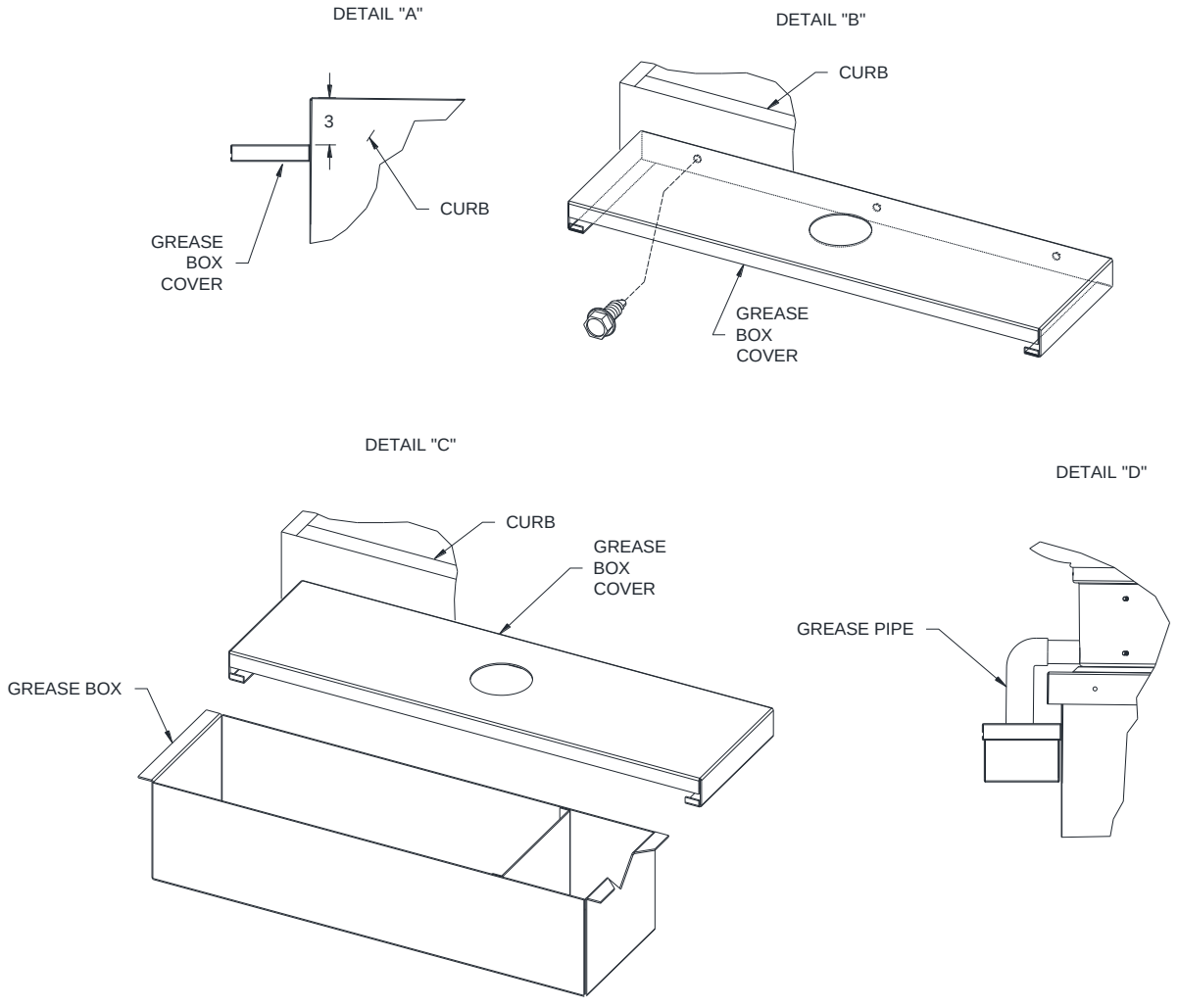
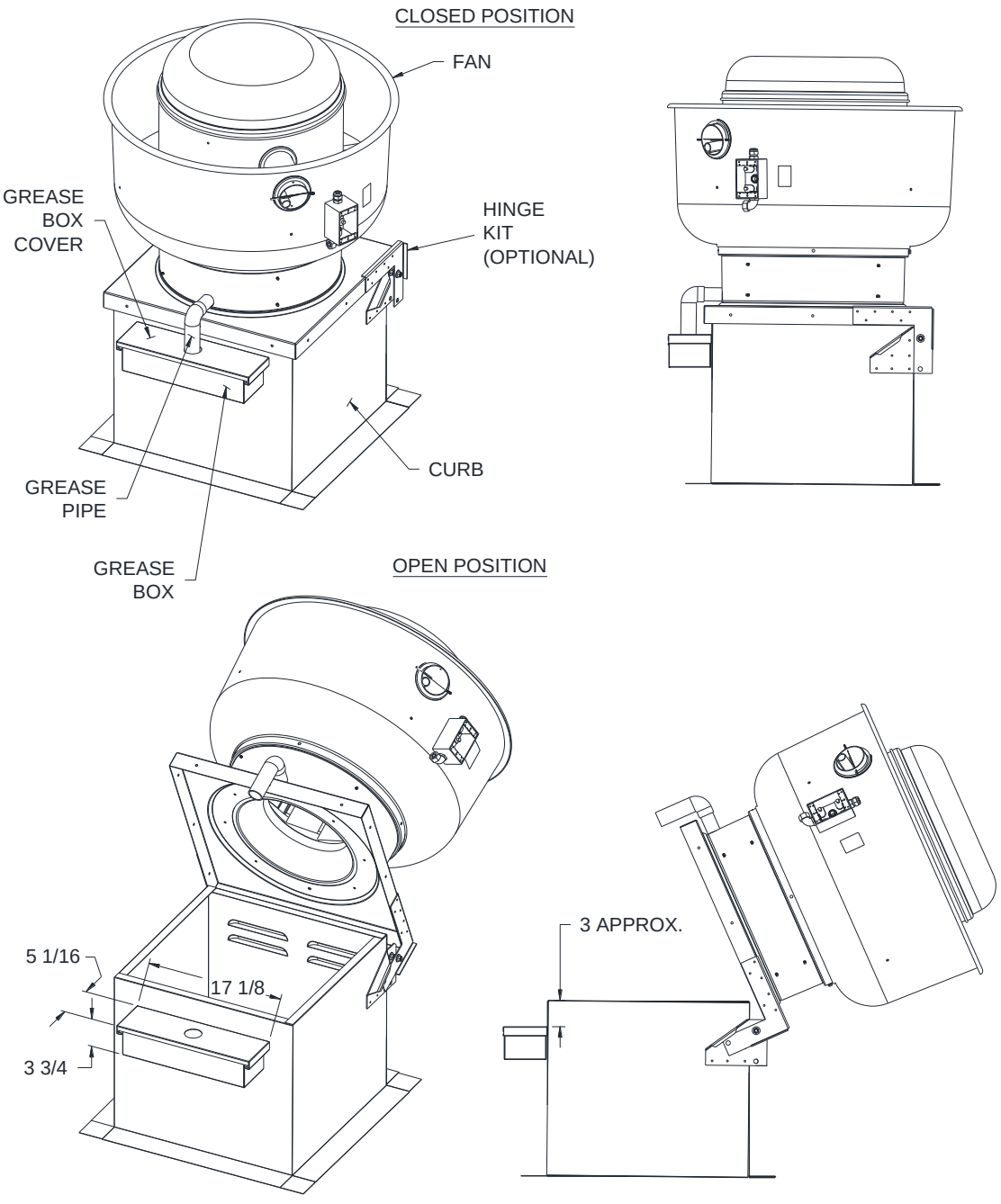


Figure 15 – Grease Box Installed



Up-blast Utility Set Installation

Normal temperature test belt drive – The 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 – The 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.

Direct drive shaft diameter may change due to motor selected Horsepower (HP)/frame size.

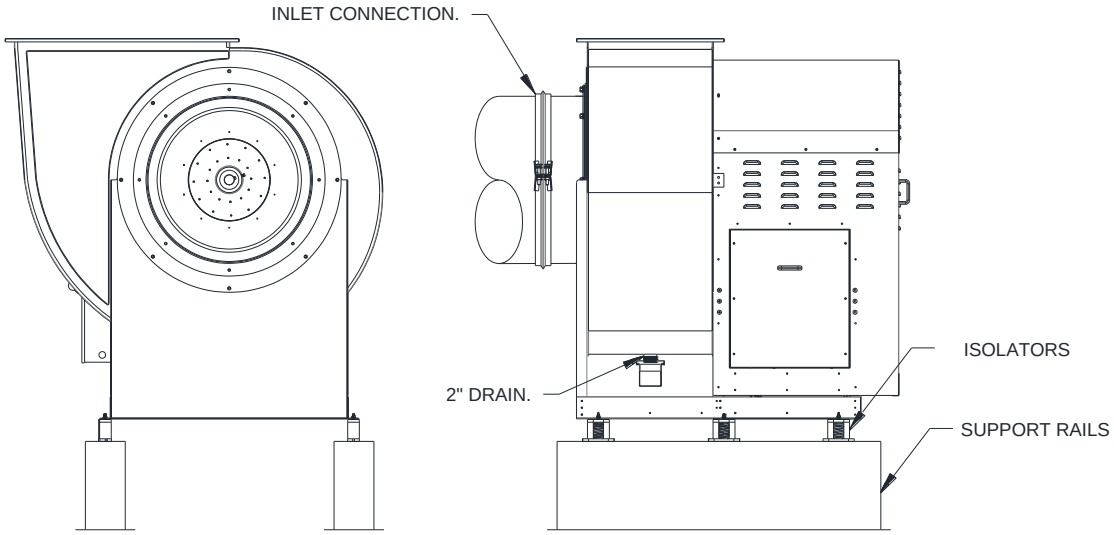
Figure 16

FEATURES:

ROOF MOUNTED FANS
RESTAURANT MODEL
UL705 AND 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.

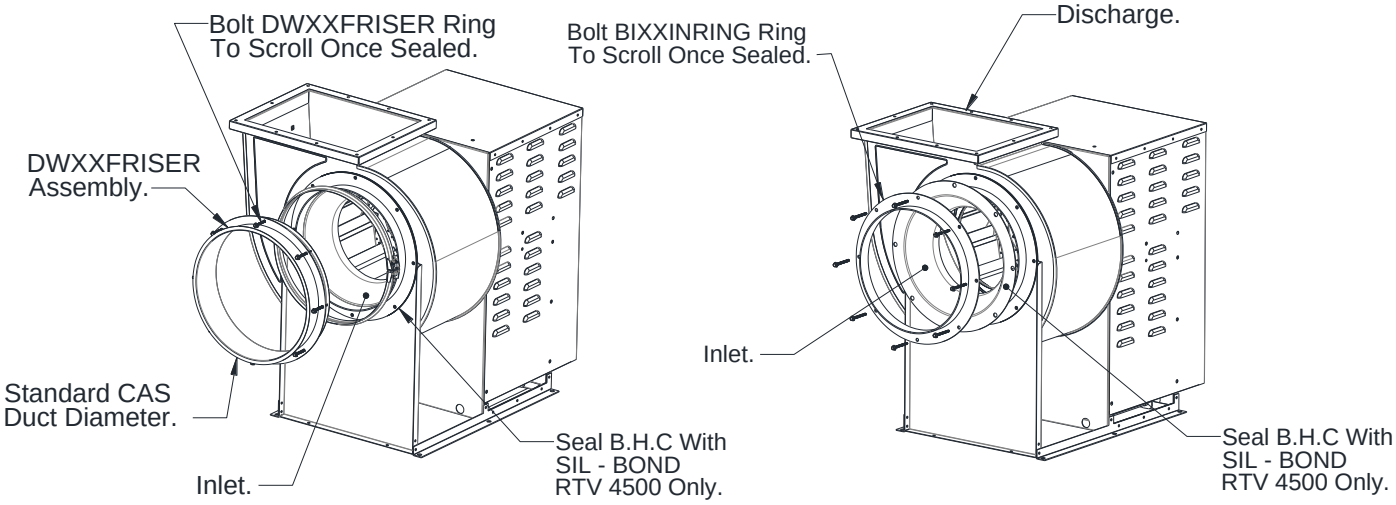
OPTIONS:

