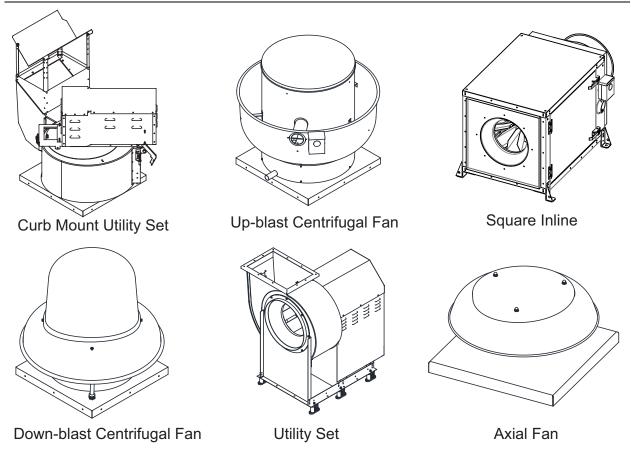
Power Roof Ventilator/Fans Installation, Operation, and Maintenance Manual



RECEIVING AND INSPECTION

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

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 2-years 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 installed and operated within the limitations set forth in this manual.
- 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 2-year 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.

NOTE: To receive warranty coverage for this product, copy and print out the "Start-up and Maintenance Documentation" on page 52. Fill in all details required. Fax the page to 1-919-516-8710 or call 1-866-784-6900 for information on emailing forms.

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

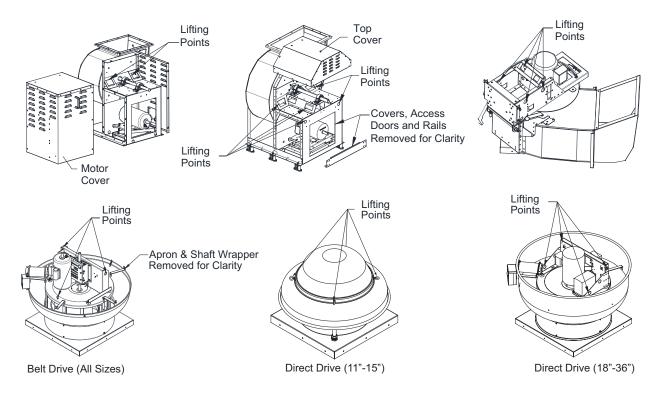
WARNING: DO NOT RAISE VENTILATOR BY THE HOOD, BLOWER OR MOTOR SHAFT, OR BEARINGS – USE LIFTING POINTS PROVIDED OR A SLING.

Site Preparation

- Provide clearance around installation site to safely rig and lift equipment into its final position. Refer to Figure 1 for lifting point locations. Supports must adequately sustain 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 in accordance with the applicable building code provisions.
- 5. Inline fans can be interior mounted, motors shall be located outside of the exhaust air-stream.
- 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 always be maintained. If necessary, the fan may be wrapped to maintain the duct system fire rating.

NOTE: Never Lift Fans From Shafts and Bearings.

Figure 1 - Recommended Lifting Points



Roof Mounting

Ventilators are designed for installation atop a prefabricated or factory-built roof curb. If an up-blast fan is used for kitchen hood exhaust, ensure discharge is at least 40" above the roof surface in accordance with NFPA 96. Refer to Authority Having Jurisdiction (AHJ) requirements prior to installation. Follow manufacturer's instructions for proper curb installation.

1. If a back-draft 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.

- 2. 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.
- 3. Curb to substrate installation: Secure curb flange to substrate using suitable hardware (not furnished). Refer to **Table 1** and **Table 2** for hardware details.
- 4. Fan to curb installation: Use 1/4"-14 x 2" galvanized self-drilling screws. 19" through 40" fan bases use a minimum of 12 screws (3 per side). 44" fan bases use a minimum of 16 screws (4 per side).
- 5. Before connecting power source to the fan motor, verify power line wiring is de-energized. Check that the power source is compatible with the requirements of your equipment.
- 6. Connect power supply wiring to the motor as indicated on the motor nameplate or terminal box cover.
- 7. Before powering up fan, check ventilator wheel for free rotation.
- 8. Re-install motor cover. Check all fasteners for tightness.
- 9. 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 downspout and grease collection box is available as an accessory item for up-blast fans.

Wall Mounting

Refer to Authority Having Jurisdiction (AHJ) requirements prior to installation. Follow manufacturer's instructions for proper curb installation.

- 1. The same instructions, warnings, and notes found under Roof Mounting section will apply. Follow steps 1-9 from above, with additional mounting information below.
- 2. **Masonry Wall/Steel Studs:** 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. For masonry, secure the lead cinch type anchors with non-ferrous bolts (3 per side). For steel, use self-drilling screws (3) per side. The ventilator should be mounted to the mounting angle iron frame with self-tapping 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 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 for fans greater than 24" wheel with 2 HP motor (1 or 3 phase); 24" wheel with 3 HP motor (3 phase only).

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 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 members, such as wooden studs, steel studs, or concrete. The curb should be installed to the roof and/or wall using appropriate type and size fasteners. Refer to **Table 1** for minimum hardware requirements, refer to **Table 2** for quantity per curb flange. Always use suitable fasteners (not furnished) and quantity recommendations.

Refer to **Figure 2** and **Figure 3** for installation details. The fan should be installed on a curb and/or rail. Caulking, flashing and sealing of wall/roof penetration done by contractor or installer.

Verify that the duct connection and fan inlet are properly aligned and sealed. The fan base is secured to the curb with 1/4"-14 x 2" galvanized self-drilling screws. Use a minimum of 12 screws (3 per side) for units with base sizes 19" through 40". Use a minimum of 16 screws (4 per side) for units with a base size of 44". Shims may be required depending upon curb installation and wall/roofing material. Check all fasteners for tightness.

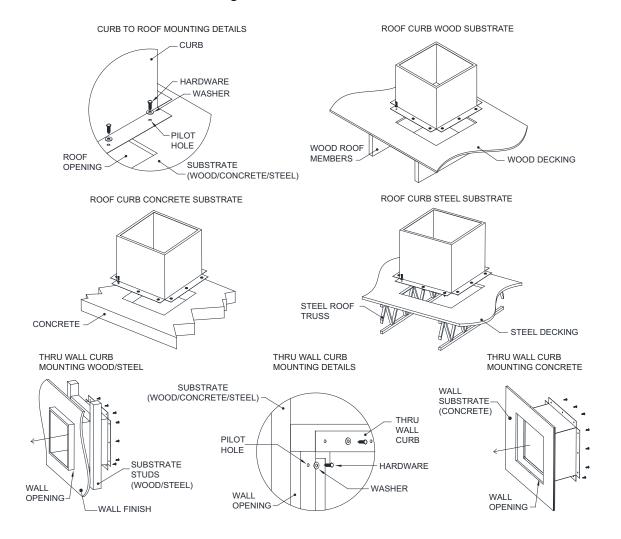


Figure 2 - Curb Mount Details

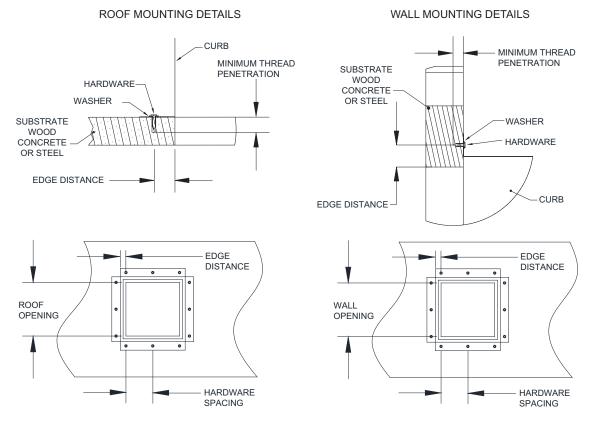


Figure 3 - Minimum Edge Distance and Penetration Details

Table 1 - Minimum Hardware Requirements

Material	Minimum Hardware Specifications	Minimum Thread Penetration	Minimum Edge Distance
Wood - Minimum G.42	Zinc Plated Steel Hex Head Lag Screw 3/8" x 2-1/2" with 3/8" washer	2"	1-1/2"
Concrete - 2500 Minimum PSI	Hilti Kwik Bolt 3/8" Diameter TZ Expansion Anchor with 3/8" washer	2-5/16"	3"
Steel (Studs/Roof Truss)	Dril-Flex Self-Drilling Screws 1/4"-14 Min. 1/2" Through with 1/4" washer	12 Gauge or 1/8" Thick	3/8"

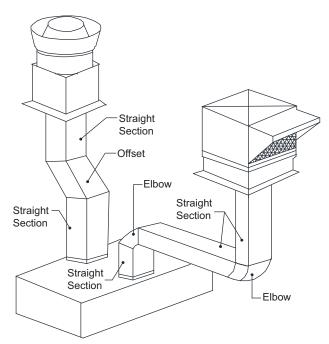
Fan Base Size	Hardware Quantity Wood	Hardware Quantity Concrete	Hardware Quantity Steel
19"	12 (3 per side)	12 (3 per side)	12 (3 per side)
21"	12 (3 per side)	12 (3 per side)	16 (4 per side)
24-3/4"	16 (4 per side)	16 (4 per side)	20 (5 per side)
26"	20 (5 per side)	20 (5 per side)	24 (6 per side)
28"	20 (5 per side)	20 (5 per side)	24 (6 per side)
33"	24 (6 per side)	24 (6 per side)	28 (7 per side)
40"	28 (7 per side)	28 (7 per side)	36 (8 per side)
44"	40 (10 per side)	36 (9 per side)	44 (11 per side)

NOTE: Fan to Curb Installation: Use 1/4"-14 x 2" self-drilling screws. Use a minimum of 12 screws (3 per side) for 19" through 40" fan bases. Use a minimum of 16 screws (4 per side) for 44" fan bases.

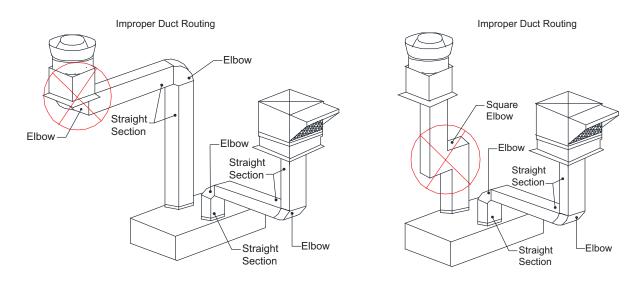
Duct Routing

Figure 4 - Examples of Duct Routing

Proper Duct Routing



Use offsets if the duct cannot be routed straight up.



DO NOT connect elbow directly to fan inlet.

DO NOT use square elbows.

Up-blast Wall Mount Details

Drill pilot holes into the bracket.

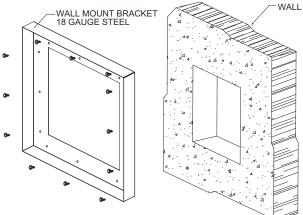
Secure wall mount bracket to the wall. Refer to Table 1 for hardware details.

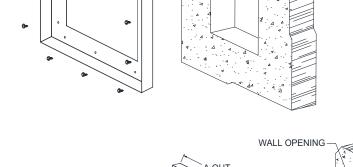
Use at least (3) suitable fasteners (not furnished) per side.

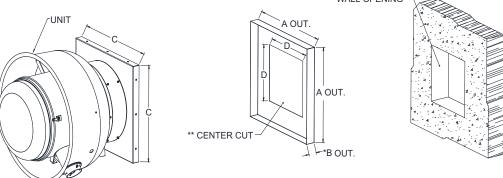
Wall bracket fits into base of fan.

Use self-drilling screws to attach unit to the wall mount bracket.

- * "B" dimension = 5" when used with damper.
- ** Centered in wall mount.







A Outer	B Outer	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"

Figure 5 - Wall Mount Bracket

Up-blast Through Wall Mount Details

Standard curb fits into base of fan.

Refer to "Curb and Ductwork" on page 6 for curb installation details.

Use self-drilling screws when attaching unit to curb.

Flashing and sealing of wall penetration done by contractor or installer.

For use with fans up to: 24" Wheel 2 HP - 1 Phase Maximum; 24" Wheel 3 HP - 3 Phase Maximum

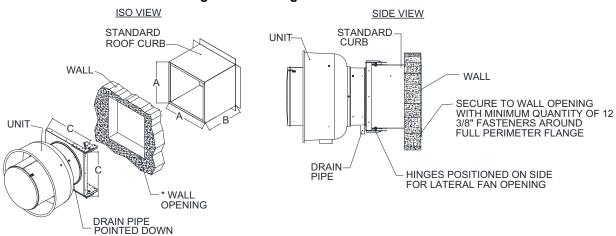


Figure 6 - Through Wall Mount Details

*Contractor or installer must flash wall to curb.

A Dimension	B Dimension	C Dimension
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"

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.

Pitched curbs are available. Specify pitch when ordering, for example: 7/12 Pitch = 30° Slope

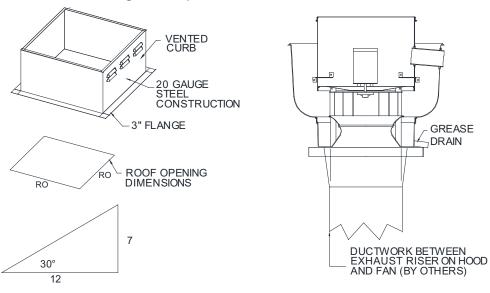
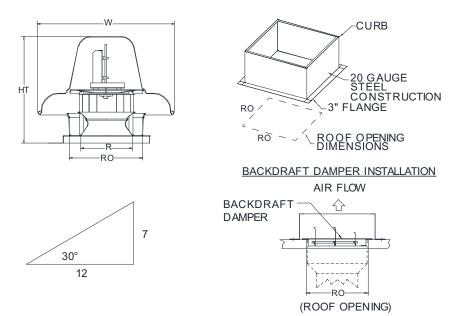


Figure 7 - Up-blast Roof Mount Details

Down-blast Installation

Pitched curbs are available. Specify pitch when ordering, for example: 7/12 Pitch = 30° Slope

Figure 8 - Down-Blast Details



Typical Hinge Kit - Centrifugal Up-blast

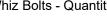
Hinge Kit Field Installation

Attention: Installer Must Supply Enough Electrical Cord to Allow the Fan to Swing Open.