GREASE BOX
SHAFT SEAL
VIBRATION ISOLATORS
EXTENSION
INLET ADAPTERS
INLET RISER
SUPPORT RAILS
RAIN CAP



Up-blast Utility Set Inlet Options

Figure 17

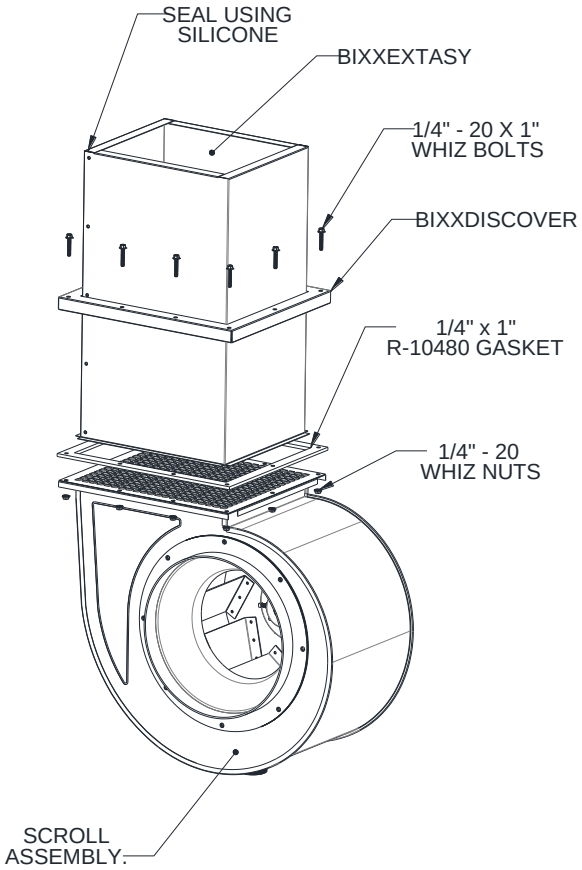


Inlet Connections						
Fan Size	Duct Diameter	Inlet Connection	B.H.C.	Inlet Ring OD	Hardware #	Hardware Qty
11	12"	DW12FRISER	13.375"	12.500"	1/4" - 20 x 1 1/2" (92323A523)	8
13	14"	DW14FRISER	15.375"	13.500"	1/4" - 20 x 1 1/2" (92323A523)	8
15	16"	DW16FRISER	17.375"	15.250"	1/4" - 20 x 1 1/2" (92323A523)	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
11	12"	BI11INRING	13.375"	12.500"	1/4" - 20 x 1 1/2" (92323A523)	8
13	14"	BI13INRING	15.375"	13.500"	1/4" - 20 x 1 1/2" (92323A523)	8
15	16"	BI15INRING	17.375"	15.250"	1/4" - 20 x 1 1/2" (92323A523)	8
18	20"	BI18INRING	21.375"	18.500"	1/4" - 20 x 1 1/2" (92323A523)	8
20	20"	BI20INRING	22.375"	19.625"	1/4" - 20 x 1 1/2" (92323A523)	8
24	24"	BI24INRING	28.000"	25.375"	3/8" - 16 X 1 1/2" (92323A558)	8
30	24"	BI30INRING	26.962"	24.375"	3/8" - 16 X 1 1/2" (92323A558)	8
36	24"	BI36INRING	N/A	30.500"	3/8" - 16 X 1 1/2" (92323A558)	8

Up-blast Utility Set

Figure 18

Discharge Extension Options



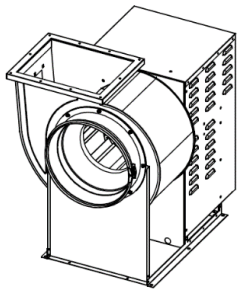
Hardware Counts	
Hardware # Bolt / Nut	Hardware Qty
1/4" - 20 x 1" (92323A518) / 1/4" - 20 (94831A029)	8
1/4" - 20 x 1" (92323A518) / 1/4" - 20 (94831A029)	8
1/4" - 20 x 1" (92323A518) / 1/4" - 20 (94831A029)	8
1/4" - 20 x 1" (92323A518) / 1/4" - 20 (94831A029)	12
1/4" - 20 x 1" (92323A518) / 1/4" -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

BI - Discharge Extension					
Fan Size	Extension #	"L"	"W"	"H"	Cover #
11	BI11EXTASY	12"	11"	24"	BI11DISCOVER
13	BI13EXTASY	14"	12"	24"	BI13DISCOVER
15	BI15EXTASY	16"	13"	24"	BI15DISCOVER
18	BI18EXTASY	19"	15"	24"	BI18DISCOVER
20	BI20EXTASY	21"	15"	24"	BI20DISCOVER
24	BI24EXTASY	26"	17"	24"	BI24DISCOVER
30	BI30EXTASY	32"	19"	24"	BI30DISCOVER
36	BI36EXTASY	39"	23"	24"	BI36DISCOVER

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.

Figure 19



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°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 UL 2221 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 UL 2221 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

Normal temperature test belt drive – The 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 – The 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.

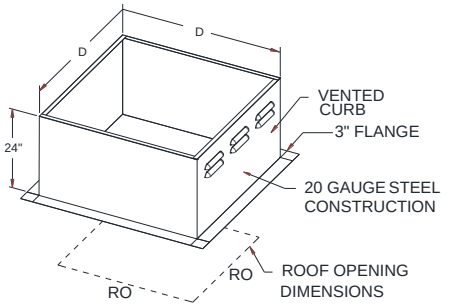
Abnormal flare-up test – The exhaust fan must operate continuously while exhausting burning grease vapors at 600°F (316°C) for a period of 15 minutes without the fan becoming damaged to any extent that could cause an unsafe condition.

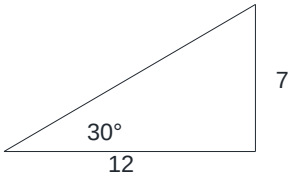
Figure 20

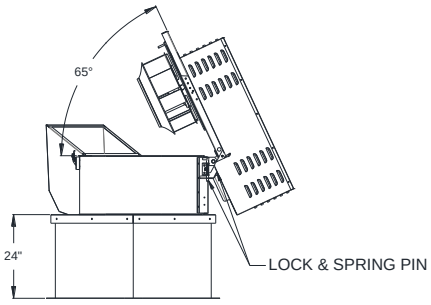
FEATURES:
ROOF MOUNTED FANS
RESTAURANT MODEL
UL762
HIGH HEAT OPERATION DIRECT DRIVE 300°F (149°C)
HIGH HEAT OPERATION BELT DRIVE 500°F (260°C)
HEAT SLINGER
GREASE CLASSIFICATION TESTING
TILT OUT WHEEL
LOCKING PIN FOR POWER PACK
MOTOR WEATHER COVER
INTERLOCKED DISCONNECT SWITCH

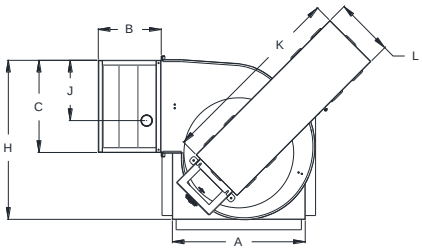
OPTIONS
GREASE BOX
PITCHED CURB
INSULATED CURB
RAIN CAP

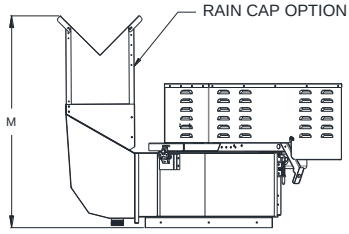
PITCHED CURBS ARE AVAILABLE FOR PITCHED ROOFS.
SPECIFY PITCH:
EXAMPLE: 7/12 PITCH = 30° SLOPE

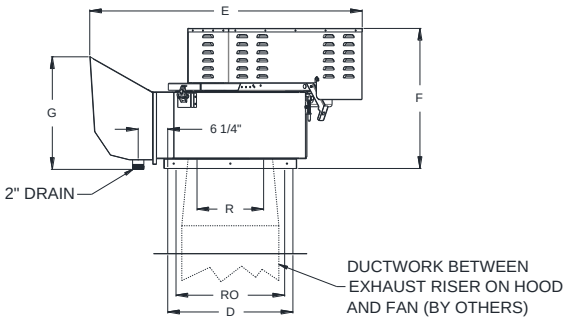








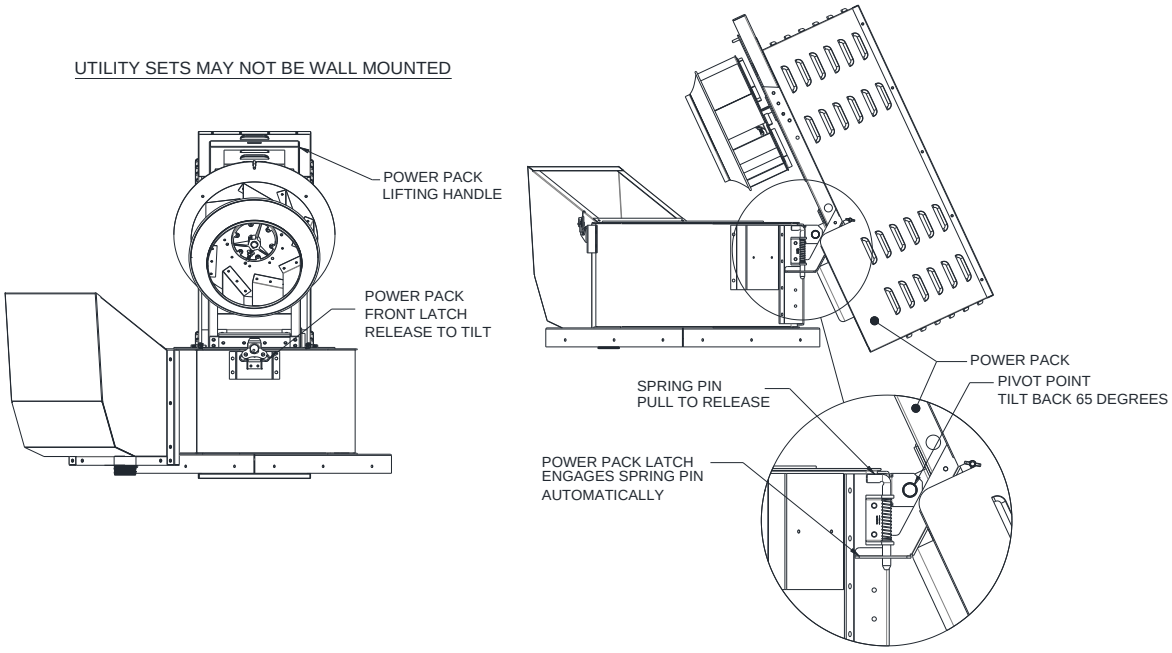




Up-blast Curb Mounted Utility Set Hinging Instructions

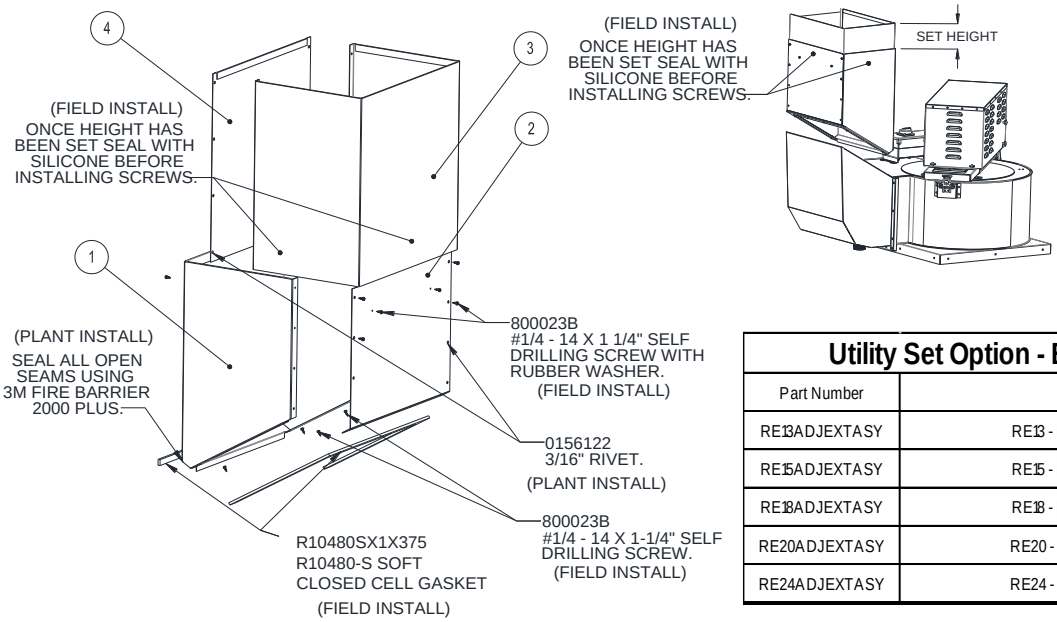
1. Turn the disconnect switch to the off position.
2. Turn and release the latch from the power pack handle.
3. Lift the power pack using the front handle.
4. The power pack will tilt back 65 degrees.
5. The power pack latch will automatically engage the spring pin.
6. To close the power pack, hold the 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 is not any interference.