- 1. If parts are not already assembled, refer to Figure 9 for assembly instructions. Assemble the fan plate and curb plate with hardware, as shown in Figure 9 Detail "A" and Detail "B".
- 2. Line up fan base edge to inside edge of fan plate, as shown in Figure 9 Detail "C". Refer to Figure 10 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). If the screws interfere with the curb, run the screws from the inside of the fan base. Refer to Figure 9 Detail "D". Verify 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 9 Detail "C". Verify all parts and hardware are secure and tight. Verify that the fan and base swings open properly, see Figure 10.

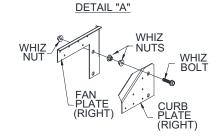
Parts List

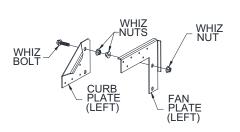
- Left and Right Fan Plates Quantity 2
- Whiz Nuts Quantity 6
- Sheet Metal Screws
- Left and Right Curb Plates Quantity 2 Whiz Bolts Quantity 2



(#14 x 3/4") - Quantity 24

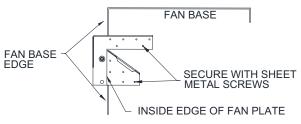
Figure 9 - Typical Hinge Kit Fan Plate and Curb Plate Details



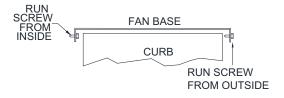


DETAIL "B"





DETAIL "D"



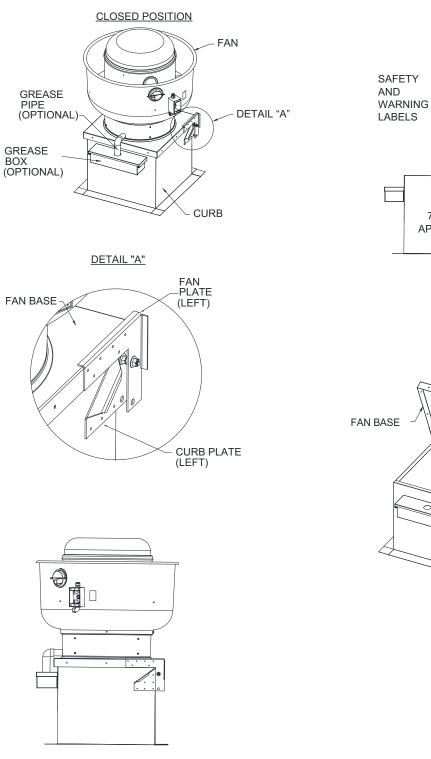
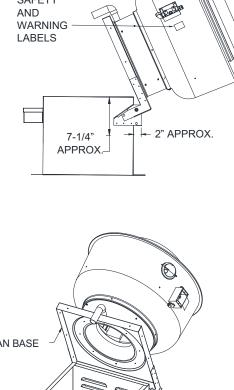


Figure 10 - Centrifugal Up-blast Hinge Kit Installation Details

Attention! Installer Must Supply Enough Electrical Cord to Allow the Fan to Swing Open.



OPEN POSITION

đ

Heavy Duty (HD) Hinge Kit Installation

Hinge Kit Field Installation

Attention: Installer Must Supply Enough Electrical Cord to Allow the Fan to Swing Open.

- 1. If parts are not already assembled, refer to **Figure 11** for assembly instructions. Assemble the fan plate and curb plate with hardware, as shown in Figure 11 Detail "A" and Detail "B".
- 2. Secure the hinge backplate to the curb with provided hardware, refer to Figure 12 Detail "B".
- 3. Line up fan base edge to inside edge of fan plate, as shown in Figure 11 Detail "C". Refer to Figure 12 detail "A" for positioning fan plate on fan base.
- 4. Secure the fan plate to the fan base using provided hardware $(1/4^{2}-20 qty 11)$. If the screws interfere with the curb, run the screws from the inside of the fan base. Refer to Figure 11 Detail "D". Verify hardware does not interfere with curb when fan swings open or closed.
- 5. Secure the curb plate to the curb using provided hardware (1/4"-20 qty 9), Figure 11 Detail "C". Verify all parts and hardware are secure and tight. Verify that the fan and base swings open properly, see Figure 12.

Parts List

- Left and Right Fan Plates Quantity 2 • •
- 3/8"-16 Whiz Nuts Quantity 6
- 1/4"-20 Whiz Bolts Quantity 20
- Left and Right Curb Plates Quantity 2 • 3/8"-16 Whiz Bolts - Quantity 2

INSIDE EDGE OF FAN PLATE

• 1/4"-20 Whiz Bolts - Quantity 20

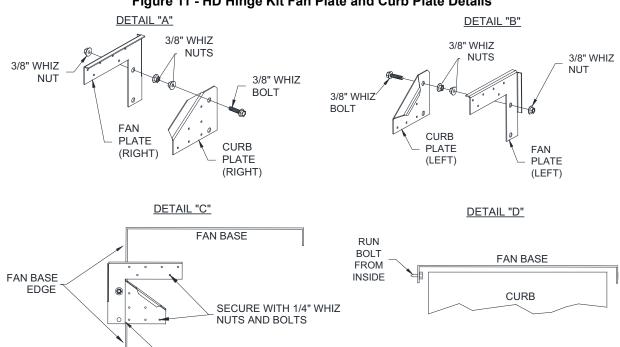
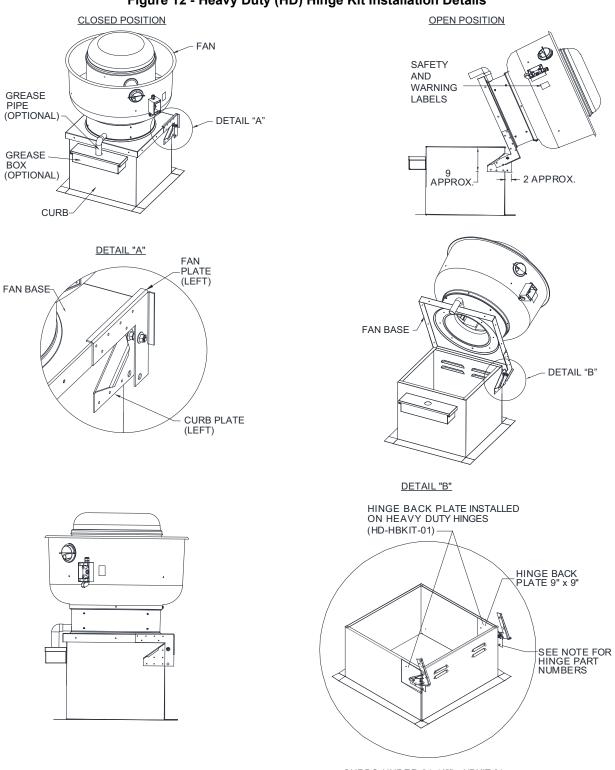


Figure 11 - HD Hinge Kit Fan Plate and Curb Plate Details



Attention! Installer Must Supply Enough Electrical Cord to Allow the Fan to Swing Open.

Figure 12 - Heavy Duty (HD) Hinge Kit Installation Details

CURBS UNDER 31-1/2" = HBKIT-01 CURBS 31-1/2" TO 38-1/2" = HD-HBKIT-01

Heavy Duty (HD) Locking Hinge Kit Installation

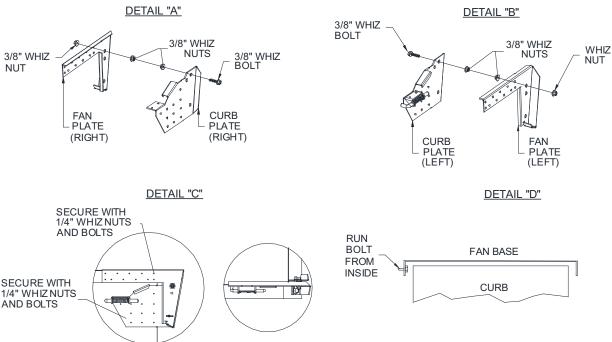
Hinge Kit Field Installation

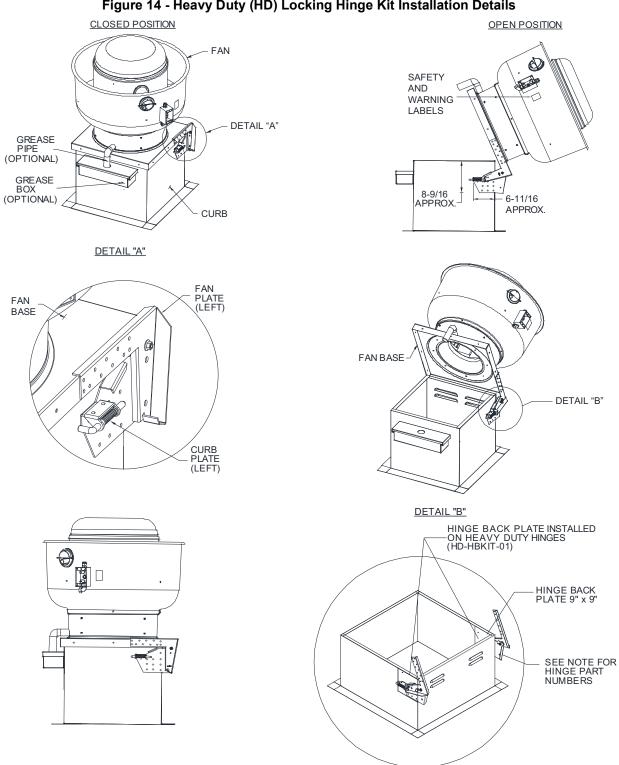
Attention: Installer Must Supply Enough Electrical Cord to Allow the Fan to Swing Open.

- 1. If parts are not already assembled, refer to Figure 13 for assembly instructions. Assemble the fan plate and curb plate with hardware, as shown in Figure 13 Detail "A" and Detail "B".
- 2. Secure the hinge backplate to the curb with provided hardware, refer to Figure 14 Detail "B".
- 3. Line up fan base edge to inside edge of fan plate, as shown in Figure 13 Detail "C". Refer to Figure 14 detail "A" for positioning fan plate on fan base.
- 4. Secure the fan plate to the fan base using provided hardware $(1/4^{2}-20 qty 11)$. If the screws interfere with the curb, run the screws from the inside of the fan base. Refer to Figure 13 Detail "D". Verify hardware does not interfere with curb when fan swings open or closed.
- 5. Secure the curb plate to the curb using provided hardware (1/4"-20 gty 11), Figure 13 Detail "C". Verify all parts and hardware are secure and tight. Verify that the fan and base swings open properly, see Figure 14.
 - Parts List
- Left and Right Fan Plates Quantity 2 •
 - 3/8"-16 Whiz Nuts Quantity 6
- 1/4"-20 Whiz Bolts Quantity 22

- Left and Right Curb Plates Quantity 2 ٠
- 3/8"-16 Whiz Bolts Quantity 2
- 1/4"-20 Whiz Bolts Quantity 22

Figure 13 - HD Locking Hinge Kit Fan Plate and Curb Plate Details





Attention! Installer Must Supply Enough Electrical Cord to Allow the Fan to Swing Open.

Figure 14 - Heavy Duty (HD) Locking Hinge Kit Installation Details

Typical Grease Box Installation

Grease Box Field Installation

- 1. Mark a mounting location 3" from the top of the curb for the grease box cover. Refer to **Figure 15** Detail "A".
- 2. Secure grease box cover to the curb using provided sheet metal screws (qty 3). Refer to **Figure 15** Detail "B".
- 3. Slide the grease box into the grease box cover lip. Refer to Figure 15 Detail "C".
- 4. Install grease pipe into grease box cover. Refer to Figure 15 Detail "D".

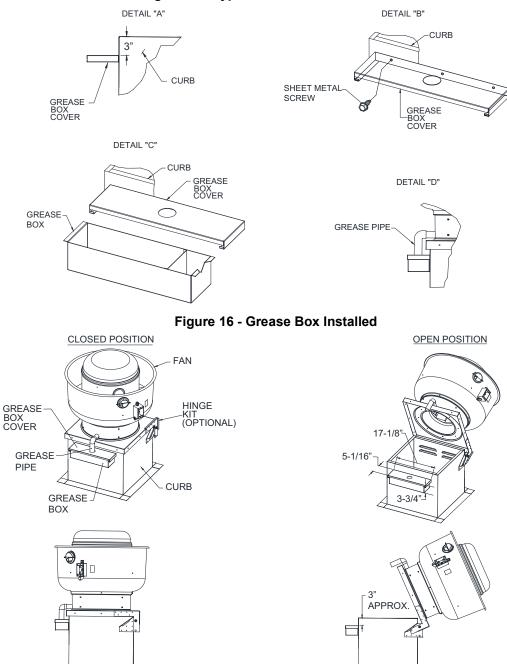


Figure 15 - Typical Grease Box Installation

Up-blast Utility Set Installation

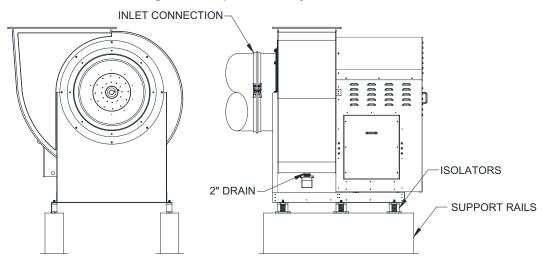
Normal temperature test belt drive – The exhaust fan must operate continuously while exhausting air at 350°F (176°C) until all fan parts have reached thermal equilibrium, and without any deteriorating effects to the fan which would cause unsafe operation.

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 driveshaft diameter may change due to motor selected Horsepower (HP)/frame size.