Figure 21



Up-blast Curb Mounted Utility Set Discharge Extension Option

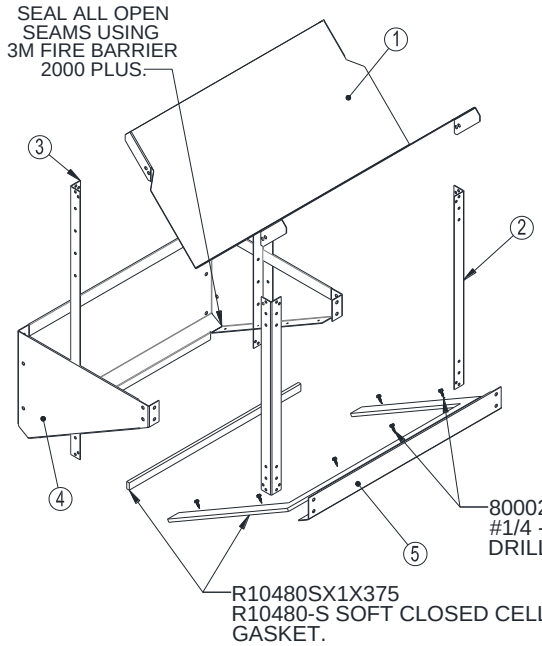
Figure 22



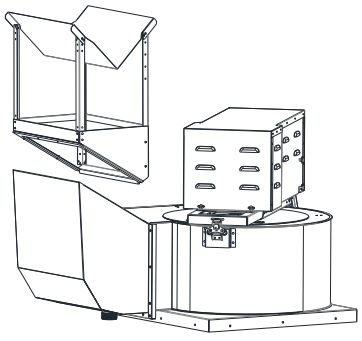
Utility Set Option - Extension - Assembly	
Part Number	Description
RE13ADJEXTASY	RE13 - EXTENSION ASSEMBLY OPTION
RE15ADJEXTASY	RE15 - EXTENSION ASSEMBLY OPTION
RE18ADJEXTASY	RE18 - EXTENSION ASSEMBLY OPTION
RE20ADJEXTASY	RE20 - EXTENSION ASSEMBLY OPTION
RE24ADJEXTASY	RE24 - EXTENSION ASSEMBLY OPTION

Up-blast Curb Mounted Utility Set Rain Cap Option

Figure 23

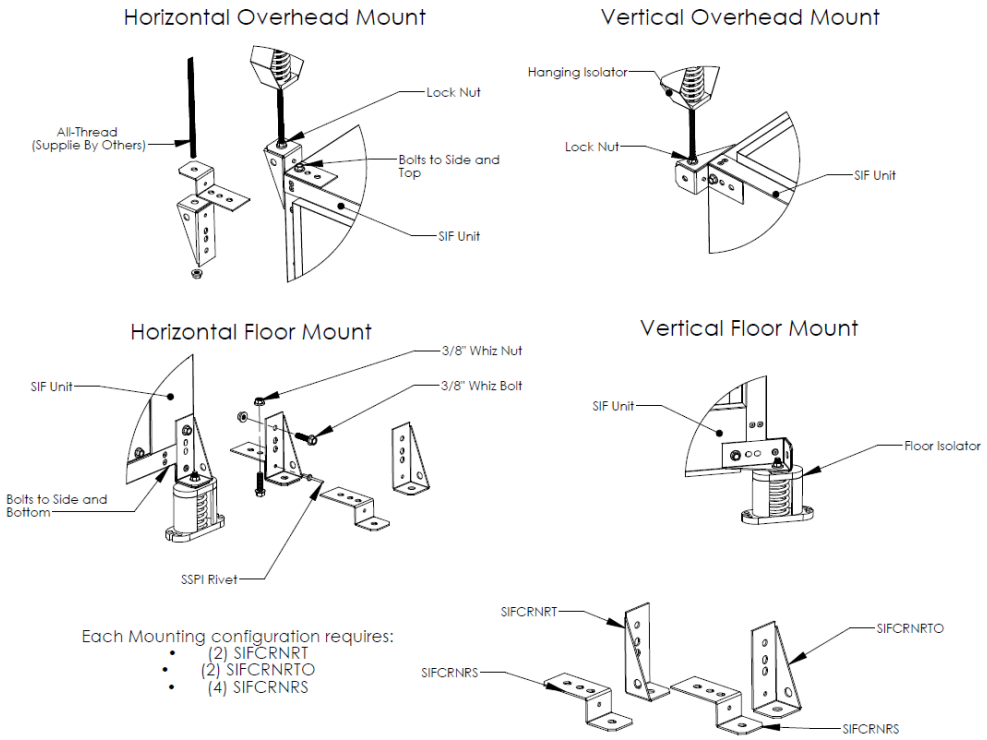


Utility Set Option - Rain Cap - Assembly		
Size	Part Number	Description
11	RE13RAINCAPASSY	RE13 - RAIN CAP ASSEMBLY OPTION
13	RE13RAINCAPASSY	RE13 - RAIN CAP ASSEMBLY OPTION
15	RE15RAINCAPASSY	RE15 - RAIN CAP ASSEMBLY OPTION
18	RE18RAINCAPASSY	RE18 - RAIN CAP ASSEMBLY OPTION
20	RE20RAINCAPASSY	RE20 - RAIN CAP ASSEMBLY OPTION
24	RE24RAINCAPASSY	RE24 - RAIN CAP ASSEMBLY OPTION



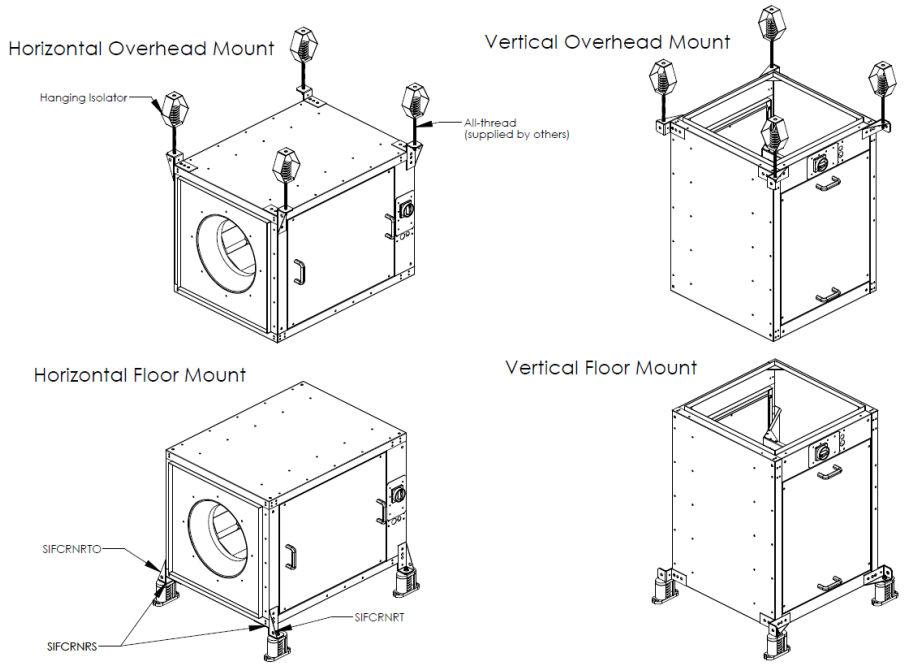
Square Inline Mounting Bracket Detail

Figure 24



Square Inline Mounting Configurations

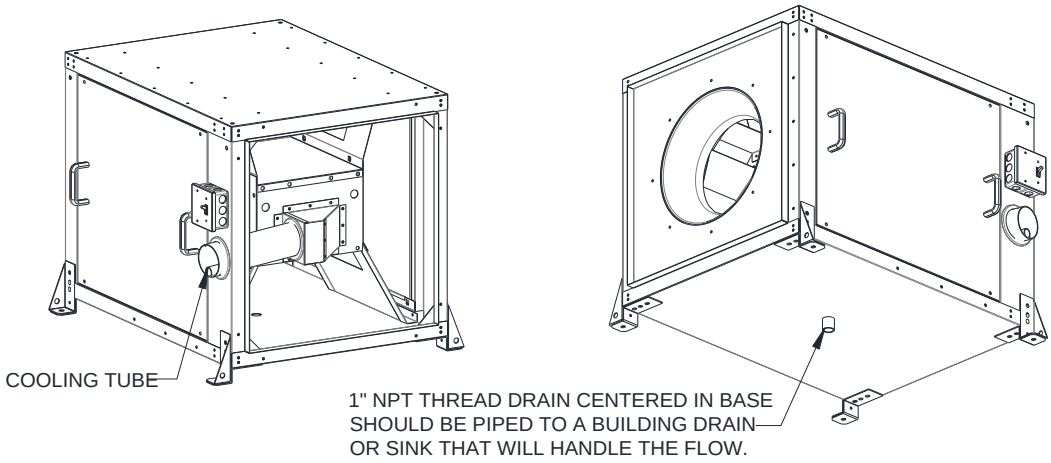
Figure 25



Square Inline Fan Drain

Figure 26

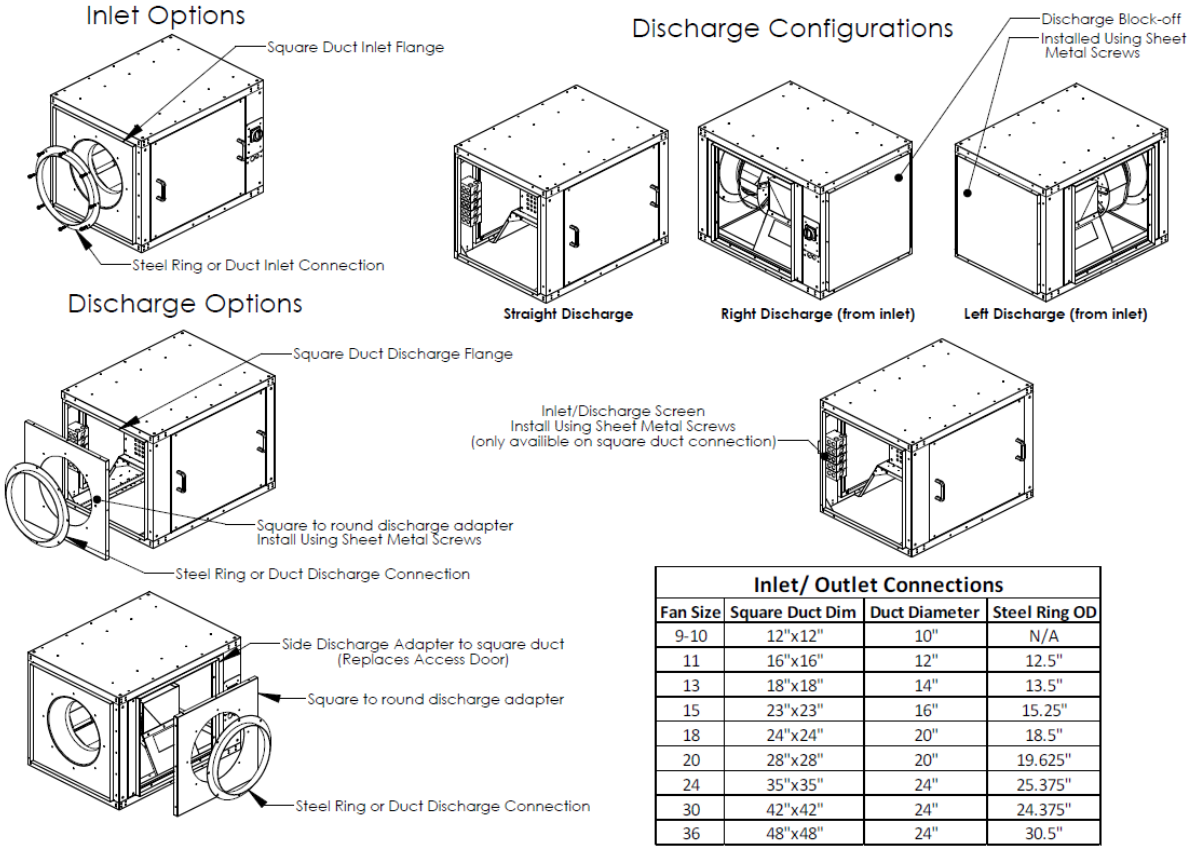
DIRECT DRIVE STAINLESS STEEL INLINE FANS



*FAN MUST BE INSTALLED WITH DRAIN POINTING DOWN.