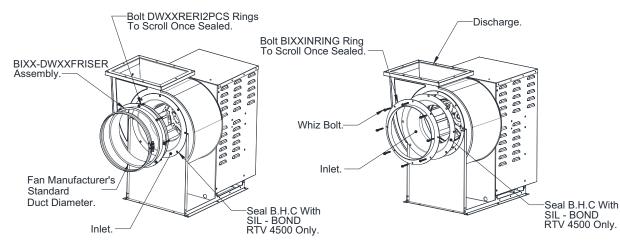
Features Roof Mounted Fans Restaurant Model UL705 and UL762 High Heat Operation Direct Drive 350°F (176°C) High Heat Operation Belt Drive 350°F (176°C) Heat Slinger Grease Classification Testing 2" Drain Motor Weather Cover Fully Sealed Scroll Housing Scroll Access Door Flange 1 = 1/4"-11 through 20" Flange 2 = 2"-24 through 36" Options Grease Box Shaft Seal Vibration Isolators Extension Inlet Adapters Inlet Riser Support Rails Rain Cap

Figure 17 - Up-blast Utility Set Installation



Up-blast Utility Set Inlet Options





Fan Size	Duct Diameter	Inlet Connection	Inlet Rings	Quantity	Duct Riser	Quantity	Whiz Bolt	Quantity
11	12"	BI11-DW12FRISER	A0028896/ DW12RERI2PCS	2	DW12RISER	1	A0005696/ 1/4"-20 x 1-1/2"	8
13	14"	BI13-DW14FRISER	A0028897/ DW14RERI2PCS	2	DW14RISER	1	A0005696/ 1/4"-20 x 1-1/2"	8
15	16"	BI15-DW16FRISER	A0028898/ DW16RERI2PCS	2	DW16RISER	1	A0005696/ 1/4"-20 x 1-1/2"	8
18	20"	BI18-DW20FRISER	A0028900/ DW20RERI2PCS	2	DW20RISER	1	A0005696/ 1/4"-20 x 1-1/2"	8
20	20"	BI20-DW20FRISER	A0028901/ DW20RERIUSBI202PCS	2	DW20RISER	1	A0005696/ 1/4"-20 x 1-1/2"	8
24	24"	BI24-DW24FRISER	A0028904/ DW24RERIUSBI242PCS	2	DW24RISER	1	A0005678/ 3/8"-16 x 1-1/2"	8
30	24"	BI30-DW24FRISER	A0028905/ 2 DW24RERIUSBI302PCS		DW24RISER	1	A0005678/ 3/8"-16 x 1-1/2"	8
36	30"	BI36-DW30FRISER	A0030879/ DW30RERIUSBI362PCS	2	DW30RISER	1	A0005678/ 3/8"-16 x 1-1/2"	8
11	12"	A0023766/BI11INRING	N/A		N/A		A0005696/ 1/4"-20 x 1-1/2"	8
13	14"	A0023767/BI13INRING	N/A		N/A		A0005696/ 1/4"-20 x 1-1/2"	8
15	16"	A0023768/BI15INRING	N/A		N/A		A0005696/ 1/4"-20 x 1-1/2"	8
18	20"	A0023769/BI18INRING	N/A		N/A		A0005696/ 1/4"-20 x 1-1/2"	8
20	20"	A0023770/BI20INRING	N/A		N/A		A0005696/ 1/4"-20 x 1-1/2"	8
24	24"	A0023771/BI24INRING	N/A		N/A		A0005678/ 3/8"-16 x 1-1/2"	8
30	24"	A0023772/BI30INRING	N/A		N/A		A0005678/ 3/8"-16 x 1-1/2"	8
36	30"	A0023773/BI36INRING	N/A		N/A		A0005678/ 3/8"-16 x 1-1/2"	8

Inlet Service Duct Option

Service duct kits allow a quick disconnect between the fan inlet and duct system.

- 1. Service duct kits come with (2) 7" long duct sections, (8) riser rings, and installation hardware.
- 2. Service duct flanges must be sealed with 3M Barrier 2000+.
- 3. Once sealed, the service duct is secured using bolt together riser rings.
- 4. The first 7" long duct section can be welded directly to existing duct systems.
- 5. If connecting to fan Manufacturer's factory duct, the first 7" long duct section may or may not be used. You may connect fan Manufacturer's standard duct directly to service duct using V-bands.

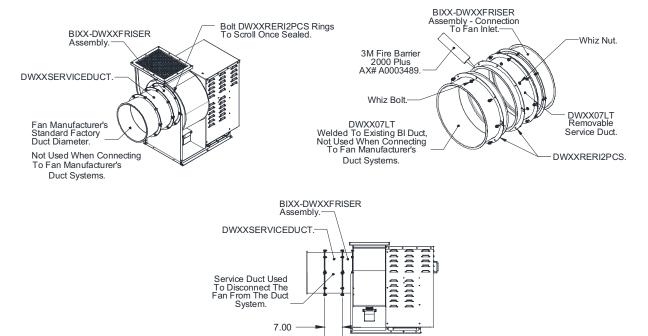


Figure 19 - Inlet Service Duct Option

Fan Size	Duct Diameter	Inlet Connection Assembly	Duct LT	Quantity	Riser Rings	Quantity	Whiz Bolt (Inches)	Quantity	Whiz Nut (Inches)	Quantity
11	12"	12SERVICEDUCTKIT	DW1207LT	2	A0028896/ DW12RERI2PCS	8	A0023684/ 1/4"-20 x 1"	16	A005690/ 1/4"-20	16
13	14"	14SERVICEDUCTKIT	DW1407LT	2	A0028897/ DW14RERI2PCS	8	A0023684/ 1/4"-20 x 1"	16	A005690/ 1/4"-20	16
15	16"	16SERVICEDUCTKIT	DW1607LT	2	A0028898/ DW16RERI2PCS	8	A0023684/ 1/4"-20 x 1"	16	A005690/ 1/4"-20	16
18	20"	20SERVICEDUCTKIT	DW2007LT	2	A0028900/ DW20RERI2PCS	8	A0023684/ 1/4"-20 x 1"	16	A005690/ 1/4"-20	16
20	20"	20SERVICEDUCTKIT	DW2007LT	2	A0028900/ DW20RERI2PCS	8	A0023684/ 1/4"-20 x 1"	16	A005690/ 1/4"-20	16
24	24"	24SERVICEDUCTKIT	DW2407LT	2	A0028903/ DW24RERI2PCS	8	A0023684/ 1/4"-20 x 1"	16	A005690/ 1/4"-20	16
30	24"	24SERVICEDUCTKIT	DW2407LT	2	A0028903/ DW24RERI2PCS	8	A0023684/ 1/4"-20 x 1"	16	A005690/ 1/4"-20	16
36	30"	30SERVICEDUCTKIT	DW3007LT	2	A0030878/ DW36RERI2PCS	8	A0024297/ 3/8"-16 x 1"	16	A005688/ 3/8"-16	16

Up-blast Utility Set

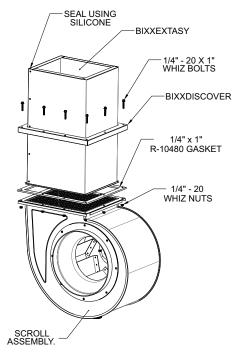


Figure 20 - Discharge Extension Options

Hardware Counts					
Hardware # Bolt/Nut	Hardware Quantity				
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	Н	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"	BI26DISCOVER	

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 Authority Having Jurisdictions (AHJs) comply with IMC, NFPA 96 and UL 762 standards. Standard UL 762, "Power Roof Ventilators for Restaurant Exhaust Appliances", covers the utility set high temperature and grease fire testing. NFPA 96 "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 UL 762:

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 of section 1.1, it states "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 for 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 UL 1978 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).

Manufacturer Recommendations for Indoor Installation:

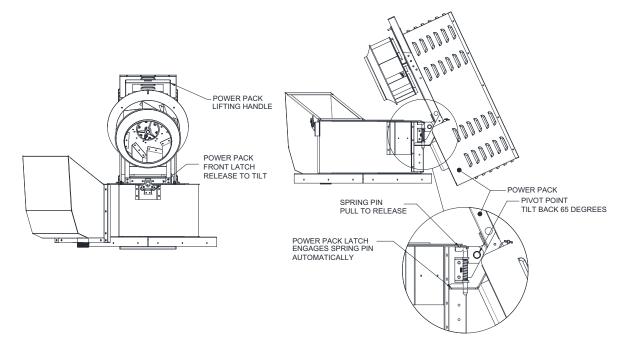
- The fan inlet and outlet must be connected to the ducts using companion flanges and high temperature (1500F) gaskets or by a system specifically listed for such use, such as UL 1978 or UL 2221 listed duct systems.
- 2. Install the fan where there is room for service and removal.
- 3. Usually, the duct 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 noncombustibles.
- 9. All wiring and electrical equipment must comply with NFPA 70, National Electrical Code.

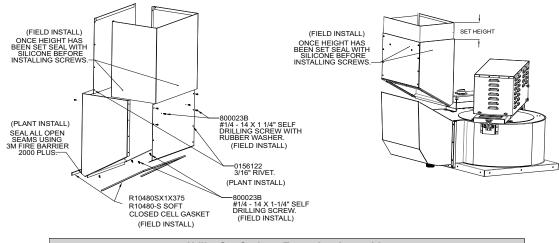
Up-blast Curb Mounted Utility Set Hinging Instructions

- 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.

NOTE: Utility sets may not be wall mounted.

Figure 21 - Up-blast Curb Mounted Utility Set Hinge





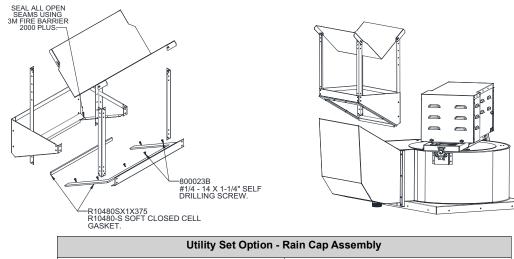
Up-blast Curb Mounted Utility Set Discharge Extension Option

Figure 22 - 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

Figure 23 - Rain Cap Option



Utility Set Option - Rain Cap Assembly					
Part Number	Description				
RE11RAINCAP ASSY	RE11 - Extension Assembly Option				
RE13RAINCAP ASSY	RE13 - Extension Assembly Option				
RE15RAINCAP ASSY	RE15 - Extension Assembly Option				
RE18RAINCAP ASSY	RE18 - Extension Assembly Option				
RE20RAINCAP ASSY	RE20 - Extension Assembly Option				
RE24RAINCAP ASSY	RE24 - Extension Assembly Option				

Square Inline Mounting Configurations

IMPORTANT: Models containing cooling tubes and drains should not be mounted vertically. Drains must be oriented in the 6 o'clock position.

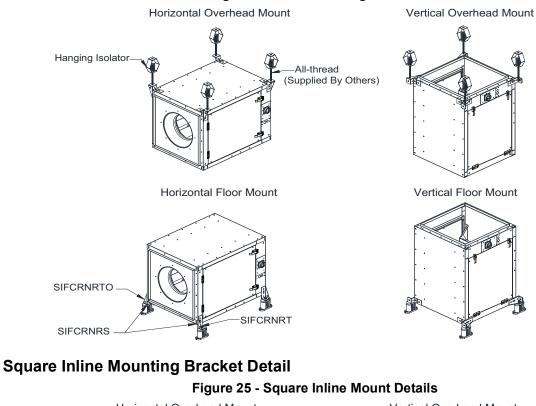
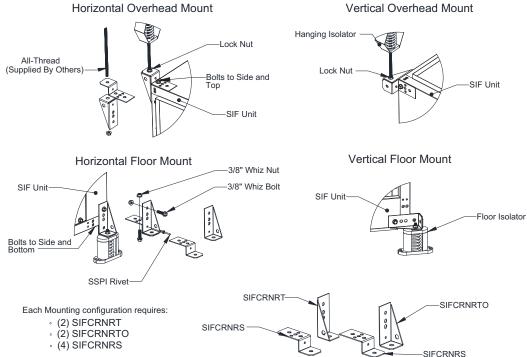
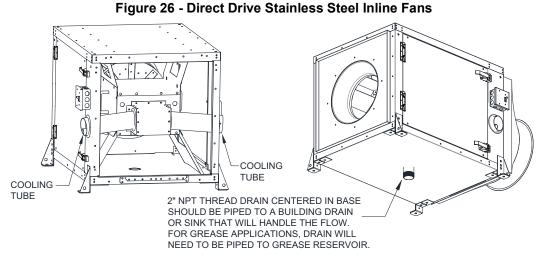


Figure 24 - Mount Configurations



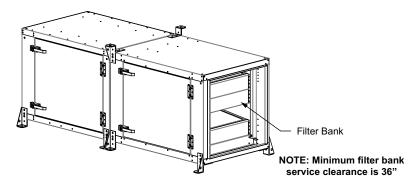
Square Inline Fan Drain



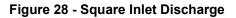
*FAN MUST BE INSTALLED WITH DRAIN POINTING DOWN.

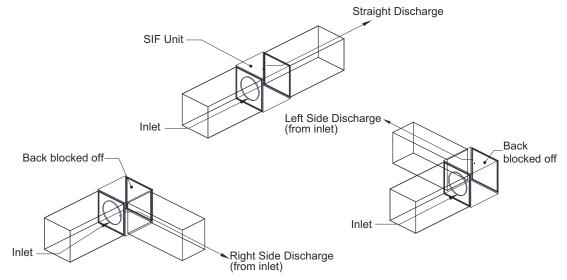
Square Inline Filter Bank Option

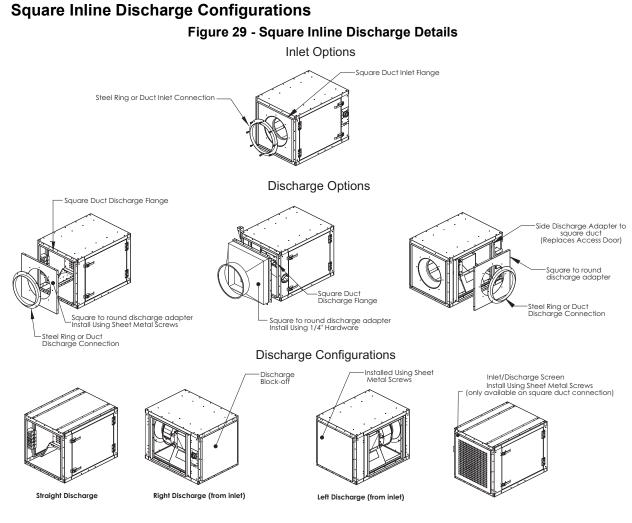
Figure 27 - Filter Bank Option











NOTE: If the fan manufacturer's duct is not used, black iron grease duct will need to be welded directly to the unit.

Inlet/Outlet Connections				
Fan Size	Square Duct Dimension	Duct Diameter	Steel Ring O.D.	
9-10	12" x 12"	10"	N/A	
11	16" x 16"	12"	12.5"	
13	18" x 18"	14"	13.5"	
15	23" x 23"	16"	15.25"	
18	24" x 24"	20"	18.5"	
20	28" x 28"	20"	19.625"	
24	35" x 35"	24"	25.375"	
30	42" x 42"	24"	24.375"	
36	48" x 48"	30"	30.5"	

ELECTRICAL

WARNING!!