Square Inline Discharge Options

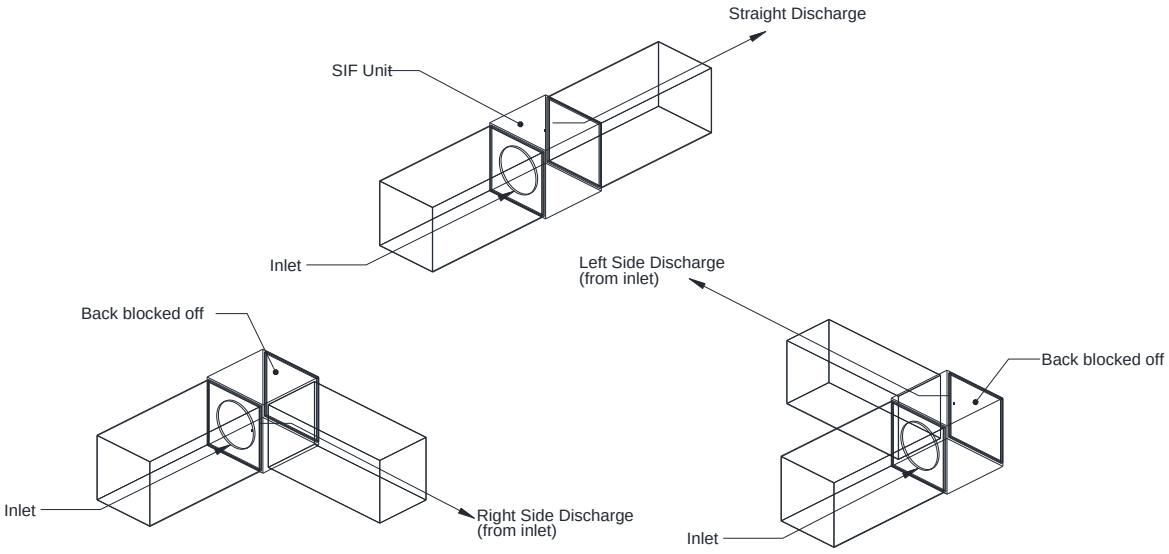
Figure 27



Inlet/ Outlet Connections			
Fan Size	Square Duct Dim	Duct Diameter	Steel Ring OD
9-10	12"x12"	10"	N/A
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

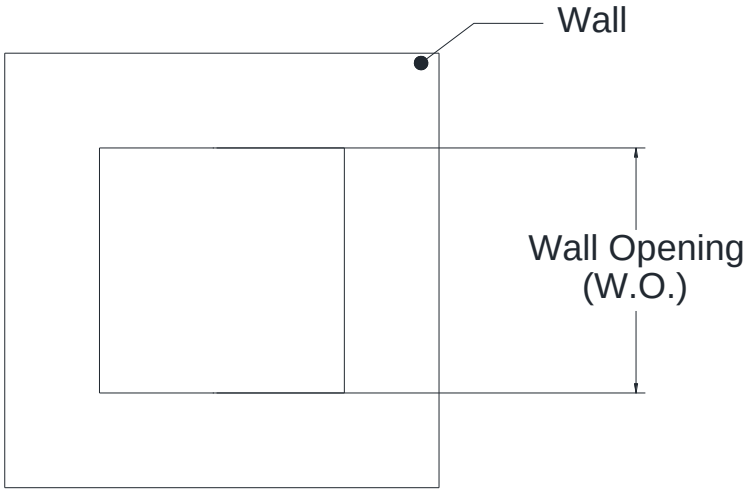
Figure 28



Wall Opening Requirements for Wall Prop Fans

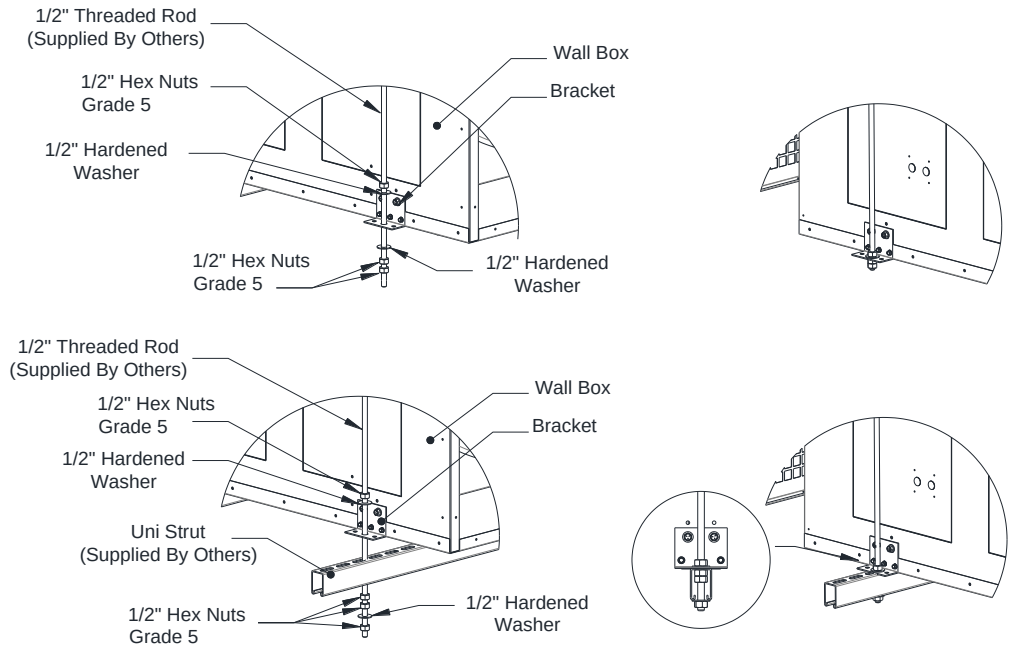
Figure 29

Model	Wall Opening (W.O.) in Inches
WP-10/12	17 1/2
WP-14/16	21 1/2
WP-18/20	25 1/2
WPD-20/24	33 5/8
WPD-30/36	45 5/8
WPD-42/48	57 3/4
WPD-54/60	70
WPD-72	82



Wall Prop Fan Mounting Detail

Figure 30



Wall Prop Mounting Angle & Closure Angle Installation

Appropriate type and size fastener/washer should be used to secure mounting angle & closure angle to the wall*.

Figure 31 - Mounting Angle

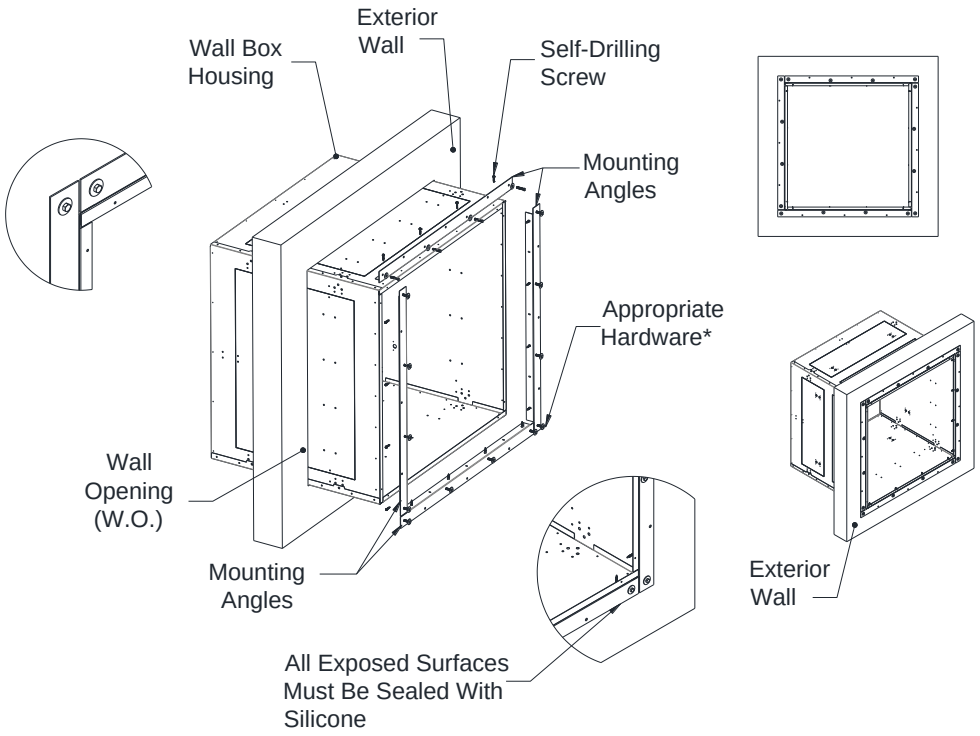


Figure 32 - Closure Angle

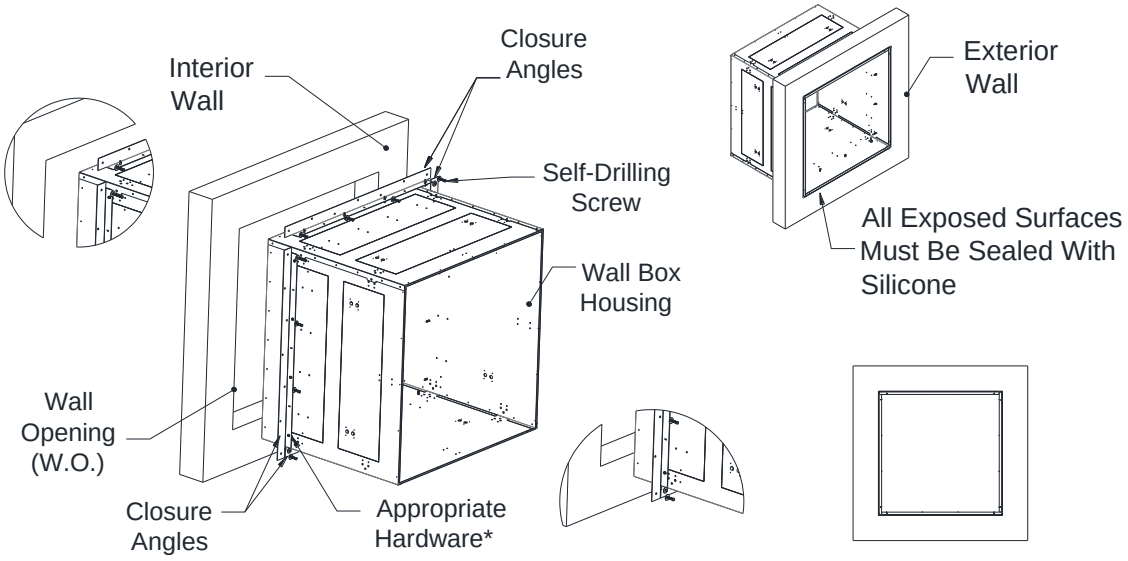
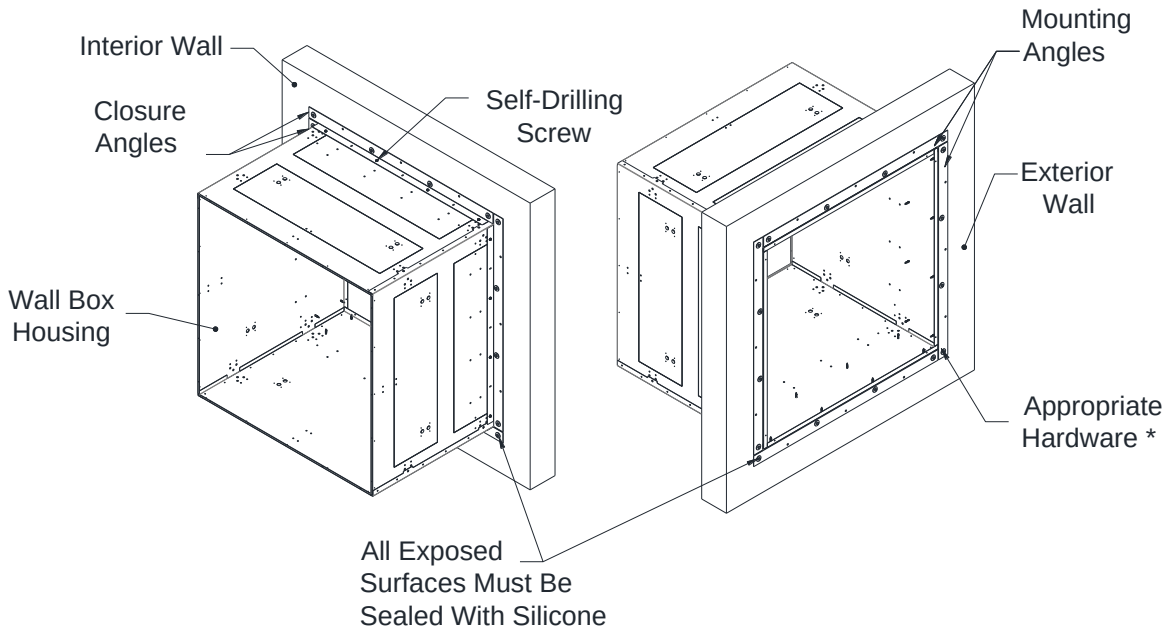


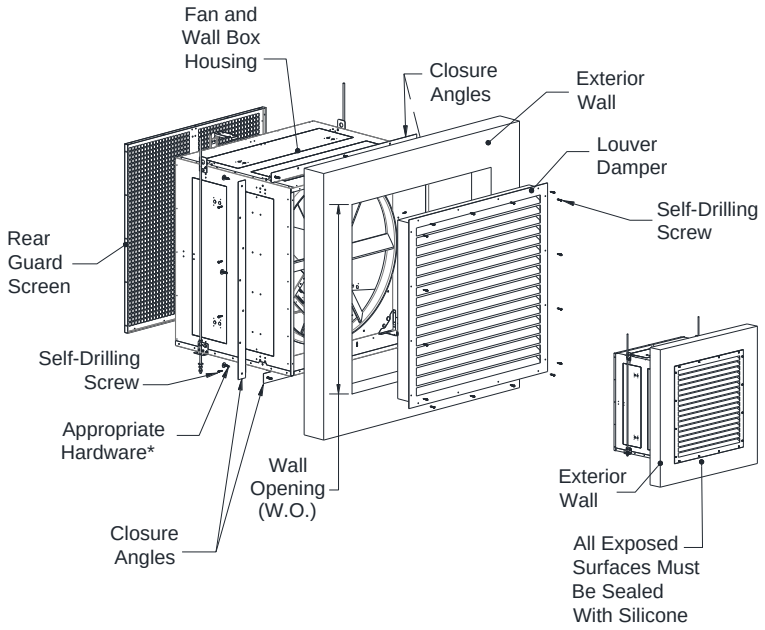
Figure 33 - Mounting and Closure Angle



Wall Prop Damper Installation

Appropriate type and size fastener/washer should be used to secure mounting angle & closure angle to the wall*.

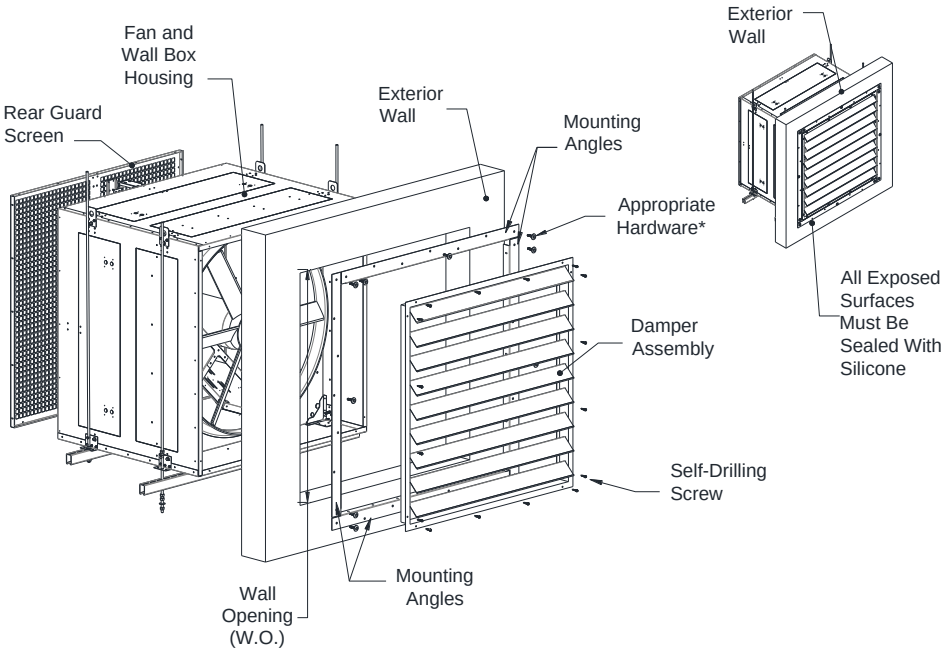
Figure 34



Wall Prop Louver Installation

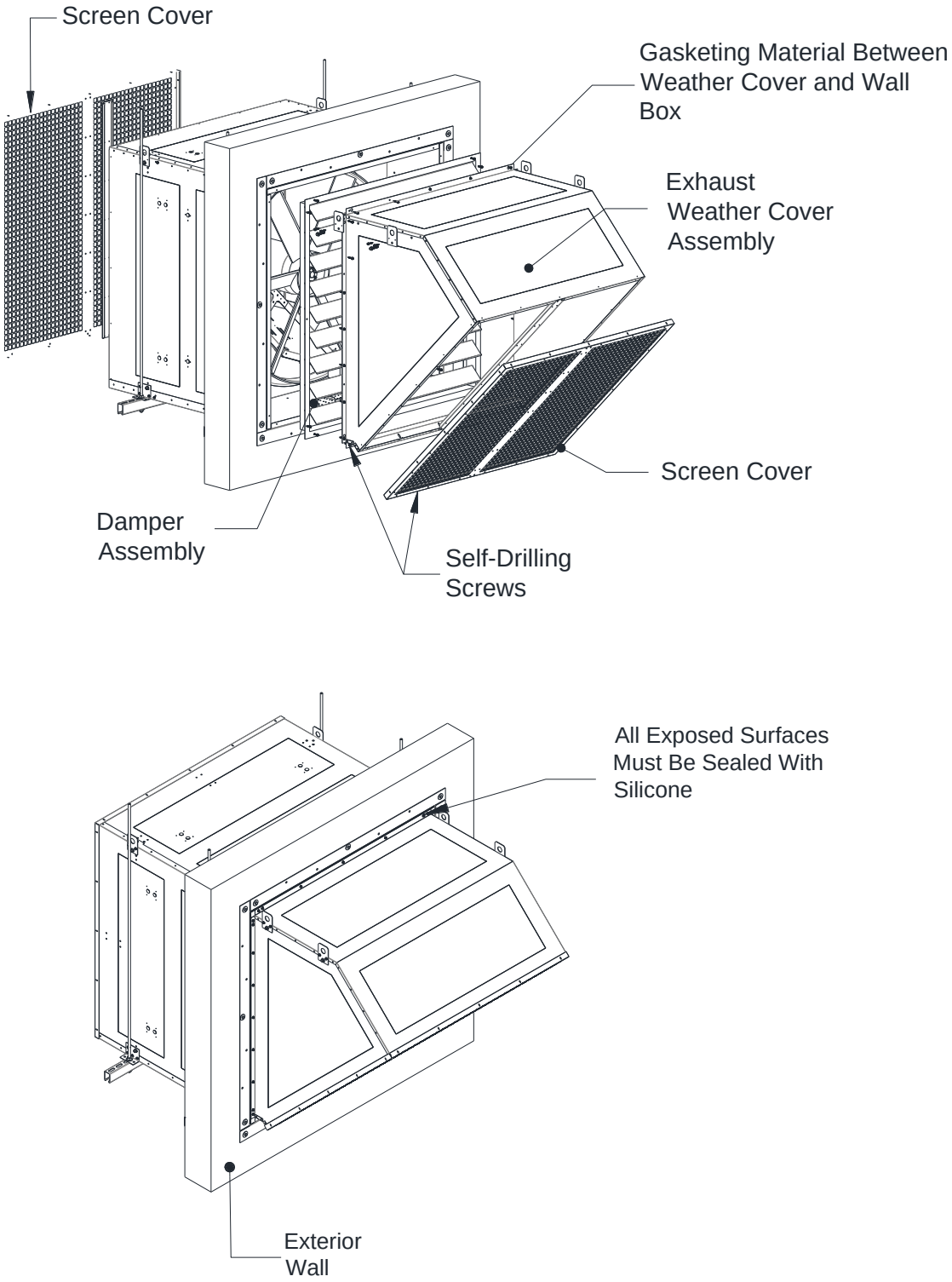
Appropriate type and size fastener/washer should be used to secure mounting angle & closure angle to the wall*.

Figure 35



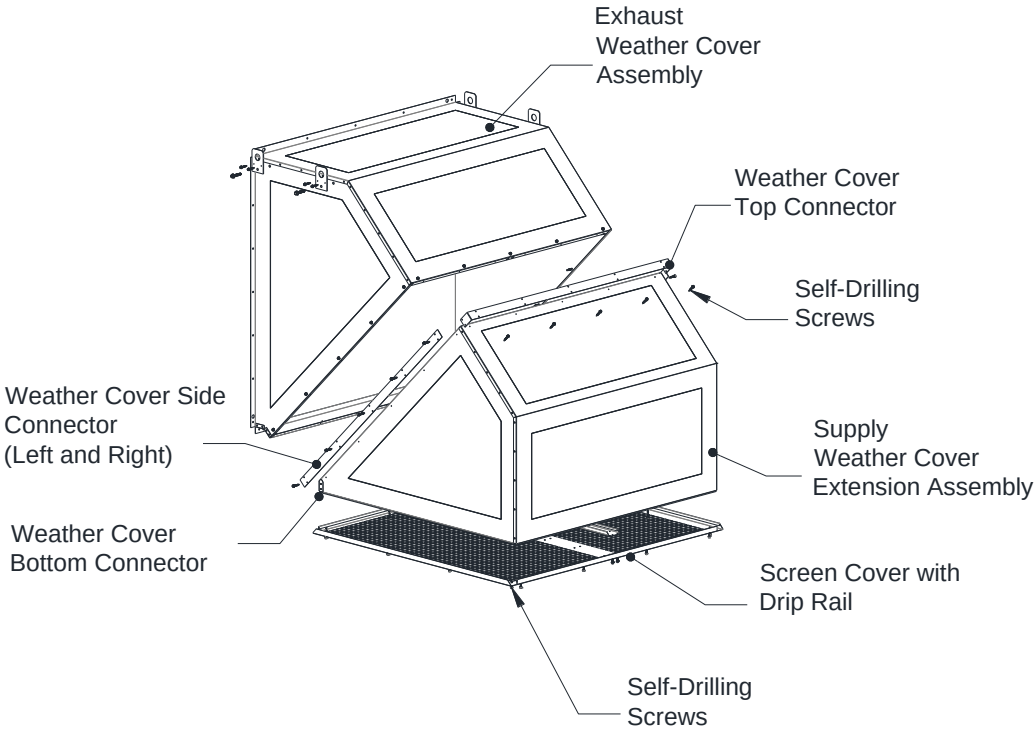
Wall Prop Exhaust Weather Cover Installation