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

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

Electrical wiring (**Table 3**) and connections must be made in accordance with local ordinances and the National Electric Code, ANSI/NFPA 70. Verify the voltage and phase of the power supply, and the wire amperage capacity is in accordance with the unit nameplate. For additional safety information, refer to AMCA publication 410-96, *Recommended Safety Practices for Users and Installers of Industrial and Commercial Fans.*

- 1. Always disconnect power before working on or near this equipment. Lock and tag the disconnect switch and/or breaker to prevent accidental power-up.
- 2. A dedicated branch circuit should supply the motor circuit with short circuit protection according to the National Electric Code. This dedicated branch should run to the junction box.
- 3. A disconnect switch is shipped with every fan. The switch maybe located on the exterior of the fan or in the interior of the fan.On down-blast direct drive fans, the disconnect function is built into the speed controller.
- 4. Verify that the power source is compatible with the requirements of your equipment. The nameplate identifies the **proper phase and voltage** of the equipment.
- 5. Before connecting the unit to the building's power source, verify that the power source wiring is deenergized. Refer to schematics.
- 6. Secure the power cable to prevent contact with sharp objects.
- 7. Do not kink power cable and never allow the cable to encounter oil, grease, hot surfaces, or chemicals.
- 8. Before powering up the unit, make sure that the fan rotates freely. Make sure that the interior of the unit is free of loose debris or shipping materials.
- 9. If any of the original wire supplied with the unit must be replaced, it must be replaced with type THHN 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.

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

Table 3	- Copper	Wire	Ampacity
---------	----------	------	----------

Permanent Split Capacitor (PSC) Motor Speed Control

Some single-phase direct-drive fans contain speed controls that regulate the amount of voltage going to the motor. Specific PSC motors must be used in conjunction with speed controls. The speed control has a knob (**Figure 30**) with an off position along with high to low range. At high speed, the speed control allows all of the line voltage to pass directly to the motor.

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

Figure 30 - PSC Motor Speed Control



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

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

Motorized Intake Damper

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

Electronically Commutated Motor (ECM) Speed Control

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

External PWM Signal

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

Unit Mount Controller

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

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

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

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

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

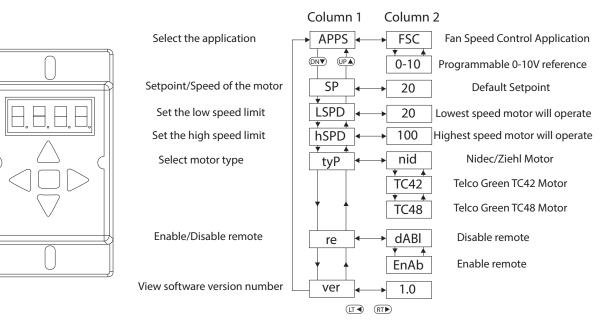


Figure 31 - RTC Speed Controller and Menu

External PWM Signal

Figure 32 illustrates ECM fan wiring. 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 for wiring 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.
- Refer to wiring schematics to verify wiring and connections.

Figure 32 - ECM Fan Wiring

Exhaust Fan Wiring Shown. Supply Fan Wiring Will Vary. Remove Top Cover to Access Wiring. Cooling Tube Тор Power and Cover Communication STP Wiring Wiring (Provided) Current Power Sensor Wiring to (optional) Breaker Fan Motor J-Box-STP Wiring Should be Connected to the ECPM03 PWM Signal Terminals (PxA/PxB)

Motor Speed Controller (MSC) Installation

The Motor Speed Controller (MSC) is a versatile device able to output various signal types to many different Electrically Commutated Motors (ECMs). The MSC signal output types can be selected under the 'Motor Type' section of the MSC menu. The MSC may be installed in a fan, remotely in a kitchen space, or in a mechanical room. While this device can be mounted remotely and powered using 24V, it may also be mounted with the fan where it will be exposed to higher voltages. If installed in the fan, the electrical installation must be carried out according to the appropriate regulations (e.g., cable cross-sections, circuit breaker, protective earth [PE] connection). National and local codes must be followed during the installation process.

The MSC board may be powered through a 120VAC/24VAC CLASS 2 transformer, 120V AC/24V DC CLASS 2 power supply, or through MODBUS connections.

The MSC contains static sensitive components. Therefore, you must handle with care to avoid damage to these components. All operations concerning installation, commissioning, and maintenance must be carried out by qualified, skilled personnel who are familiar with the installation, assembly, commissioning, and operation of the electronic board and the application for which it is being used.

Ensure proper handling and avoid excessive mechanical stress. Do not bend any components when handling or installing component. **Do not touch any electronic components or contacts**.

Precautions must be adhered to during installation, testing, servicing, and repairing of this board. Component damage may result if proper procedures are not followed.

Do not install the MSC where it is subjected to adverse environmental conditions such as combustibles, oils, hazardous vapors, corrosive chemicals, excessive dust, moisture, direct sunlight, or extreme temperatures. When removing or installing the MSC to the j-box, verify the gasket is present. All electrical connections for the MSC are located on the backside of the controller. Refer to **Figure 33** for details on installation and electrical connections. When the micro USB programming port is not in use, place the weather-seal plug into the port location.

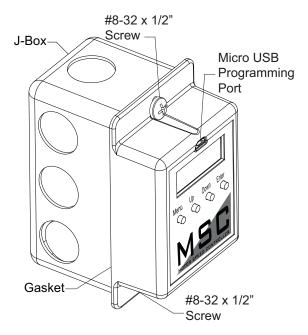
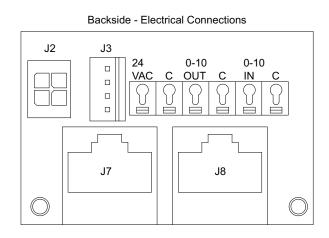


Figure 33 - Installation/Electrical Connections



MSC Controls Overview

There are four buttons to navigate through the menu screens, refer to Figure 34.

Press the **MENU** button to access menu settings/parameters, pressing **MENU** will also back out of the current menu screen. To scroll through menus, use **UP** and **DOWN** buttons. Press the **ENTER** button to change setting/parameter selection.

To enter password, press MENU, then press **ENTER** when "Board Config" is displayed. Use **UP** and **DOWN** to scroll through numbers, press **ENTER** to advance to the next numerical setting. To save changes, press **MENU** until the screen displays "SAVE CHANGES? [ENTER] TO SAVE." Press the ENTER button to save changes.

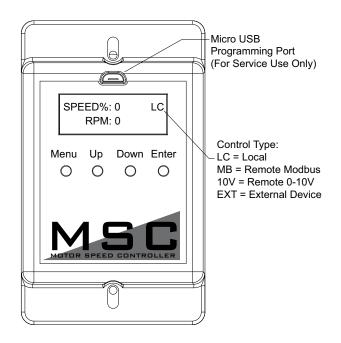


Figure 34 - MSC Front Detail View

MSC Menu

Board Config - Password (default is 0225)

- **Motor Type** User may change motor type between Nidec, Telco 42, Telco 48, Ziehl, 0-10V, Other.
- Control Type This setting adjusts how the fan will be controlled.
 - Local The fan will be controlled by the MSC.
 - **Remote Modbus** The fan will be controlled by another master board through the MSC. A connection between the 0-10V Out to 0-10V In must be made for start command.
 - **Remote 0-10V** The fan will be controlled by an external 0-10V signal.
- **Speed Settings** Provides access to speed and voltage settings.
 - Low Speed Adjustable speed from 20% up to high speed setting, or 0-10V. Setting cannot go above High Speed parameter.
 - **High Speed** Adjustable speed from 100% down to low speed setting, or 10-0V. Setting cannot go below Low Speed parameter.
 - Set Speed% Adjustable speed range is dependent on Low Speed and High Speed settings. This controls the output of the motor.
 - Voltage Range Only available when Motor Type "OTHER" is selected. Default setting is 24V. 5V, and 10V are also available.

- Modbus # Adjustable Modbus ID. Exhaust Fan range 11-18, Supply Fan range 21 or 22. A VFD and MSC cannot use the same Modbus #.
- Options
 - Feedback Fault If set to ENABLED, the MSC will monitor RPM feedback. If the MSC does not receive data for 30 seconds or 70% of the expected RPM, this fault will be displayed. Ziehl motors do not provide feedback.
 - **2 Speed** The 0-10V output cannot be used when the 2 Speed or Manual Speed options are On, or if the "Control Type" is set to Modbus. When the 0-10V OUT and 0-10V IN terminals are **not** jumped together, the fan will operate at low speed. When 0-10V OUT and 0-10V IN terminals are jumped together, the fan will operate at high speed.
 - Analog Speed The user may enable/disable the option, and calibrate a potentiometer for proper operation that is connected between the 0-10V OUT and 0-10V IN terminals. When enabled, you must calibrate the potentiometer. Follow the MSC's on-screen instructions. The speed will be adjustable between 0V (low speed) to 10V (high speed).
 - Input Threshold When control type is set to Remote 0-10V, an input threshold will be created for motor control. Refer to Figure 35 on page 36 for threshold examples.
 - **Zero Operation** The user may select how the motor will operate when the 0-10V input is at 0V. The options will be Off or Low Speed (default).
 - **Threshold** Increasing the threshold value will allow for the device to hold its voltage/RPM output while the input is between the 0 threshold value.
- Restore Settings Provides access to restore factory settings, and test & balance settings.
 - Factory Settings This will reset all values back to factory settings.
 - **T & B Settings** This will reset all values back to last saved test & balance settings.
- **Change Password** Users may update the password setting to their own. Password 0225 will also be stored for backup. Both passwords will allow users to enter "Board Config" settings.

Software Version - Displays the current software version installed on the board.

Faults - This provides access to "Fault History," "Fault Totals," and "Clear Faults."

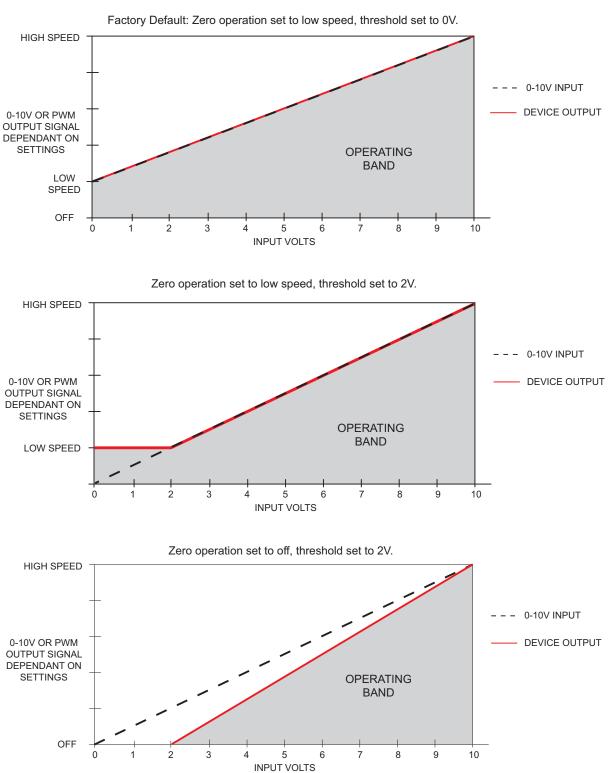
- **Fault History** Displays fault history and board reboots in chronological order. Possible displayed faults are:
 - **No Faults** There are no active faults with the system.
 - Feedback Fault Only displayed for motors with feedback capabilities.
 - **Reboot** Any time the fan goes from OFF to ON, this "fault" will be logged. This fault will only display in "Fault History."
 - Modbus Issue with Modbus communication between the MSC and master board.
 - Variable Device Fault When "Analog Speed" is selected and a potentiometer is connected, if the voltage drops below 1V, this fault will be displayed.
- Fault Totals Displays amount of faults for Modbus, Feedback, Var Device, Reboot, and Total Faults.
- Clear Faults Users may clear all faults from the board.

Service - This provides access to service settings. Password: 1234

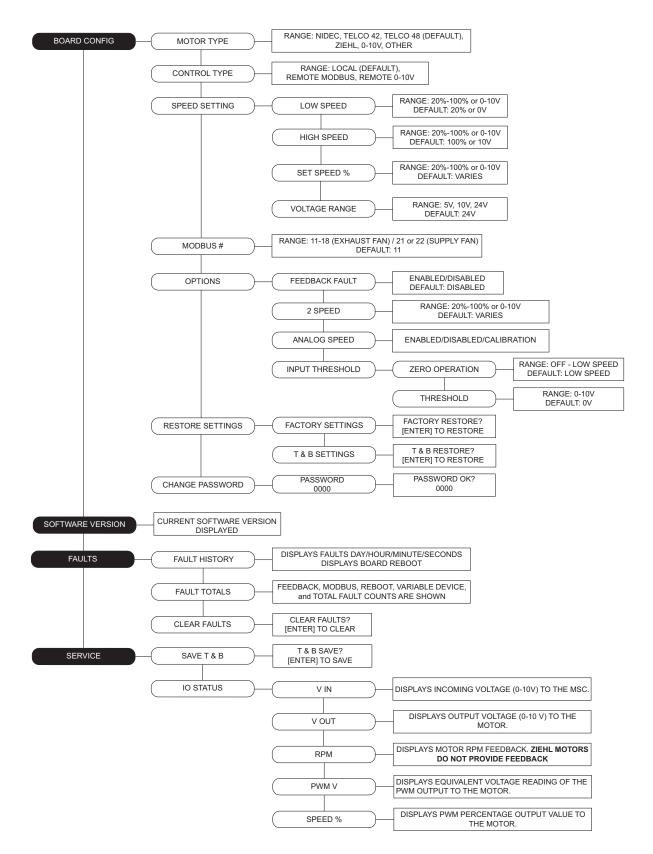
- Save T & B After the test & balance process has been completed, save adjustments under this menu.
- **IO Status** Provides access to information about the inputs and outputs of the MSC board.
 - V In Displays the incoming voltage (0-10V) to the MSC.
 - **V Out** Displays the output voltage (0-10V) to the motor.
 - RPM Displays motor RPM feedback. Ziehl motors do not provide feedback.
 - **PWM V** Displays equivalent voltage reading of the PWM output to the motor.
 - Speed% Displays PWM percentage output value to the motor.

Input Threshold





MSC Menu Tree



Fan to Building Wiring Connection

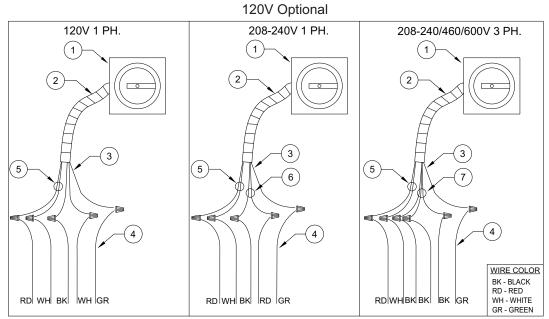


Figure 36 - Wiring Connection Details

- 1. Disconnect Switch
- 2. Galflex Conduit (In Unit)
- 3. Factory Wiring
- 4. Field Supplied Wiring From building power or pre-wired control panel.
- 5. 120V Single Phase Standing Power
- 6. 208-240 Single Phase
- 7. Three Phase

Variable Frequency Drive (VFD)

WARNING!!