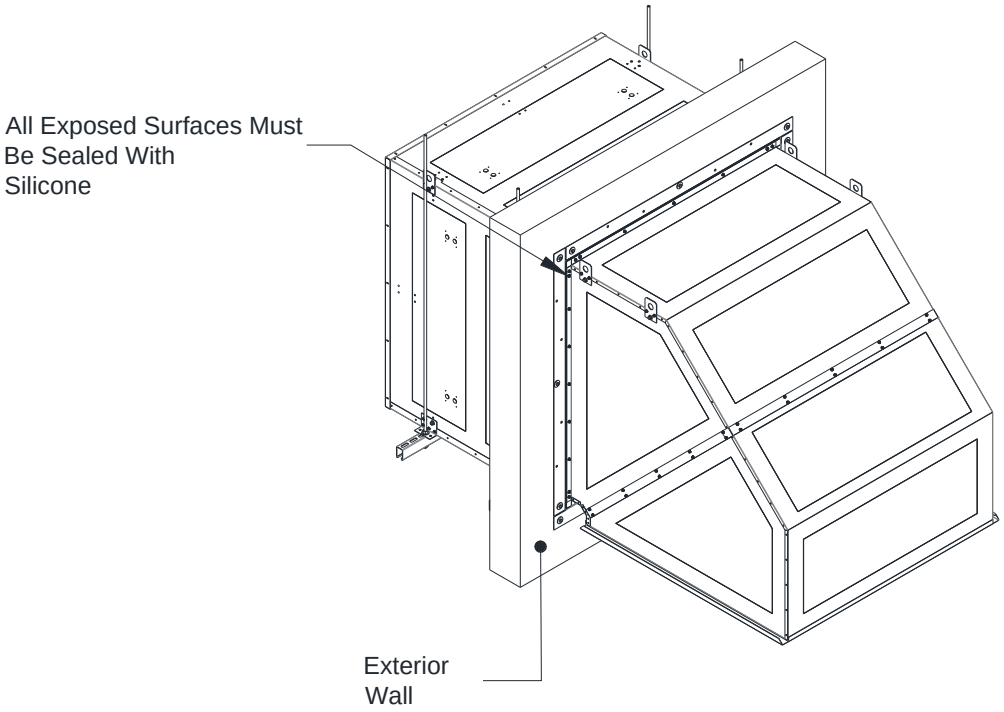
Figure 36



Wall Prop Supply Weather Cover Installation

Figure 37





Wall Prop Speed Control Panel

Figure 38 - Externally Mounted

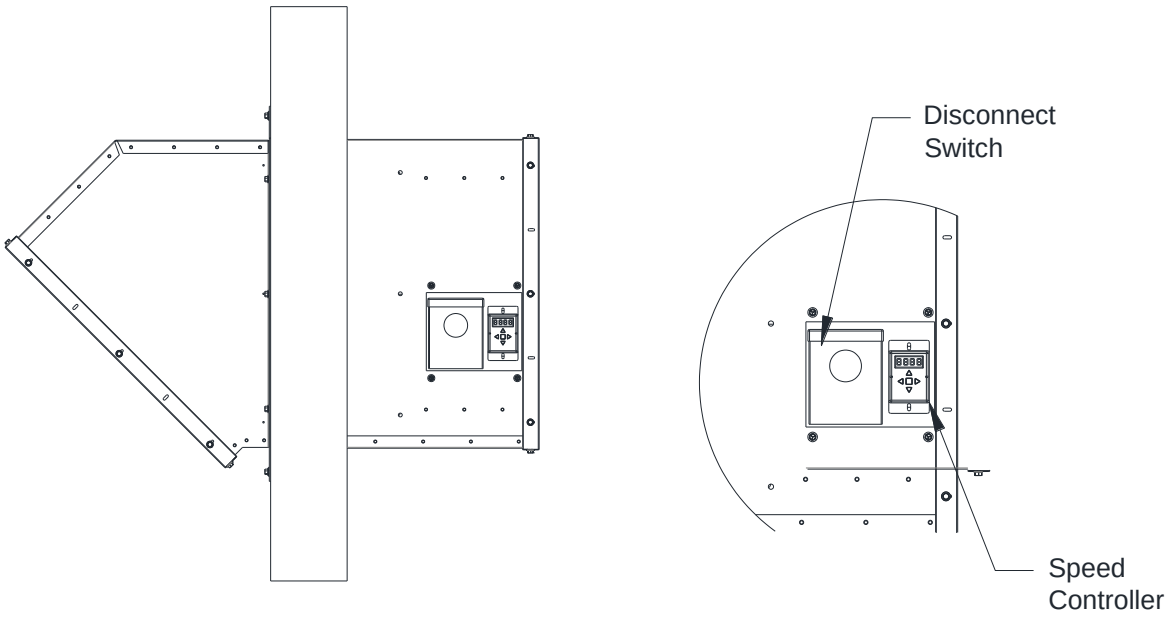
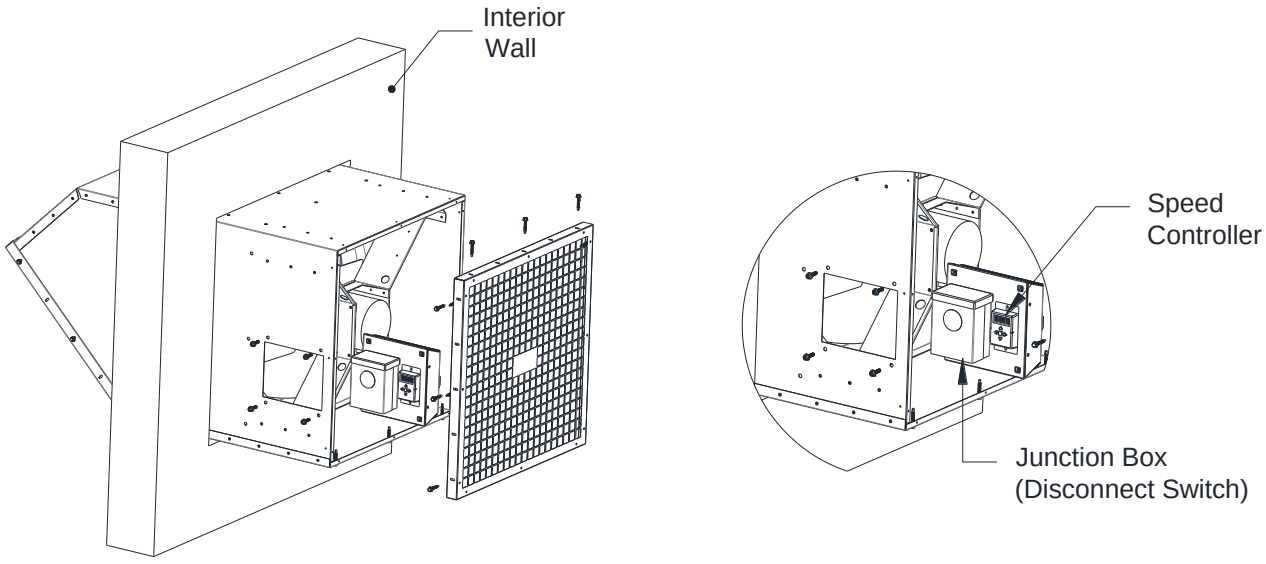


Figure 39 - Internally Mounted



Note: Junction box can be unbolted and pushed into the housing. This will allow the wall box to slide into the wall opening without disconnecting factory wiring.

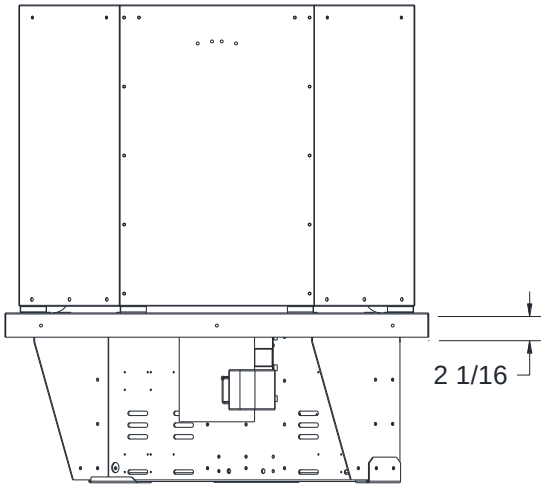
Roof Prop Up-Blast Mount Installation

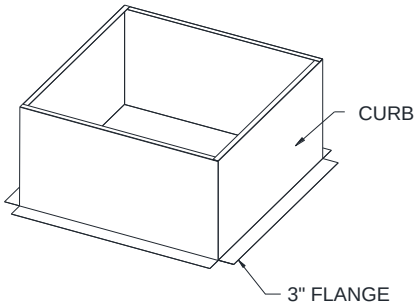
Figure 40

FEATURES
STEEL CONSTRUCTION
REMOVABLE BUTTERFLY DAMPERS
STEEL OR ALUMINUM PROPELLER
DISCONNECT SWITCH

OPTIONS
BASE WITH ACCESS DOOR
ROOF CURBS
OUTLET GUARD
MAGNETIC LATCHES

Model	Roof Opening (R.O.) in Inches
RPUD-20/24	31
RPUD-30/36	43
RPUD-42/48	55
RPUD-54/60	67
RPUD-72	79

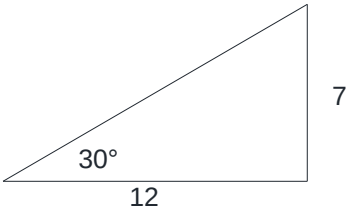


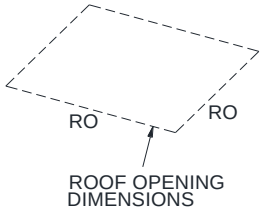


PITCHED CURBS ARE AVAILABLE FOR PITCHED ROOFS

SPECIFY PITCH:

EXAMPLE: 7/12 PITCH = 30° SLOPE

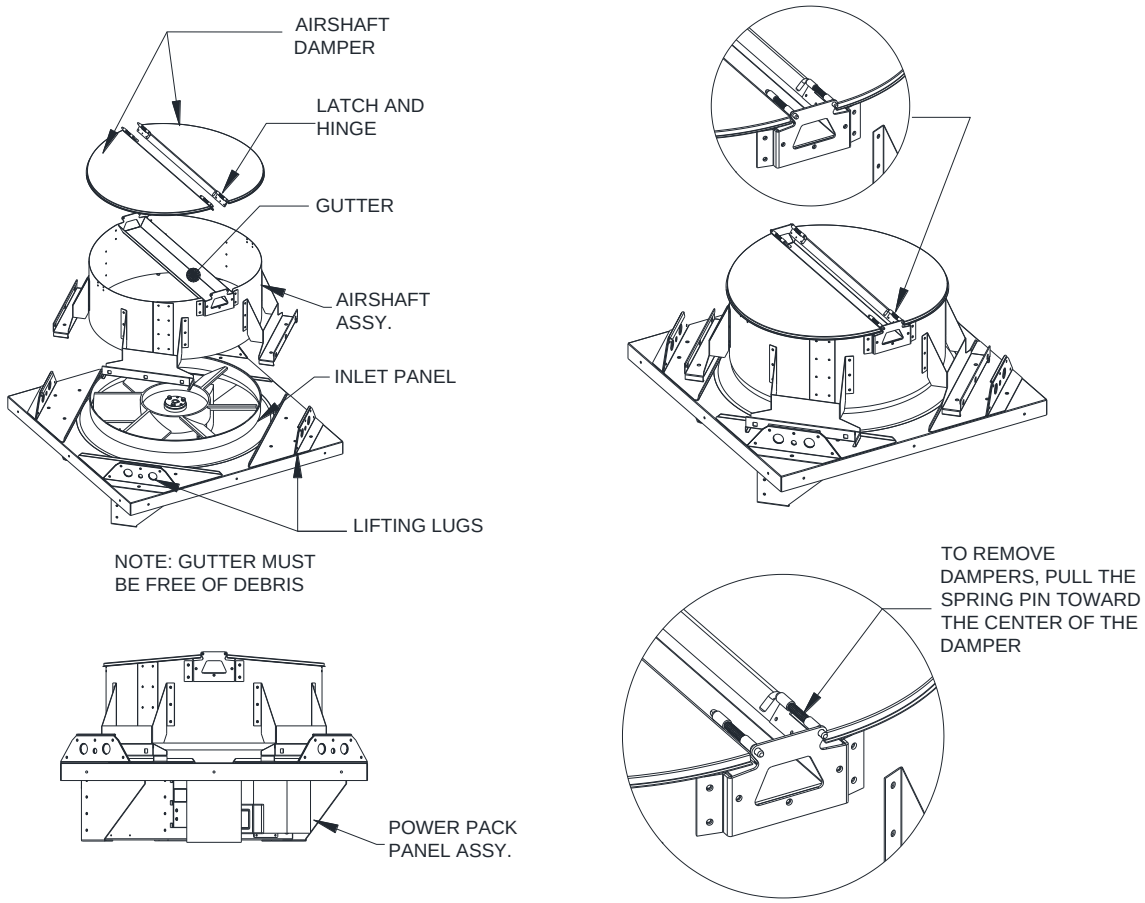




ROOF OPENING DIMENSIONS

20-48” Roof Prop Up-Blast Fan Assembly

Figure 41

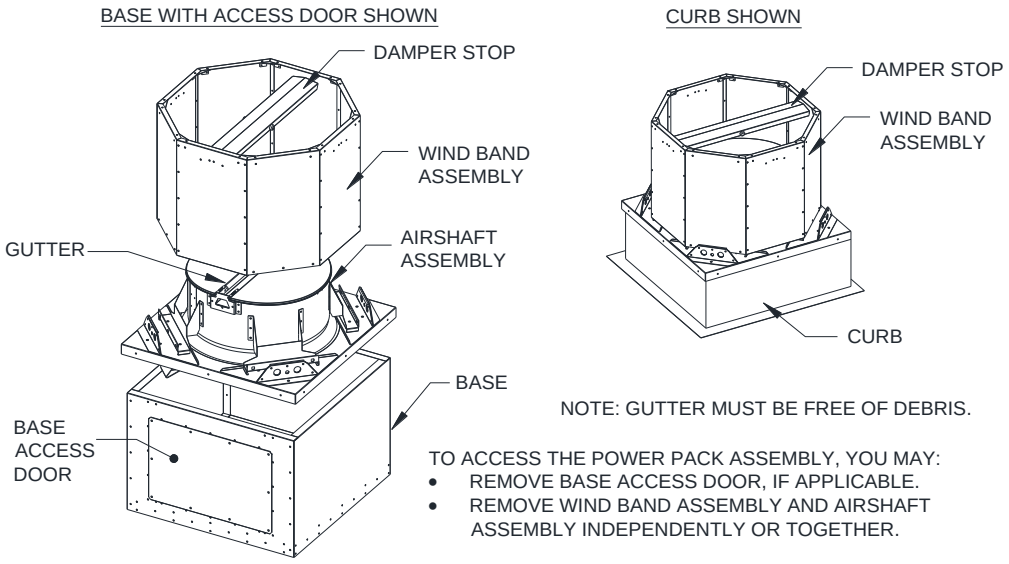


During maintenance, clean out debris from the gutter that may block water runoff and cause water to overflow into the building.

20-48” Roof Prop Up-Blast Features

Figure 42

DAMPER STOP MUST BE PARALLEL TO THE GUTTER



NOTE: GUTTER MUST BE FREE OF DEBRIS.

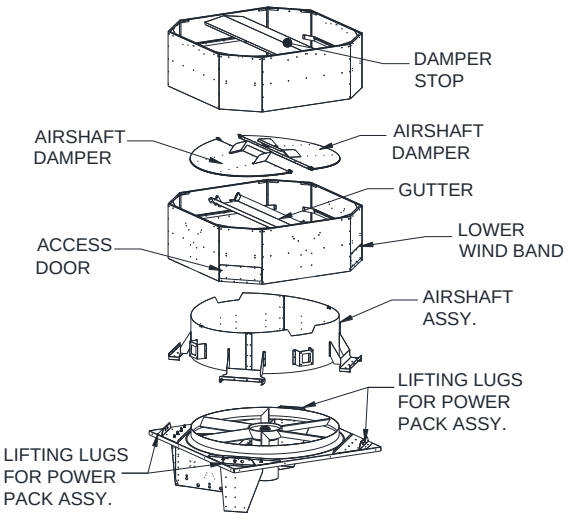
TO ACCESS THE POWER PACK ASSEMBLY, YOU MAY:

- REMOVE BASE ACCESS DOOR, IF APPLICABLE.
- REMOVE WIND BAND ASSEMBLY AND AIRSHAFT ASSEMBLY INDEPENDENTLY OR TOGETHER.

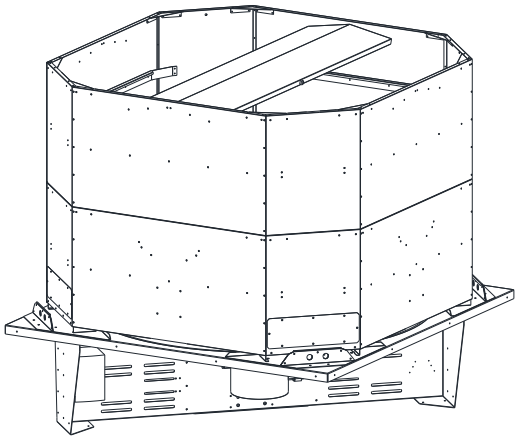
54-72” Roof Prop Up-Blast Fan Assembly

Figure 43

DAMPER STOP MUST BE PARALLEL TO THE GUTTER



ALIGN TOP WIND BAND ASSEMBLY WITH LOWER SECTION. USE SHEET METAL SCREWS TO ATTACH THE TWO SECTIONS TOGETHER. PILOT HOLES ARE PROVIDED.



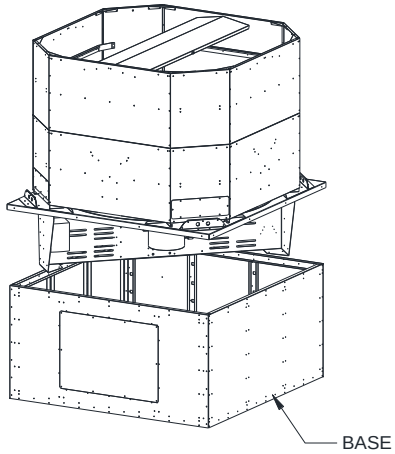
REMOVE ACCESS DOOR ON THE LOWER WIND BAND TO ACCESS THE AIRSHAFT SUPPORTS AND HARDWARE.

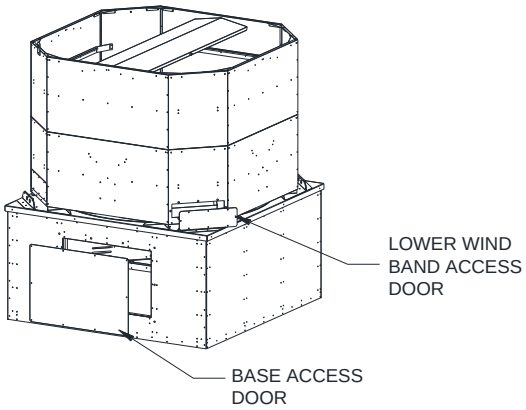
NOTE: GUTTER MUST BE FREE OF DEBRIS

During maintenance, clean out any debris that may be in the gutter. This will allow for rain water to properly drain and prevent water from leaking into the roof

54-72” Roof Prop Up-Blast Features

Figure 44



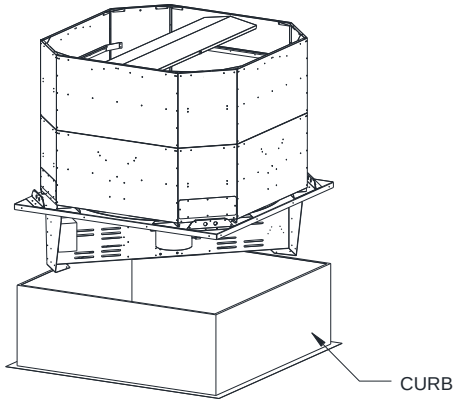


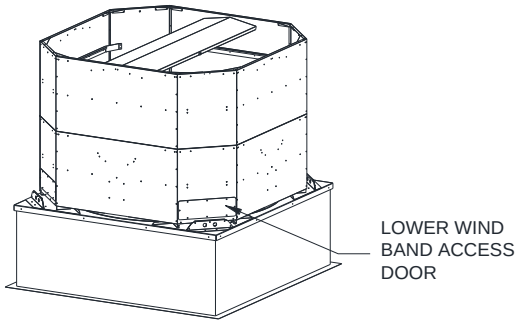
TO ACCESS THE POWER PACK ASSEMBLY, YOU MAY:

- REMOVE BASE ACCESS DOOR, IF APPLICABLE.
- REMOVE WIND BAND ASSEMBLY AND AIRSHAFT ASSEMBLY INDEPENDENTLY OR TOGETHER.

REMOVE ACCESS DOOR ON THE LOWER WIND BAND TO ACCESS THE AIRSHAFT SUPPORTS AND HARDWARE.

AIRSHAFT SUPPORTS AND WIND BANDS WILL NEED TO BE REMOVED TO ACCESS THE PROPELLER.





REMOVE ACCESS DOOR ON THE LOWER WIND BAND TO ACCESS THE AIRSHAFT SUPPORTS AND HARDWARE.

AIRSHAFT SUPPORTS AND WIND BANDS WILL NEED TO BE REMOVED TO ACCESS THE PROPELLER.

Electrical

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.

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.*

Table 1 - 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. **External wiring to the damper motor is required**.

PSC (Permanent Split Capacitor) Motor Speed Control

Figure 45 – PSC

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.

ECM (Electronically Commutated Motor) Speed Control

EC motors with control allows accurate manual adjustment of fan speed. The benefit of EC motors is exceptional efficiency, performance, and motor life.

Unit Mounted Controller

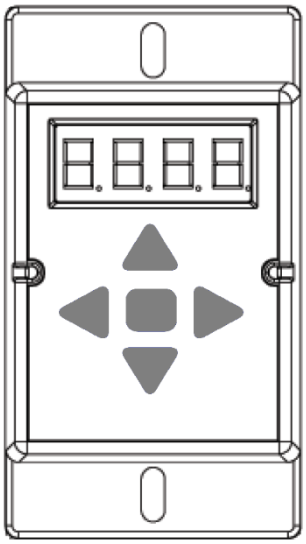
The ECM features a 4 digit LED display with a five button interface. All parameters can be accessed through the user menu. The percent of run speed can be changed by using the Up and Down buttons followed by pressing Enter (middle button) to save changes. Every **ten seconds** the display will toggle 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 ECM control requires a **24 VAC** 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.

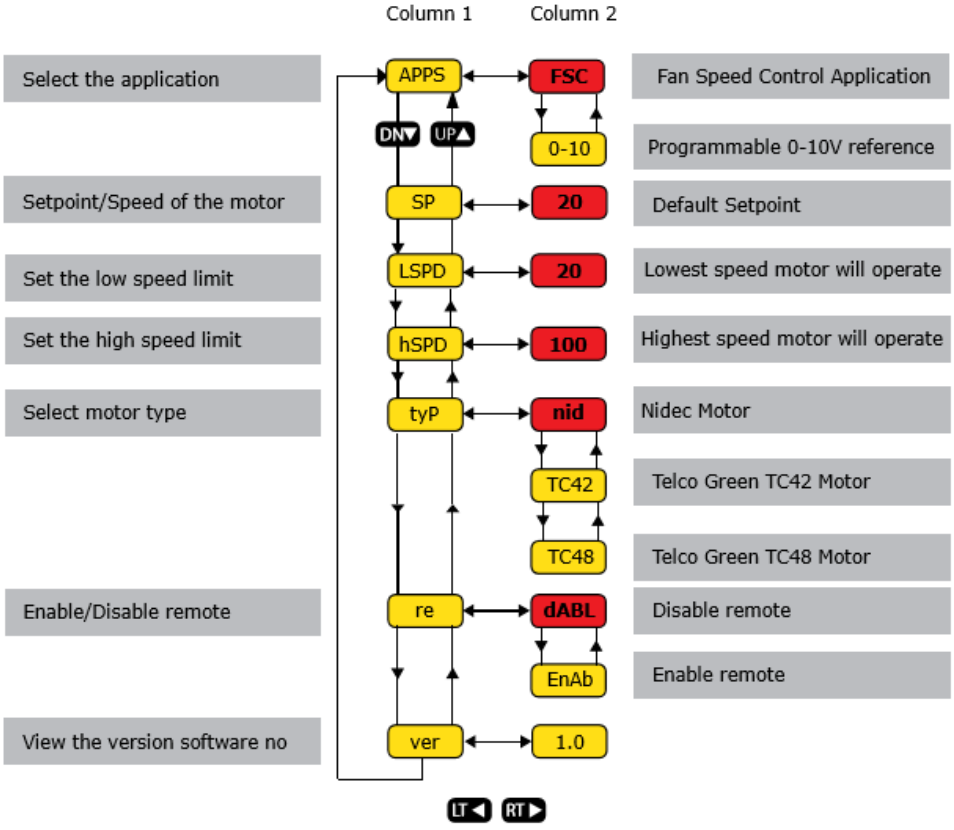
If “oFF” is being displayed, and the speed is set above 300 RPM, the ECM is not receiving RPM feedback. Check that the ECM is wired correctly. Check that the motor “tyP” in the settings matches the motor manufacturer.