- Before installing the VFD drive, ensure the input power supply to the drive is OFF.

- The power supply and motor wiring of the VFD must be completed by a qualified electrician.

- The VFD is factory programmed, only change if replaced or ordered separately.

Consult the VFD manual and all documentation shipped with the unit for proper installation and wiring of the VFD. The VFD has been programmed by the factory with ordered specific parameters. Use **Table 4** as a guide during installation.

Check Description Off The installation environment conforms to the VFD manual. The drive is mounted securely. Space around the drive meets the drive's specification for cooling. The motor and driven equipment are ready to start. The drive is properly grounded. The input power voltage matches the drive's nominal input voltage. The input power connections at L1, L2, and L3 are connected and tight. Verify correct size crimp fitting is used. The input power protection is installed. The motor power connection at U, V, and W are connected and tight. Verify correct size crimp fitting is used. The input, motor, and control wiring are run in separate conduit runs. The control wiring is connected and tight. NO tools or foreign objects (such as drill shavings) are in the drive. NO alternative power source for the motor (such as a bypass connection) is connected - NO voltage is applied to the output of the drive.

Table 4 - VFD Installation Check List

VFD Installation

Input AC Power

- Circuit breakers feeding the VFDs are recommended to be thermal-magnetic and fast-acting. They should be sized based on the VFD amperage. Refer to **Table 5 on page 42**. See installation schematic for exact breaker sizing.
- Every VFD should receive power from its own breaker. If multiple VFDs are to be combined on the same breaker, each drive should have its own protection measure (fuses or miniature circuit breaker) downstream from the breaker.
- Input AC line wires should be routed in conduit from the breaker panel to the drives. AC input power to multiple VFDs can be run in a single conduit if needed. **Do not combine input and output power cables in the same conduit.**
- The VFD should be grounded on the terminal marked PE. A separate insulated ground wire must be provided to each VFD from the electrical panel. This will reduce the noise being radiated in other equipment.

ATTENTION: Do not connect incoming AC power to output terminals U, V, W. Severe damage to the drive will result. Input power must always be wired to the input L terminal connections (L1, L2, L3).

VFD Output Power

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

VFD Programming

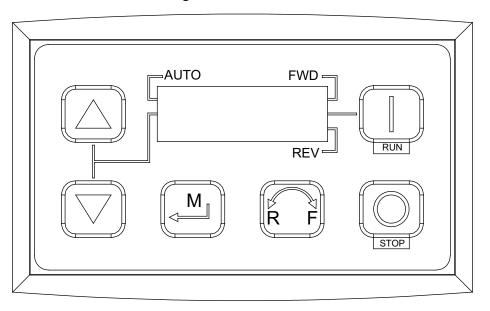
Programming

- 1. The Drive should be programmed for the proper motor voltage. P107 is set to 0 (Low) if motor voltage is 120V AC, 208V AC or 400V AC. P107 is set to 1 (High) if the 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 (refer to **Table 5 on page 42**).

To enter the PROGRAM mode to access the parameters:

- 1. Use the buttons on the VFD screen (**Figure 37**) to adjust VFD settings. Press the Mode (M) button. This will activate the password prompt (PASS).
- 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 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 to access the parameters again.

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





NOTE: When a parameter is changed in the drive, the drive should be de-energized. Wait for the display to go completely dark. Once the display is completely dark, the drive can be re-energized.

ACTECH SMV VFD

Table 5 - Cross-Reference

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 1.5 ESV112N01SXB 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 Votts 10 30 Input Amps 10 Input Amps 30 Amps Breaker 30 0.5 ESV371N02YXB 240V X X 8.8 5 4.2 15 15 1 ESV751N02YXB 240V X X 13.3 8.1 7 25 15 3 ESV22N02YXB 240V X X 17.1 10.8 9.6 30 20 5 ESV42N02YXB 240V - X - 26	НР	Part Number	Volts	1Ø Input	3Ø Input	Input Amps 1Ø 120V AC	Input Amps 1Ø 240V AC	Output Amps	Breaker 1Ø 120V AC	Breaker 1Ø 240V AC
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30 ESV223N06TXB 600V - X - 36 32 - 60										

START-UP OPERATION

Before starting up or operating the unit, verify all fasteners are secure and tight. Check the set screw in the wheel hub, bearings, and the fan sheaves (pulleys). With power **OFF** to the unit or before connecting the unit to power, turn the fan wheel by hand. Verify it is not striking the inlet or any obstructions. If necessary, re-center.

Special Tools Required: Standard Hand Tools, AC Voltage Meter, Tachometer

Start-up Procedure

- 1. Check all electrical connections are secure and tight.
- 2. Inspect the condition of the intake damper and damper linkage, if applicable.
- 3. Inspect the air-stream for obstructions or debris in wheel.
- 4. Compare the supplied **motor voltage** with the fan's nameplate voltage. If this does not match, correct the problem.
- 5. Place the external disconnect to the **ON** position to start the unit. Immediately place the disconnect switch off. **Check the rotation of the fan** 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.
- 6. When the fan is started, observe the operation and check for any unusual noises.
- 7. Place the external disconnect switch back to the ON position. The system should be in full operation with all ducts attached. Measure the system airflow. The motor sheave (pulley) is variable pitch and allows for an increase or decrease of the fan RPM. If an adjustment is needed, refer to "Pulley Adjustment" on page 44. Refer to "Pulley Combination Chart" on page 47 for adjustment specifications.
- 8. 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. Refer to "Troubleshooting" on page 48 for more information.
- 9. Measure and record the **voltage** and **amperage** to the motor. Compare with the motor's nameplate to determine if the motor is operating under safe load conditions. Once the RPM of the ventilator has been properly set, disconnect power. Re-check belt tension and pulley alignment, refer to "**Pulley Alignment/Proper Belt Tension**" on page 45.

Pulley Adjustment

The adjustable motor pulley is factory set for the RPM specified (**Table 6**). Speed can be increased by closing or decreased by opening the adjustable motor sheave. Two groove variable pitch pulleys must be adjusted to an equal number of turns open or closed. Any increase in speed represents a substantial increase in horsepower required by the unit. Motor amperage should always be checked to avoid serious damage to the motor when the speed is varied. Always torque set screws according to the torque specifications shown in **Figure 38**.

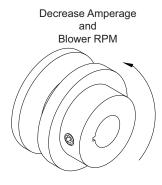


Figure	38 -	Adjustable	Pulley
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Setscrew Thread Size	Torque (in-lbs)
No. 10 (bushing)	32
1/4" (bushing)	72
5/16"	130

Table 6 - Maximum RPM and HP Chart

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

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

Pulley Alignment/Proper Belt Tension

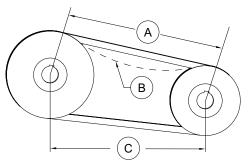
- 1. Belts tend to stretch and settle into pulleys after an initial start-up sequence. **Do not tension belts by changing the setting of the motor pulley**, this will change the fan speed and may damage the motor.
 - To re-tension belts, turn OFF power to the fan motor.
 - Loosen all fasteners that hold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

Belt tension examples:

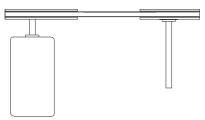
- Belt span 12" = 3/16" deflection
- Belt span 32" = 1/2" deflection

Figure 39 - Pulley Alignment/Belt Tension

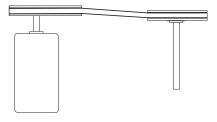
- A. Belt Span Length
- B. Deflection
- C. Center Distance



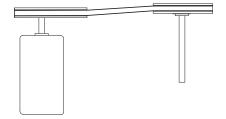
Correct



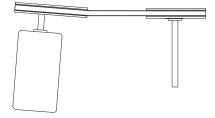
Incorrect



Incorrect



Incorrect



Bushing Information

Refer to **Figure 40** for fan bushing assembly details. **Bushing type is stamped on the face of the bushing.**

- 1. Place bushing key into bushing slot (A), excludes H bushing.
- 2. Install bushing into wheel hub. Align bushing key with hub keyway (B).
- 3. Use blue Loctite on the mounting bolts.
- 4. Install wheel assembly so that the bushing keyway (C) is aligned with the motor's shaft key (D).
- 5. For Direct Drive motors, make sure the bushing is flush to the tip of the motor shaft.
- 6. For Belt Drive motors, make sure the wheel is properly aligned to the inlet.
- 7. Tighten set screw to lock shaft key in place. Install bolts and torque to proper setting listed in **Table 7**.
- 8. There are threaded holes provided on the bushing. These holes are for removing the bushing when required.

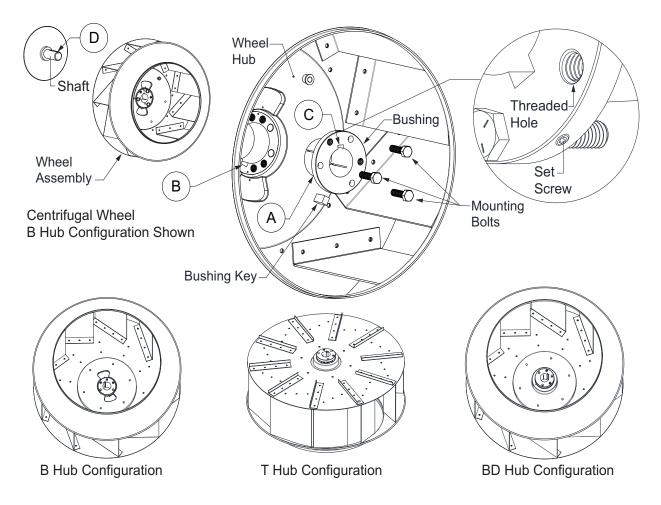


Figure 40 - Bushing Details

Bushing Type	Outer Diameter	Bolt Size	Torque (In-Ibs)	Set-Screw (in-lbs)
Н	2-1/2"	1/4" X 3/4"	95	17
P1	3"	5/16" X 1"	192	65
Q1	4-1/8"	3/8" X 1-1/4"	348	115