Figure 46 – Unit Mount Controller



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

Figure 47 – Controller Navigation Menu



External PWM Signal

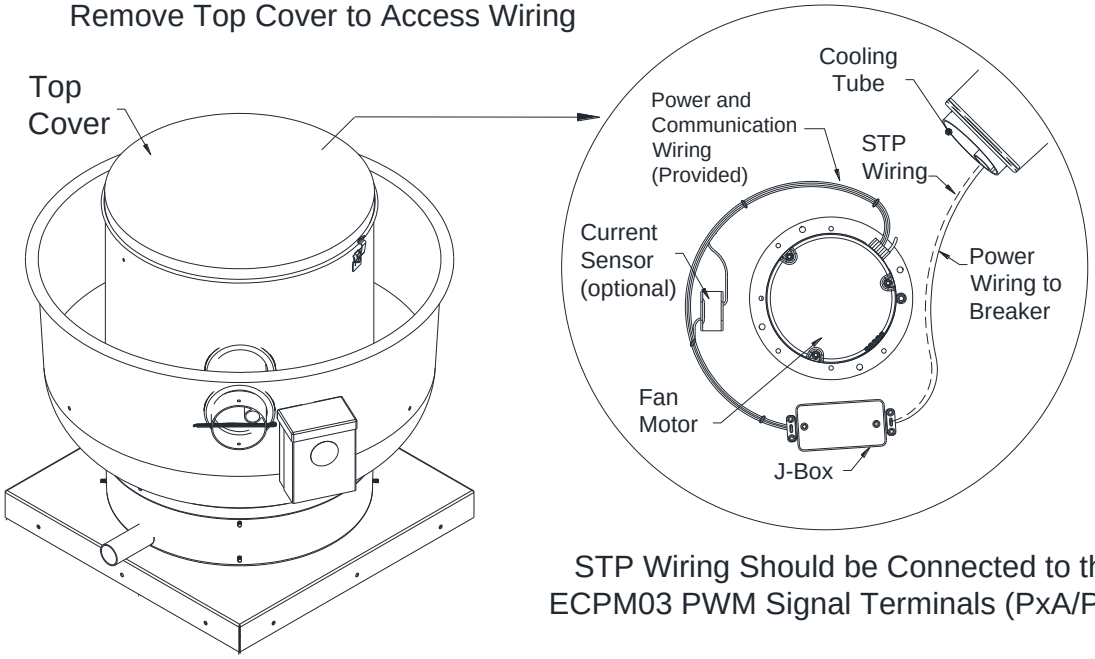
The fan unit will be shipped with power wiring and communication wiring fed to an internal junction box (J-Box). The fan is shipped with Shielded Twisted Pair (STP) wire which is used to wire to a remote PWM signal. Power the unit off. Remove top cover from fan. Remove J-Box cover to access wiring connections.

- The STP wire 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 wiring located in junction box from the factory.
- If wiring is not connected from the factory, connect the red wire to the positive PWM signal and the black wire to the negative PWM signal. Reference schematics for all wiring connections (PxA and PxB).
- Run STP wiring through the cooling tube and along the power wiring of the fan, secure the two together with zip ties. Ensure there is enough slack for the fan to hinge open and close freely.

Figure 48 – ECM Fan Wiring

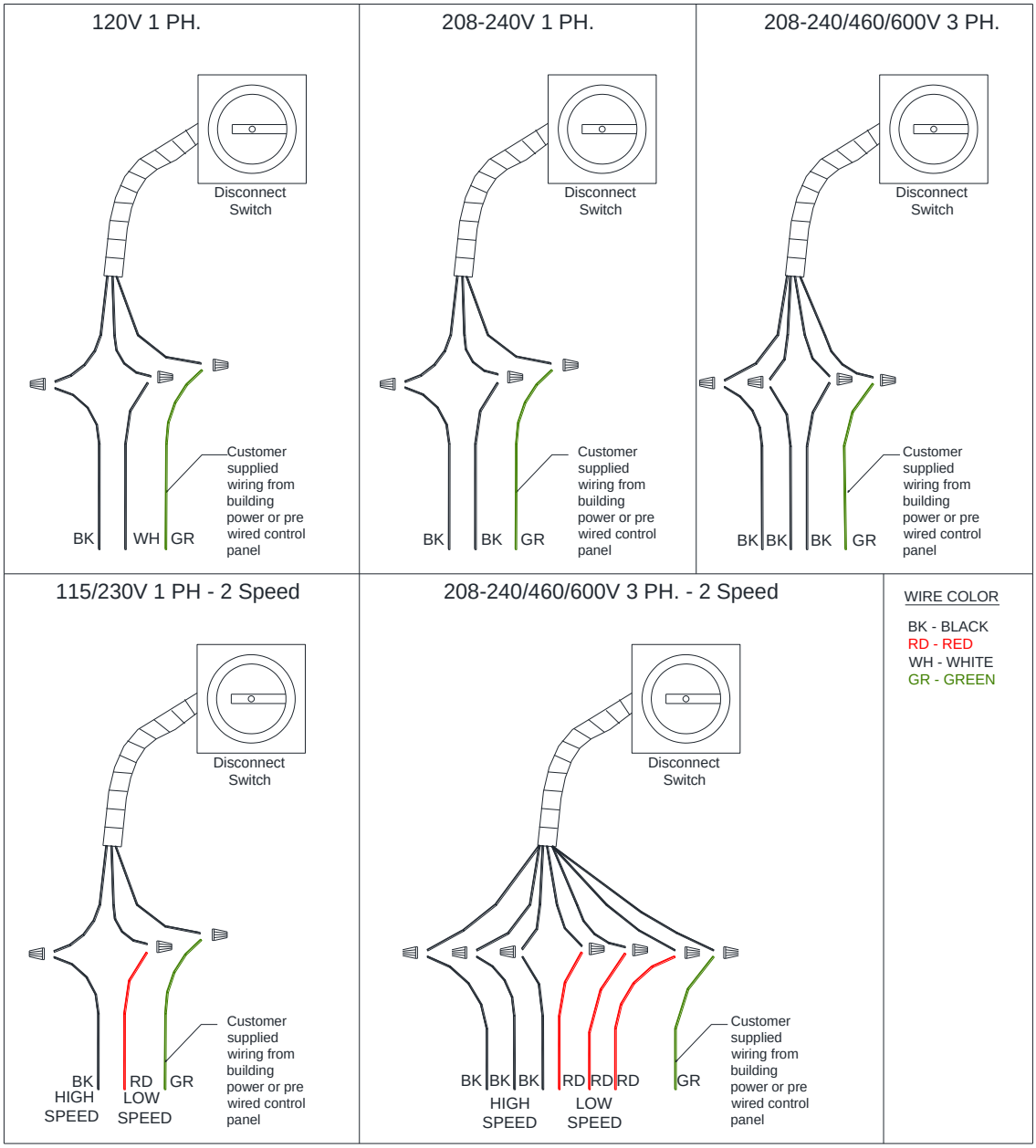
Exhaust Fan Wiring Shown. Supply Fan Wiring Will Vary.

Remove Top Cover to Access Wiring



STP Wiring Should be Connected to the ECPM03 PWM Signal Terminals (PxA/PxB)

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 switch 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 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

HP	Part Number	Volts	1Ø Input	3Ø Input	Input Amps 1Ø 120VAC	Input Amps 1Ø 240VAC	Output Amps	Breaker 1Ø 120VAC	Breaker 1Ø 240VAC
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, 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.

Bushing Information

Place bushing key into slot **(A)**, excludes H bushing. Install bushing into hub **(1)**. Align bushing key with hub keyway **(1)**. Use blue Loctite on the mounting bolts. Install bolts and torque to proper setting listed in **Table 2**. Install fan assembly so that bushing keyway **(B)** is aligned with the motor's shaft slot **(2)**. Install shaft key in keyway **(2)**. Tighten set screw to lock key in place. There are threaded holes provided on the bushing. These holes are for removing the bushing when required.

Figure 49 – Bushing Details

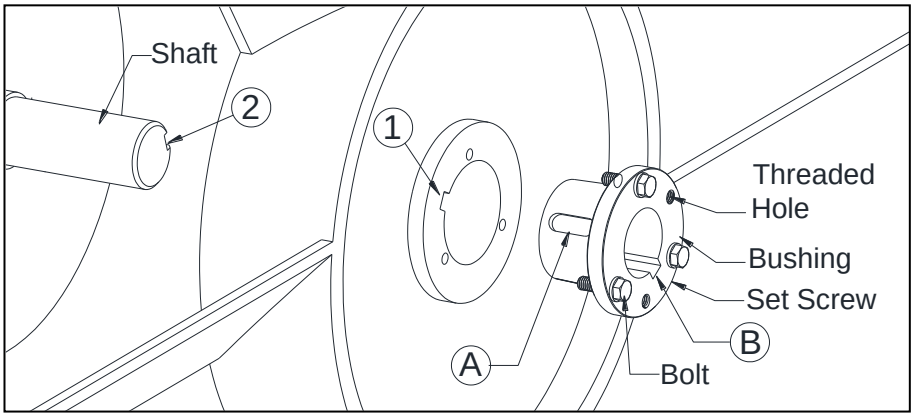


Table 2 – Bushing Specifications

Bushing Type	Outer Diameter	Bolt Size	Torque (In-lbs)
H	2 1/2	1/4 x 3/4	95
P1	3	5/16 x 1	192
Q1	4 1/8	3/8 x 1 1/4	348

Bushing type is stamped on the face of the bushing.

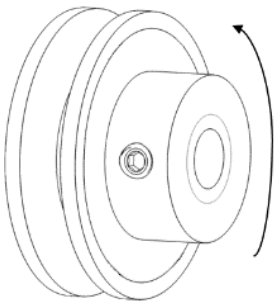
Pulley Information

Table 3 - Pulley Setscrew Torque

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

Make sure you tighten the setscrew on the flat of the shaft. If you tighten the setscrew on the treads, you will damage the shaft.

Figure 50 - Pulley Adjustment Illustration

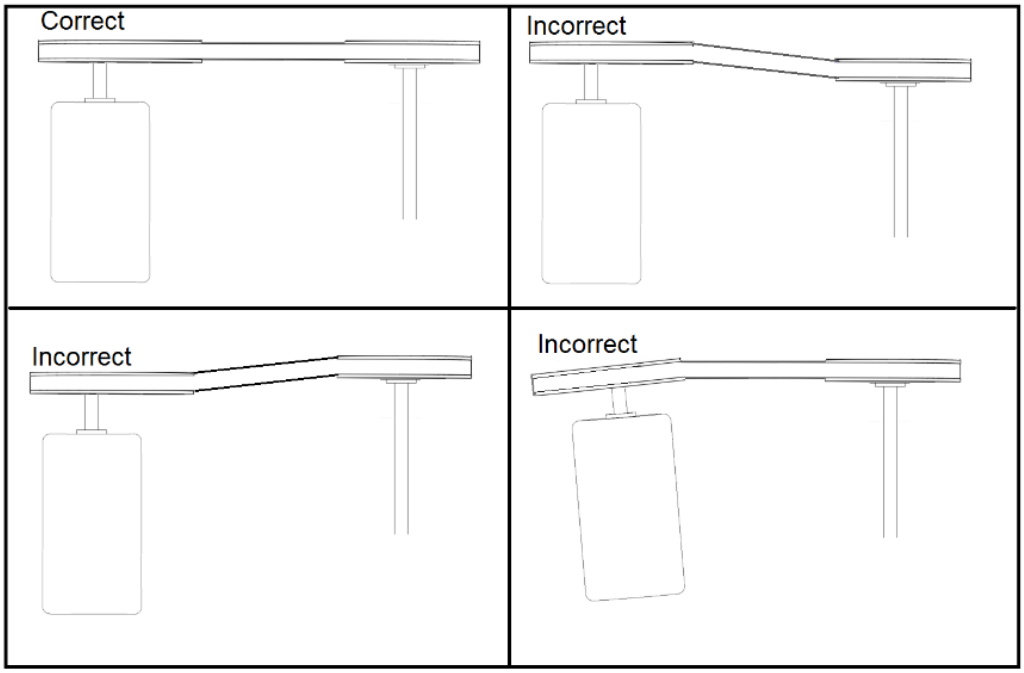


Decrease Amperage
And Blower RPM

Pulley Adjustment (Belt Drive Fans)

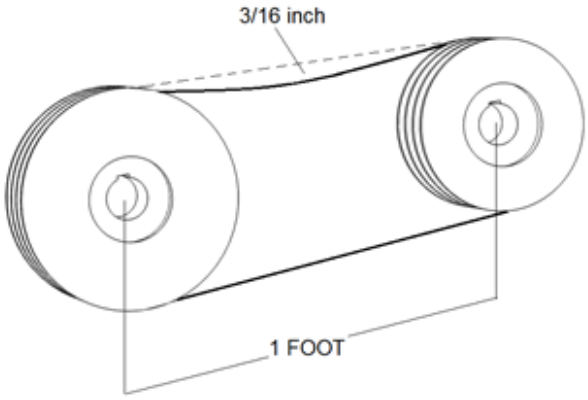
The adjustable motor pulley is factory set for the RPM specified. Speed can be increased by closing or decreased by opening the adjustable motor sheave. Two groove variable pitch pulleys must be adjusted an equal number of turns open or closed. Any increase in speed represents a substantial increase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

Figure 51



Proper Belt Tension

Figure 52



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 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	
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 Measured 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.

Maintenance Record

Date	Service Performed

Factory Service Department

Phone: 1-866-784-6900

Fax: 1-919-554-9374