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											
			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 AX BELTS		MOTOR PULLEY 1VL40	Dd1 2.4	Dd2 3.4	Pd1	Pd2 3.6									
AX BELIS		1VL40	2.4 Open	3.4	2.6	3.6	TUDNS	ON MOTOR	DUILLEY				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	1	
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	1	
AK66	6.2	6.4	701	728	755	782	809	836	863	889	916	943	970	1	
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	J	
2 to 5 HP		MOTOR PULLEY	Dd1	Dd2	Pd1	Pd2									
BX BELTS		2VP42	2.9	3.9	3	Pd2 4									
DA DEETO		200.02	Open	5.5	2			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 2BK60H	6.4 5.4	6.7 5.7	772 908	794 933	815 958	837 984	858 1009	880 1034	901 1059	923 1084	944 1110	965 1135	987 1160	1008 1185	1030 1211
2BK55H	5.4 4.9	5.2	908	933	958	984 1078	1009	1034	1059	1084	1110	1135	1160	1185	1211 1327
2BK50H	4.9	4.7	1101	1023	1162	1193	1223	1254	1285	1315	1210	1376	1272	1438	1468
		1		1				1					1		
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 2BK90H	9.4 8.4	9.7 8.7	836	854	871	889	907	925	943	960	978	996	1014	1031	1049
LDICOUT					972	991	1011	1031	1051	1071	1091	1110	1130	1150	1170
	7.4		932 1053	952 1075	972 1098	991 1120	1011	1031	1051	1071	1091	1110	1130	1150	1170
2BK80H	7.4	7.7	1053	952 1075	972 1098	991 1120	1011 1143	1031 1165	1051 1187	1071 1210	1091 1232	1110 1255	1130 1277	1150 1299	1170 1322
	7.4			1075 Dd2											
2BK80H	7.4	7.7	1053 Dd1 2.9	1075	1098	1120		1165	1187	1210					1322
2BK80H 3 to 5 HP BX BELTS		7.7 MOTOR PULLEY 2VP42	1053 Dd1 2.9 Open	1075 Dd2 3.9	1098 Pd1 3	1120 Pd2 4	1143	1165 TURNS	1187 ON MOTOR	1210 PULLEY	1232	1255	1277	1299	1322 Closed
2BK80H 3 to 5 HP BX BELTS BLOWER PULLEY	DATUM DIAMETER	7.7 MOTOR PULLEY 2VP42 PITCH DIAMETER	1053 Dd1 2.9 Open 6	1075 Dd2 3.9 5 1/2	1098 Pd1 3 5	1120 Pd2 4 4 1/2	4	1165 TURNS 3 1/2	1187 ON MOTOR 3	1210 PULLEY 2 1/2	1232 2	1255	1277	1299 1/2	1322 Closed 0
2BK80H 3 to 5 HP BX BELTS BLOWER PULLEY 2B5V278	DATUM DIAMETER 27.8	7.7 MOTOR PULLEY 2VP42 PITCH DIAMETER 28.1	1053 Dd1 2.9 Open 6 184	1075 Dd2 3.9 5 1/2 189	1098 Pd1 3 5 194	1120 Pd2 4 4 1/2 200	1143 4 205	1165 TURNS 3 1/2 210	1187 ON MOTOR 3 215	1210 PULLEY 2 1/2 220	1232 2 225	1255 1 1/2 230	1277 1 235	1299 1/2 240	1322 Closed 0 246
2BK80H 3 to 5 HP BX BELTS BLOWER PULLEY	DATUM DIAMETER 27.8 25	7.7 MOTOR PULLEY 2VP42 PITCH DIAMETER 28.1 25.3	1053 Dd1 2.9 Open 6 184 205	1075 Dd2 3.9 5 1/2 189 210	1098 Pd1 3 5 194 216	1120 Pd2 4 4 1/2 200 222	1143 4 205 227	TURNS 3 1/2 210 233	1187 ON MOTOR 3 215 239	1210 PULLEY 2 1/2 220 244	2 225 250	1255 1 1/2 230 256	1277	1299 1/2 240 267	1322 Closed 0 246 273
2BK80H 3 to 5 HP BX BELTS BLOWER PULLEY 2B5V278 2B5V250	DATUM DIAMETER 27.8	7.7 MOTOR PULLEY 2VP42 PITCH DIAMETER 28.1	1053 Dd1 2.9 Open 6 184	1075 Dd2 3.9 5 1/2 189	1098 Pd1 3 5 194	1120 Pd2 4 4 1/2 200	1143 4 205	1165 TURNS 3 1/2 210	1187 ON MOTOR 3 215	1210 PULLEY 2 1/2 220	1232 2 225	1255 1 1/2 230	1277 1 235 261	1299 1/2 240	1322 Closed 0 246
2BK80H 3 to 5 HP BX BELTS BLOWER PULLEY 2BSV278 2BSV278 2BSV250 2BSV234	DATUM DIAMETER 27.8 25 23.4	7.7 MOTOR PULLEY 2VP42 PITCH DIAMETER 28.1 25.3 23.7	1053 Dd1 2.9 Open 6 184 205 218	1075 Dd2 3.9 5 1/2 189 210 224	1098 Pd1 3 5 194 216 230	1120 Pd2 4 4 1/2 200 222 237	4 205 227 243	TURNS 3 1/2 210 233 249	1187 ON MOTOR 3 215 239 255	1210 PULLEY 2 1/2 220 244 261	1232 2 225 250 267	1255 1 1/2 230 256 273	1277 1 235 261 279	1299 1/2 240 267 285 333 361	Closed 0 246 273 291
2BK80H 3 to 5 HP BX BELTS BLOWER PULLEY 2BSV278 2BSV250 2BSV250 2BSV234 2BSV200	DATUM DIAMETER 27.8 25 23.4 20 18.4 16	7.7 MOTOR PULLEY 2VP42 PITCH DIAMETER 28.1 25.3 23.7 20.3 18.7 16.3	1053 Dd1 2.9 Open 6 184 205 218 255 277 317	1075 Dd2 3.9 5 1/2 189 210 224 262 284 326	1098 Pd1 3 5 194 216 230 269 292 335	1120 Pd2 4 4 1/2 200 222 237 276 300 344	4 205 227 243 283 307 353	TURNS 3 1/2 210 233 249 290 315 362	1187 ON MOTOR 3 215 239 255 297 323 370	1210 PULLEY 2 1/2 220 244 261 304 331 379	2 225 250 267 312 338 388	1255 1 1/2 230 256 273 319 346 397	1277 1 235 261 279 326 354 406	1299 1/2 240 267 285 333 361 414	Closed 0 246 273 291 340 369 423
2BK80H 3 to 5 HP BX BELTS BLOWER PULLEY 2B5V278 2B5V234 2B5V234 2B5V20 2B5V14 2B5V160 2B5V154	DATUM DIAMETER 27.8 25 23.4 20 18.4 16 15.4	7.7 MOTOR PULLEY 2VP42 PITCH DIAMETER 28.1 25.3 23.7 20.3 18.7 16.3 15.7	1053 Dd1 2.9 Open 6 184 205 218 255 277 317 330	1075 Dd2 3.9 5 1/2 189 210 224 262 284 326 339	1098 Pd1 3 5 194 216 230 269 292 335 348	1120 Pd2 4 200 222 237 276 300 344 357	4 205 227 243 283 307 353 366	TURNS 3 1/2 210 233 249 290 315 362 375	1187 ON MOTOR 3 215 239 255 297 323 370 385	1210 PULLEY 2 1/2 220 244 304 331 379 394	2 225 250 250 312 338 388 403	1255 1 1/2 230 256 273 319 346 397 412	1277 1 235 261 279 326 354 406 421	1/2 240 267 285 333 361 414 430	Closed 0 246 273 291 340 369 423 439
28K80H 3 to 5 HP BX BELTS BLOWER PULLEY 285V278 285V250 285V250 285V24 285V20 285V184 285V160 285V136	DATUM DIAMETER 27.8 25 23.4 20 18.4 16 15.4 15.4 12.6	7.7 MOTOR PULLEY 2VP42 PITCH DIAMETER 28.1 25.3 23.7 20.3 18.7 16.3 15.7 12.9	1053 Dd1 2.9 Open 6 184 205 218 255 277 317 330 401	1075 Dd2 3.9 5 1/2 189 210 224 262 284 326 339 412	1098 Pd1 3 5 194 216 230 269 292 335 348 423	1120 Pd2 4 4 1/2 200 222 237 276 300 344 357 435	4 205 227 243 307 353 366 446	11165 TURNS 3 1/2 210 233 249 290 315 362 375 457	1187 ON MOTOR 3 215 239 255 297 323 370 385 468	1210 PULLEY 2 1/2 220 244 261 304 331 379 394 479	2 225 250 267 312 338 388 403 490	1255 1 1/2 230 256 273 319 346 397 412 501	1277 1 235 261 279 326 354 406 421 513	1299 1/2 240 267 285 333 361 414 430 524	Closed 0 246 273 291 340 369 423 439 535
28K80H 3 to 5 HP BX BELTS BLOWER PULLEY 285V278 285V250 285V254 285V250 285V184 285V106 285V134 285V136 285V126	DATUM DIAMETER 27.8 25 23.4 20 18.4 16 15.4 12.6 12.4	7.7 MOTOR PULLEY 2VP42 PITCH DIAMETER 28.1 25.3 23.7 20.3 18.7 16.3 15.7 12.9 12.7	053 Dd1 2.9 Open 6 184 205 218 255 277 317 330 401 407	1075 Dd2 3.9 51/2 189 210 224 262 284 326 339 412 419	1098 Pd1 3 5 194 216 230 269 292 335 348 423 430	1120 Pd2 4 200 222 237 276 300 344 357 435 441	1143 4 205 227 243 283 307 353 353 356 446 453	1165 TURNS 3 1/2 210 233 249 290 315 362 375 3457 457 464	1187 ON MOTOR 3 215 239 255 297 323 370 385 468 475	1210 PULLEY 2 1/2 220 244 261 304 331 379 394 479 487	2 225 250 267 312 338 388 403 490 498	1255 11/2 230 256 273 319 346 397 412 501 509	1277 1 235 261 279 326 354 406 421 513 521	1299 1/2 240 267 285 333 361 414 430 524 532	1322 Closed 0 246 273 291 340 369 423 439 535 543
28K80H 3 to 5 HP BX BELTS BLOWER PULLEY 285V278 285V250 285V250 285V24 285V20 285V184 285V160 285V136	DATUM DIAMETER 27.8 25 23.4 20 18.4 16 15.4 15.4 12.6	7.7 MOTOR PULLEY 2VP42 PITCH DIAMETER 28.1 25.3 23.7 20.3 18.7 16.3 15.7 12.9	1053 Dd1 2.9 Open 6 184 205 218 255 277 317 330 401	1075 Dd2 3.9 5 1/2 189 210 224 262 284 326 339 412	1098 Pd1 3 5 194 216 230 269 292 335 348 423	1120 Pd2 4 4 1/2 200 222 237 276 300 344 357 435	4 205 227 243 307 353 366 446	11165 TURNS 3 1/2 210 233 249 290 315 362 375 457	1187 ON MOTOR 3 215 239 255 297 323 370 385 468	1210 PULLEY 2 1/2 220 244 261 304 331 379 394 479	2 225 250 267 312 338 388 403 490	1255 1 1/2 230 256 273 319 346 397 412 501	1277 1 235 261 279 326 354 406 421 513	1299 1/2 240 267 285 333 361 414 430 524	Closed 0 246 273 291 340 369 423 439 535
28K80H 3 to 5 HP BX BELTS BLOWER PULLEY 285V278 285V278 285V234 285V230 285V124 285V160 285V136 285V136 285V136	DATUM DIAMETER 27.8 25 23.4 20 18.4 16 15.4 12.6 12.4	7.7 MOTOR PULLEY 2VP42 PITCH DIAMETER 28.1 25.3 23.7 20.3 18.7 16.3 15.7 12.9 12.7 11.3	1053 Dd1 2.9 Open 6 184 205 218 255 277 317 330 401 407 458	1075 Dd2 3.9 5 1/2 189 210 224 264 264 326 339 412 419 471	1098 Pd1 3 5 194 216 230 269 292 335 348 423 430 483	1120 Pd2 4 4 1/2 200 222 237 276 300 344 357 435 441 496	1143 4 205 227 243 283 307 353 353 356 446 453	1165 TURNS 3 1/2 210 233 249 290 315 362 375 3457 457 464	1187 ON MOTOR 3 215 239 255 297 323 370 385 468 475	1210 PULLEY 2 1/2 220 244 261 304 331 379 394 479 487	2 225 250 267 312 338 388 403 490 498	1255 11/2 230 256 273 319 346 397 412 501 509	1277 1 235 261 279 326 354 406 421 513 521	1299 1/2 240 267 285 333 361 414 430 524 532	1322 Closed 0 246 273 291 340 369 423 439 535 543
28K80H 3 to 5 HP BX BELTS BLOWER PULLEY 285V278 285V250 285V250 285V254 285V260 285V184 285V160 285V136 285V136	DATUM DIAMETER 27.8 25 23.4 20 18.4 16 15.4 12.6 12.4	7.7 MOTOR PULLEY 2VP42 PITCH DIAMETER 28.1 25.3 23.7 20.3 18.7 16.3 15.7 12.9 12.7	1053 Dd1 2.9 Open 6 184 205 218 255 277 317 330 401 407	1075 Dd2 3.9 51/2 189 210 224 262 284 326 339 412 419	1098 Pd1 3 5 194 216 230 269 292 335 348 423 430	1120 Pd2 4 200 222 237 276 300 344 357 435 441	1143 4 205 227 243 283 307 353 353 356 446 453	1165 TURNS 3 1/2 210 233 249 290 315 362 375 3457 457 464	1187 ON MOTOR 3 215 239 255 297 323 370 385 468 475	1210 PULLEY 2 1/2 220 244 261 304 331 379 394 479 487	2 225 250 267 312 338 388 403 490 498	1255 11/2 230 256 273 319 346 397 412 501 509	1277 1 235 261 279 326 354 406 421 513 521	1299 1/2 240 267 285 333 361 414 430 524 532	1322 Closed 0 246 273 291 340 369 423 439 535 543
28K80H 3 to 5 HP BX BELTS BLOWER PULLEY 285V278 285V250 285V250 285V124 285V160 285V154 285V136 285V124 285V124 285V110 7-1/2 to 10 HP	DATUM DIAMETER 27.8 25 23.4 20 18.4 16 15.4 12.6 12.4	7.7 MOTOR PULLEY 2VP42 PITCH DIAMETER 25.3 23.7 20.3 18.7 16.3 15.7 12.9 12.7 11.3 MOTOR PULLEY	1053 Dd1 2.9 Open 6 184 205 218 255 277 317 330 401 407 458 Dd1	1075 Dd2 3.9 51/2 189 210 224 262 284 326 284 339 412 419 471 Dd2	1098 Pd1 3 5 194 216 230 269 292 335 348 423 430 483 Pd1	1120 Pd2 4 4 1/2 200 222 237 276 300 344 357 435 435 441 496 Pd2	1143 4 205 227 243 283 307 353 353 356 446 453	1165 TURNS 31/2 210 233 249 290 315 362 375 362 375 457 464 522	1187 ON MOTOR 3 215 239 255 297 323 370 385 468 475	1210 PULLEY 2 1/2 220 244 261 304 331 379 394 479 487 547	2 225 250 267 312 338 388 403 490 498	1255 11/2 230 256 273 319 346 397 412 501 509	1277 1 235 261 279 326 354 406 421 513 521	1299 1/2 240 267 285 333 361 414 430 524 532	1322 Closed 0 246 273 291 340 369 423 439 535 543
28K80H 3 to 5 HP BX BELTS BLOWER PULLEY 285V278 285V250 285V250 285V124 285V160 285V154 285V136 285V124 285V124 285V110 7-1/2 to 10 HP	DATUM DIAMETER 27.8 25 23.4 20 18.4 16 15.4 12.6 12.4	7.7 MOTOR PULLEY 2VP42 PITCH DIAMETER 25.3 23.7 20.3 18.7 16.3 15.7 12.9 12.7 11.3 MOTOR PULLEY	1053 Dd1 2.9 Open 6 184 205 218 255 218 255 217 317 330 401 407 458 Dd1 4.3	1075 Dd2 3.9 51/2 189 210 224 262 284 326 284 339 412 419 471 Dd2	1098 Pd1 3 5 194 216 230 269 292 335 348 423 430 483 Pd1	1120 Pd2 4 4 1/2 200 222 237 276 300 344 357 435 435 441 496 Pd2	1143 4 205 227 243 283 307 353 353 356 446 453	1165 TURNS 31/2 210 233 249 290 315 362 375 362 375 457 464 522	1187 ON MOTOR 3 215 239 255 297 323 370 385 468 475 534	1210 PULLEY 2 1/2 220 244 261 304 331 379 394 479 394 487 547	2 225 250 267 312 338 388 403 490 498	1255 11/2 230 256 273 319 346 397 412 501 509	1277 1 235 261 279 326 354 406 421 513 521	1/2 240 267 285 333 361 414 430 524 532	1322 Closed 0 246 273 291 340 369 423 423 439 535 543 611
28K80H 3 to 5 HP BX BELTS BLOWER PULLEY 285V278 285V278 285V250 285V124 285V10 285V154 285V154 285V154 285V154 285V110 7-1/2 to 10 HP BX BELTS BLOWER PULLEY 285V278	DATUM DIAMETER 27.8 25 23.4 20 18.4 16 15.4 12.6 12.4 11 DATUM DIAMETER 27.8	7.7 MOTOR PULLEY 2VP42 PITCH DIAMETER 28.1 25.3 23.7 20.3 18.7 16.3 15.7 12.9 12.7 11.3 MOTOR PULLEY 2VP60 PITCH DIAMETER 28.1	1053 Dd1 2.9 Open 6 184 205 218 255 277 330 401 407 458 Dd1 4.3 Open 6 289	1075 Dd2 3.9 210 224 262 326 326 326 326 412 419 471 Dd2 5.5 5 1/2 295	1098 Pd1 3 5 194 216 230 269 292 335 348 423 430 483 Pd1 4.7 5 301	1120 Pd2 4 200 222 237 276 300 344 357 435 441 496 Pd2 5.9 4 1/2 307	4 205 227 243 307 353 366 446 453 509	11165 TURNS 3 1/2 210 233 249 290 315 362 375 464 522 TURNS 3 1/2 319	1187 ON MOTOR 3 215 239 255 297 323 370 385 468 475 534 ON MOTOR 3 325	1210 PULLEY 2 1/2 220 244 304 331 379 394 479 487 547 PULLEY 2 1/2 331	2 225 250 267 312 338 403 490 498 560 2 2 338	1255 11/2 230 256 273 319 346 397 412 501 501 502 572 11/2 344	1277 1 235 261 279 326 354 406 421 513 521 585	1299 1/2 240 267 285 333 361 414 430 532 598	1322 Closed 0 246 273 340 369 423 439 535 543 611 Closed 0 362
28K80H 3 to 5 HP BX BELTS BLOWER PULLEY 285V278 285V250 285V250 285V124 285V160 285V154 285V136 285V134 285V136 285V136 285V124 285V130 7-1/2 to 10 HP BX BELTS BLOWER PULLEY 285V278 285V278	DATUM DIAMETER 27.8 25 23.4 20 18.4 16 15.4 12.6 12.4 11 0 DATUM DIAMETER 27.8 25	7.7 MOTOR PULLEY 2VP42 PITCH DIAMETER 28.1 25.3 23.7 20.3 18.7 16.3 15.7 12.9 12.7 11.3 MOTOR PULLEY 2VP60 PITCH DIAMETER 28.1 25.3	1053 Dd1 2.9 Open 6 184 205 218 255 277 310 401 403 Open 6 289 320	1075 Dd2 3.9 5 1/2 189 210 224 262 284 326 339 412 419 471 Dd2 5.5 5 1/2 295 327	1098 Pd1 3 5 194 216 230 269 292 335 348 423 423 423 423 423 423 423 433 9d1 4.7 5 301 334	1120 Pd2 4 200 222 237 300 344 357 435 435 435 441 496 Pd2 5.9 9 4 1/2 307 341	4 205 227 243 307 353 366 446 453 509 4 4 313 348	1165 TURNS 3 1/2 210 233 249 315 362 375 457 464 522 TURNS 3 1/2 319 355	1187 ON MOTOR 3 215 239 255 297 323 370 385 468 475 534 ON MOTOR 3 325 361	1210 PULLEY 2 1/2 220 244 261 304 331 379 487 547 PULLEY 2 1/2 31 368	2 225 250 267 312 338 403 490 498 560 260 27 338 375	1255 11/2 230 256 273 319 346 397 412 501 509 572 11/2 344 382	1277 1 235 261 279 326 354 406 421 513 521 585 1 385	1/2 240 267 285 333 361 414 430 524 532 598 1/2 356 395	1322 Closed 0 246 273 291 340 369 423 535 543 611 611 Closed 0 362 402
28K80H 3 to 5 HP BX BELTS BLOWER PULLEY 285V278 285V250 285V250 285V128 285V10 285V184 285V16 285V136 285V136 285V124 285V110 7-1/2 to 10 HP BX BELTS BLOWER PULLEY 285V228 285V250 2	DATUM DIAMETER 27.8 25 23.4 16 15.4 12.6 12.4 11 DATUM DIAMETER 27.8 25 23.4	7.7 MOTOR PULLEY 2VP42 PITCH DIAMETER 28.1 25.3 23.7 20.3 18.7 16.3 15.7 12.9 12.7 11.3 MOTOR PULLEY 2VP60 PITCH DIAMETER 28.1 25.3 23.7	1053 Dd1 2.9 Open 6 184 205 218 255 277 317 330 401 407 458 Dd1 4.3 Open 6 289 320 342	1075 Dd2 3.9 51/2 189 210 262 284 326 339 412 419 471 Dd2 5.5 51/2 295 327 349	1098 Pd1 3 5 194 216 230 269 292 293 335 348 430 483 430 483 Pd1 4.7 5 301 334 357	1120 Pd2 4 200 222 237 276 300 344 357 435 7 435 7 435 7 435 7 435 7 435 7 435 7 431 496 Pd2 5.9 2 41/2 496 2 5.9	4 205 227 243 307 353 366 446 453 509 4 4 4 313 313 348 371	1165 TURNS 3 1/2 210 230 315 362 375 457 464 522 TURNS 3 1/2 319 355 378	1187 ON MOTOR 3 215 239 255 297 323 370 385 468 475 534 ON MOTOR 3 325 365 386	1210 PULLEY 2 1/2 220 244 304 379 394 479 487 547 PULLEY 2 1/2 331 368 393	2 225 250 267 312 338 403 490 498 560 2 2 338 560 2 2 338 560	1255 11/2 230 256 273 319 346 397 412 509 572 11/2 344 382 408	1277 1 235 261 279 326 406 421 513 521 585 1 1 350 389 415	1/2 240 267 285 333 361 414 430 524 532 598 1/2 356 395 395	1322 Closed 0 246 273 340 369 423 439 535 543 611 Closed 0 362 429
28K80H 3 to 5 HP BX BELTS BLOWER PULLEY 285V278 285V278 285V250 285V124 285V10 285V154 285V154 285V154 285V154 285V110 7-1/2 to 10 HP BX BELTS BLOWER PULLEY 285V278 285V278 285V278	DATUM DIAMETER 27.8 25 23.4 20 18.4 16 15.4 12.6 12.4 11 DATUM DIAMETER 27.8 25 23.4 20	7.7 MOTOR PULLEY 2VP42 PITCH DIAMETER 28.1 25.3 23.7 20.3 18.7 16.3 15.7 12.9 12.7 11.3 MOTOR PULLEY 2VP60 PITCH DIAMETER 28.1 25.3 23.7 20.3	1053 Dd1 2.9 Open 6 184 205 218 255 277 330 401 407 458 Dd1 407 458 Dd1 4.3 Open 6 289 320 342 349	1075 Dd2 3.9 5 1/2 189 210 262 284 339 412 4419 471 Dd2 5.5 5 1/2 295 327 349 408	1098 Pd1 3 5 194 216 269 292 335 348 423 433 483 423 443 483 Pd1 4.7 5 301 334 416	1120 Pd2 4 200 222 237 276 300 344 357 435 441 496 Pd2 5.9 Pd2 5.9 4 1/2 307 341 341 3425	4 205 227 243 283 307 353 366 445 445 509 445 509 4 4 313 348 348 348 348	TURNS 3 1/2 210 233 290 315 362 375 457 457 457 457 522 TURNS 3 1/2 319 355 375 3 1/2 319 355	1187 ON MOTOR 3 215 239 255 297 323 370 385 468 475 534 ON MOTOR 3 325 361 386 450	1210 PULLEY 2 1/2 220 244 304 331 379 394 479 487 547 PULLEY 2 1/2 331 368 393 459	2 225 250 312 338 403 490 498 560 2 2 338 375 400 467	1255 11/2 230 256 273 319 346 397 412 501 501 509 572 11/2 344 382 408 476	1277 1235 261 279 326 354 406 421 513 521 585 1 350 389 415 389 484	1/2 240 267 333 361 414 430 524 538 598 1/2 356 395 422 493	1322 Closed 0 246 273 340 369 423 439 535 543 611 Closed 0 362 402 402 402 551
28K30H 3 to 5 HP BX BELTS BLOWER PULLEY 285V278 285V250 285V250 285V124 285V160 285V154 285V136 285V136 285V136 285V124 285V10 7-1/2 to 10 HP BX BELTS BLOWER PULLEY 285V278	DATUM DIAMETER 27.8 25 23.4 20 18.4 16 15.4 12.6 12.4 11 DATUM DIAMETER 27.8 27.8 25 23.4 20 18.4	7.7 MOTOR PULLEY 2VP42 PITCH DIAMETER 28.1 25.3 23.7 20.3 18.7 16.3 15.7 12.9 12.7 11.3 MOTOR PULLEY 2VP60 PITCH DIAMETER 28.1 25.3 23.7 20.3 18.7	1053 Dd1 2.9 Open 6 184 205 218 255 277 317 330 401 407 407 407 407 407 407 407 407 407 407	1075 Dd2 3.9 5 1/2 189 210 224 262 262 262 262 262 262 262 262 263 326 339 412 419 471 Dd2 5.5 5 1/2 940 5 1/2 443	1098 Pd1 3 5 194 210 202 202 335 348 423 430 483 430 483 Pd1 4.7 5 301 334 357 416 452	1120 Pd2 4 200 222 237 276 300 344 357 435 441 496 Pd2 5.9 Pd2 5.9 41/2 307 41/2 364 41/2	4 205 227 243 283 307 353 366 446 453 509 446 453 509 446 453 348 371 433	TURNS 3 1/2 210 233 362 375 457 464 522 TURNS 3 1/2 3 1/2 3 1/2 3 1/2 3 1/2 3 1/2 3 1/2 3 1/2 4 80	0N MOTOR 3 215 239 255 297 323 370 385 468 475 534 0N MOTOR 3 325 534 0N MOTOR 3 325 361 386 450 489	1210 PULLEY 2 1/2 220 244 261 304 379 394 479 487 547 PULLEY 2 1/2 368 393 459 498	2 225 250 267 312 338 388 400 498 560 2 338 560 2 338 375 400 467 507	1255 11/2 230 256 273 319 346 397 412 509 572 11/2 344 382 408 476 517	1277 1277 261 279 326 406 421 521 585 1 350 389 415 484 526	1/2 240 267 285 333 414 430 532 598 1/2 356 395 422 493 535	1322 Closed 0 246 273 291 340 369 423 439 543 611 Closed 0 362 423 439 543 611 Closed 0 362 423 429 501 544
28K80H 3 to 5 HP BX BELTS BLOWER PULLEY 285V278 285V278 285V250 285V124 285V10 285V16 285V154 285V154 285V154 285V126 285V1278 285V120 PL/2 to 10 HP BX BELTS BLOWER PULLEY 285V228 285V220 285V234 285V228 285V250 285V28 285V250 285V28 285V250 285V28 285V250 285V28 285V250 285V28 285V250 285V28 285V18 285V28 285V2	DATUM DIAMETER 27.8 25 23.4 20 18.4 16 15.4 12.6 12.4 11 DATUM DIAMETER 27.8 25 23.4 20 18.4 16	7.7 MOTOR PULLEY 2VP42 PITCH DIAMETER 28.1 25.3 23.7 20.3 18.7 16.3 15.7 12.9 12.7 11.3 MOTOR PULLEY 2VP60 PITCH DIAMETER 28.1 25.3 23.7 20.3 18.7 16.3 18.7 16.3 18.7 16.3 18.7 16.3 18.7 16.3 18.7 16.3 18.7 16.3 18.7 16.3 18.7 16.3 19.7 10.3 10.5 10.5	1053 Dd1 2.9 Open 6 184 2055 277 317 330 401 407 458 Dd1 407 458 Dd1 458 Dd1 458 0pen 6 289 320 0pen 6 289 342 399 434 497	1075 Dd2 3.9 51/2 189 210 262 284 326 339 412 419 471 Dd2 5.5 51/2 295 327 349 408 443 508	1098 Pd1 3 5 194 216 230 269 292 292 335 348 430 483 430 483 430 483 7 901 4.7 5 301 334 8 357 416 452 519	1120 Pd2 4 200 222 237 276 300 344 357 435 7 435 7 435 7 435 7 435 7 435 7 435 7 431 441 496 Pd2 5.9 9 4 1/2 307 344 425 461 529	4 205 227 353 366 445 453 509 443 313 343 371 433 371 433	TURNS 3 1/2 210 233 249 290 315 362 375 457 464 522 TURNS 3 1/2 319 355 378 442 480 550	0N MOTOR 3 215 239 255 297 323 370 385 468 475 534 0N MOTOR 3 325 361 386 450 489 561	1210 PULLEY 2 1/2 220 244 304 331 379 394 477 487 547 PULLEY 2 1/2 331 368 393 459 459 459 571	2 225 250 312 338 403 498 498 560 2 338 375 560	1255 11/2 230 256 273 319 346 397 412 509 572 11/2 344 384 408 476 517 593	1277 1275 261 279 326 354 406 421 513 521 585 585 1 1 350 389 415 484 526 603	1/2 240 267 285 333 361 414 430 524 532 598 1/2 356 395 422 493 535 614	1322 Closed 0 246 273 340 369 423 439 535 543 611 Closed 0 362 400 362 429 501 544
28K80H 3 to 5 HP BX BELTS BLOWER PULLEY 285V278 285V250 285V124 285V10 285V154 285V154 285V136 285V110 7-1/2 to 10 HP BX BELTS BLOWER PULLEY 285V278 285V226 285V234 285V234 285V234 285V234 285V234 285V234 285V234 285V234 285V14 285V14 285V14	DATUM DIAMETER 27.8 25 23.4 20 18.4 16 15.4 12.6 12.4 11 DATUM DIAMETER 27.8 25 23.4 20 18.4 16 15.4	7.7 MOTOR PULLEY 2VP42 PITCH DIAMETER 28.1 25.3 23.7 20.3 18.7 16.3 15.7 12.9 12.7 11.3 MOTOR PULLEY 2VP60 PITCH DIAMETER 28.1 25.3 23.7 20.3 18.7 16.3 15.7 16.3 15.7 16.3 15.7 16.3 15.7 16.3 15.7 16.3 15.7 16.3 15.7 16.3 15.7 16.3 15.7 16.3 15.7 16.3 15.7 11.3 MOTOR PULLEY 2VP42 2VP	1053 Dd1 2.9 Open 6 184 205 218 255 277 330 401 407 458 Dd1 407 458 Dd1 403 407 458 0pen 6 289 320 342 329 320 343 434 497 516	1075 Dd2 3.9 5 1/2 189 210 262 284 339 412 441 471 Dd2 5.5 5 1/2 295 327 349 408 443 508 527	1098 Pd1 3 5 194 216 269 292 335 348 423 483 423 483 483 483 7 81 4.7 5 301 334 452 538	1120 Pd2 4 200 222 27 276 300 344 357 435 441 496 Pd2 5.9 Pd2 5.9 4 1/2 307 341 364 425 461 529 549	4 205 227 243 283 307 353 366 445 509 445 509 4 313 348 313 348 371 371 371 371 372 500 560	TURNS 3 1/2 210 233 240 315 362 375 457 464 452 522 TURNS 3 1/2 319 355 378 442 480 550 571	1187 ON MOTOR 3 215 239 255 297 323 370 385 468 475 534 0N MOTOR 3 325 361 386 450 489 561 582	1210 PULLEY 2 1/2 220 244 304 331 379 394 479 487 547 PULLEY 2 1/2 331 368 393 459 459 459 459 593	2 225 250 312 338 403 490 498 560 2 338 360 2 338 375 400 400 400 407 507 582 604	1255 11/2 230 256 273 319 346 397 412 501 501 509 572 11/2 344 382 408 4076 517 593 615	1277 1235 261 279 326 354 406 421 513 523 585 1 350 389 415 350 389 415 350 389 415 484 526 603 626	1/2 240 267 333 361 414 430 524 538 598 1/2 356 395 422 493 535 614 637	1322 Closed 0 246 273 340 369 423 439 535 543 611 Closed 0 362 402 402 402 402 551 544 624 648
28K80H 3 to 5 HP BX BELTS BLOWER PULLEY 285V278 285V250 285V254 285V10 285V160 225V154 285V124 285V130 7-1/2 to 10 HP BX BELTS BLOWER PULLEY 285V278 285V250 285V224 285V250 285V224 285V250 285V254 285V250 285V254 285V160 285V154 285V160 285V154 285V160 285V154 285V160 285V154 285V154 285V150 285V154 285V154 285V150 285V154 2	DATUM DIAMETER 27.8 25 23.4 20 18.4 16 15.4 12.6 12.4 11 DATUM DIAMETER 27.8 27.8 27.8 27.8 23.4 20 18.4 16 15.4 12.6	7.7 MOTOR PULLEY 2VP42 PITCH DIAMETER 25.3 23.7 20.3 18.7 16.3 15.7 12.9 12.7 11.3 MOTOR PULLEY 2VP60 PITCH DIAMETER 28.1 25.3 23.7 20.3 18.7 16.3 15.7 12.9	1053 Dd1 2.9 Open 6 184 2055 218 255 257 277 317 317 330 401 407 458 Dd1 407 458 Dd1 407 458 Dd1 407 458 Dd1 407 458 Dd1 403 401 407 458 Dd1 209 6 209 0 9 0 9 0 9 0 9 0 9 0 9 0 9 0 9 0 9	1075 Dd2 3.9 51/2 189 210 224 262 284 326 339 412 419 471 Dd2 5.5 51/2 295 51/2 295 327 349 403 508 527 642	1098 Pd1 3 5 194 216 230 269 292 335 348 423 430 483 Pd1 4.7 5 301 334 357 416 5 304 452 519 538 655	1120 Pd2 4 200 222 337 276 300 344 357 435 441 496 Pd2 5.9 Pd2 5.9 41/2 307 441 496 Pd2 5.9 669	4 205 227 243 307 353 366 446 453 509 446 453 509 446 453 509 446 453 509 446 453 509 509 682	TURNS 3 1/2 210 233 249 290 315 362 375 464 522 TURNS 3 1/2 319 355 378 442 480 550 571 665	1187 ON MOTOR 3 215 239 255 297 323 370 385 468 475 534 00 MOTOR 3 325 361 386 459 489 561 582 709	1210 PULLEY 2 1/2 220 244 261 304 379 379 499 487 547 PULLEY 2 1/2 331 368 393 459 459 571 593 722	2 225 250 267 312 388 400 499 498 560 490 498 560 2 338 375 400 467 507 582 604 735	1255 1255 230 256 347 412 509 572 11/2 344 408 476 408 476 517 593 615 749	1277 1277 1235 261 279 326 406 421 521 585 1 1 350 389 415 485 526 603 626 603 626 762	1/2 240 267 285 333 361 414 430 532 598 1/2 598 1/2 356 422 493 535 422 493 535 614 637 776	1322 0 246 273 340 369 423 439 535 543 611 Closed 0 362 429 501 544
28K80H 3 to 5 HP BX BELTS BLOWER PULLEY 285V278 285V250 285V124 285V10 285V154 285V154 285V136 285V110 7-1/2 to 10 HP BX BELTS BLOWER PULLEY 285V278 285V226 285V234 285V234 285V234 285V234 285V234 285V234 285V234 285V234 285V14 285V14 285V14	DATUM DIAMETER 27.8 25 23.4 20 18.4 16 15.4 12.6 12.4 11 DATUM DIAMETER 27.8 25 23.4 20 18.4 16 15.4	7.7 MOTOR PULLEY 2VP42 PITCH DIAMETER 28.1 25.3 23.7 20.3 18.7 16.3 15.7 12.9 12.7 11.3 MOTOR PULLEY 2VP60 PITCH DIAMETER 28.1 25.3 23.7 20.3 18.7 16.3 15.7 16.3 15.7 16.3 15.7 16.3 15.7 16.3 15.7 16.3 15.7 16.3 15.7 16.3 15.7 16.3 15.7 16.3 15.7 16.3 15.7 11.3 MOTOR PULLEY 2VP42 2VP	1053 Dd1 2.9 Open 6 184 205 218 255 277 330 401 407 458 Dd1 407 458 Dd1 4.3 Open 6 289 320 342 329 320 343 434 497 516	1075 Dd2 3.9 5 1/2 189 210 262 284 339 412 441 471 Dd2 5.5 5 1/2 295 327 349 408 443 508 527	1098 Pd1 3 5 194 216 269 292 335 348 423 483 423 483 483 483 7 81 4.7 5 301 334 452 538	1120 Pd2 4 200 222 27 276 300 344 357 435 441 496 Pd2 5.9 Pd2 5.9 4 1/2 307 341 364 425 461 529 549	4 205 227 243 283 307 353 366 445 509 445 509 4 313 348 313 348 371 371 371 371 372 500 560	TURNS 3 1/2 210 233 240 315 362 375 457 464 452 522 TURNS 3 1/2 319 355 378 442 480 550 571	1187 ON MOTOR 3 215 239 255 297 323 370 385 468 475 534 0N MOTOR 3 325 361 386 450 489 561 582	1210 PULLEY 2 1/2 220 244 304 331 379 394 479 487 547 PULLEY 2 1/2 331 368 393 459 459 459 459 593	2 225 250 312 338 403 490 498 560 2 338 360 2 338 375 400 400 400 407 507 582 604	1255 11/2 230 256 273 319 346 397 412 501 501 509 572 11/2 344 382 408 4076 517 593 615	1277 1235 261 279 326 354 406 421 513 523 585 1 350 389 415 350 389 415 350 389 415 484 526 603 626	1/2 240 267 333 361 414 430 524 538 598 1/2 356 395 422 493 535 614 637	1322 Closed 0 246 273 369 423 439 535 543 611 Closed 0 362 423 439 543 611 Closed 0 362 429 501 544 624 628 789
28K80H 3 to 5 HP BX BELTS BLOWER PULLEY 285V278 285V278 285V200 285V184 285V100 285V154 285V16 285V124 285V110 7-1/2 to 10 HP BX BELTS BLOWER PULLEY 285V220 285V28 285V280 285V284 285V290 285V184 285V290 285V184 285V290 285V184 285V136 285V124 285V136 285V136 285V124 285V136 285V136 285V136 285V136 285V136 285V136 285V136 285V124 285V136 285V136 285V124 285V136 285V136 285V136 285V136 285V124 285V136 285V136 285V136 285V136 285V124 285V136 285V124 285V136 285V124 285V136 285V124 285V12	DATUM DIAMETER 27.8 25 23.4 20 18.4 16 15.4 12.6 12.4 11 DATUM DIAMETER 27.8 25 23.4 20 18.4 16 15.4 12.6 12.4	7.7 MOTOR PULLEY 2VP42 PITCH DIAMETER 28.1 25.3 18.7 16.3 15.7 12.9 12.7 11.3 MOTOR PULLEY 2VP60 PITCH DIAMETER 28.1 25.3 18.7 20.3 18.7 16.3 15.7 11.3 MOTOR PULLEY 2VP60 PITCH DIAMETER 28.1 25.3 18.7 10.3 11.7 11.3 MOTOR PULLEY 2VP42	1053 Dd1 2.9 Open 6 184 2055 277 317 330 407 458 Dd1 407 458 Dd1 407 458 Dd1 407 458 0pen 6 289 320 342 342 399 434 497 516 628 8	1075 Dd2 3.9 5 1/2 189 210 262 284 326 339 412 419 471 Dd2 5.5 5 1/2 295 327 5408 408 408 508 527 642 652	1098 Pd1 3 5 194 216 230 269 292 233 348 430 483 430 483 430 483 7 416 4.7 5 301 334 4.7 5 5 301 337 416 452 538 666	1120 Pd2 4 200 222 237 276 300 344 357 435 435 441 496 Pd2 5.9 Pd2 5.9 41/2 307 344 425 461 259 549 669 679	4 205 227 353 366 446 453 509 4453 509 4453 509	TURNS 3 1/2 210 233 250 315 290 315 362 375 457 457 454 464 522 700 31/2 319 355 378 442 480 550 571 695 570	0N MOTOR 3 215 239 255 297 323 370 385 468 475 534 0N MOTOR 3 325 361 386 450 450 450 450 450 450 700 720	1210 PULLEY 2 1/2 220 244 304 379 394 479 487 547 PULLEY 2 1/2 331 368 393 459 459 571 593 722 733	2 225 250 267 312 338 403 490 498 560 2 338 560 2 338 375 400 467 507 582 604 735 582 604	1255 11/2 230 256 273 319 346 397 412 501 509 572 11/2 344 382 408 476 517 593 615 749 761	1277 1275 261 279 326 354 406 421 513 521 585 1 389 415 484 526 603 626 762 774	1/2 240 267 285 333 361 414 430 524 532 598 1/2 356 395 395 395 422 493 356 395 614 637 776 878	1322 Closed 0 246 273 340 369 423 439 533 543 611 Closed 0 362 402 501 544 624 648 789 801
28K80H 3 to 5 HP BX BELTS BLOWER PULLEY 285V278 285V278 285V200 285V184 285V100 285V154 285V16 285V124 285V110 7-1/2 to 10 HP BX BELTS BLOWER PULLEY 285V220 285V28 285V280 285V284 285V290 285V184 285V290 285V184 285V290 285V184 285V136 285V124 285V136 285V136 285V124 285V136 285V136 285V136 285V136 285V136 285V136 285V136 285V124 285V136 285V136 285V124 285V136 285V136 285V136 285V136 285V124 285V136 285V136 285V136 285V136 285V124 285V136 285V124 285V136 285V124 285V136 285V124 285V12	DATUM DIAMETER 27.8 25 23.4 20 18.4 16 15.4 12.6 12.4 11 DATUM DIAMETER 27.8 25 23.4 20 18.4 16 15.4 12.6 12.4	7.7 MOTOR PULLEY 2VP42 PITCH DIAMETER 28.1 25.3 18.7 16.3 15.7 12.9 12.7 11.3 MOTOR PULLEY 2VP60 PITCH DIAMETER 28.1 25.3 18.7 20.3 18.7 16.3 15.7 11.3 MOTOR PULLEY 2VP60 PITCH DIAMETER 28.1 25.3 18.7 10.3 11.7 11.3 MOTOR PULLEY 2VP42	1053 Dd1 2.9 Open 6 184 2055 277 317 330 407 458 Dd1 407 458 Dd1 407 458 Dd1 407 458 0pen 6 289 320 342 342 399 434 497 516 628 8	1075 Dd2 3.9 5 1/2 189 210 262 284 326 339 412 419 471 Dd2 5.5 5 1/2 295 327 5408 408 408 508 527 642 652	1098 Pd1 3 5 194 216 230 269 292 335 348 423 430 483 Pd1 4.7 5 301 334 416 457 519 538 655 666	1120 Pd2 4 200 222 237 276 300 344 357 435 435 441 496 Pd2 5.9 Pd2 5.9 41/2 307 344 425 461 259 549 669 679	4 205 227 353 366 446 453 509 4453 509 4453 509	TURNS 3 1/2 210 233 250 315 290 315 362 375 457 457 454 464 522 700 31/2 319 355 378 442 480 550 571 695 570	0N MOTOR 3 215 239 255 297 323 370 385 468 475 534 0N MOTOR 3 325 361 386 450 450 450 450 450 450 700 720	1210 PULLEY 2 1/2 220 244 304 379 394 479 487 547 PULLEY 2 1/2 331 368 393 459 459 571 593 722 733	2 225 250 267 312 338 403 490 498 560 2 338 560 2 338 375 400 467 507 582 604 735 582 604	1255 11/2 230 256 273 319 346 397 412 501 509 572 11/2 344 382 408 476 517 593 615 749 761	1277 1275 261 279 326 354 406 421 513 521 585 1 389 415 484 526 603 626 762 774	1/2 240 267 285 333 361 414 430 524 532 598 1/2 356 395 395 395 422 493 356 395 614 637 776 878	1322 Closed 0 246 273 340 369 423 439 533 543 611 Closed 0 362 402 501 544 624 648 789 801
28K80H 3 to 5 HP BX BELTS BLOWER PULLEY 285V278 285V250 285V124 285V10 285V160 285V154 285V174 285V10 7-1/2 to 10 HP BX BELTS BLOWER PULLEY 285V278 285V220 285V224 285V200 285V224 285V200 285V234 285V100	DATUM DIAMETER 27.8 25 23.4 20 18.4 16 15.4 12.6 12.4 11 DATUM DIAMETER 27.8 25 23.4 20 18.4 16 15.4 12.6 12.4	7.7 MOTOR PULLEY 2VP42 PITCH DIAMETER 28.1 25.3 23.7 20.3 18.7 16.3 15.7 12.9 12.7 11.3 MOTOR PULLEY 2VP60 PITCH DIAMETER 28.1 25.3 23.7 20.3 18.7 16.3 15.7 12.9 12.7 11.3	1053 Dd1 2.9 Open 6 184 225 277 317 317 317 317 401 407 458 Dd1 407 458 Dd1 407 458 Dd1 407 458 Dd1 403 289 320 342 399 434 497 516 628 638 717 717 Dd1 5.8	1075 Dd2 3.9 5 1/2 189 210 224 262 284 326 339 412 419 471 Dd2 5.5 5 1/2 295 5 1/2 295 327 349 402 5.5 5 1/2 295 5 1/2 295 5 1/2 205 5 1/2 1/2 419 471 5 1/2 205 5 1/2 205 5 1/2 205 20 419 471 207 20 40 20 20 40 20 20 40 20 20 20 20 20 20 20 20 20 20 20 20 20	1098 Pd1 3 5 194 216 230 269 292 292 335 348 423 430 483 Pd1 4.7 5 301 435 5 301 334 357 416 55 666 748	1120 Pd2 4 200 222 237 276 304 357 441 496 Pd2 5.9 Pd2 5.9 441 496 Pd2 5.9 441 364 451 364 461 529 549 569 669 679 763	4 205 227 353 366 446 453 509 4453 509 4453 509	TURNS 3 1/2 210 233 362 375 457 464 522 TURNS 3 1/2 31/2 31/2 319 355 378 480 550 551 551 551 570 695 706 794	0N MOTOR 3 215 239 2255 297 323 370 385 468 475 534 475 534 0N MOTOR 3 325 361 386 450 489 561 582 709 720 809	1210 PULLEY 2 1/2 220 244 261 304 3379 394 479 4487 547 547 PULLEY 2 1/2 331 368 393 459 498 571 591 722 733 824	2 225 250 267 312 338 403 490 498 560 2 338 560 2 338 375 400 467 507 582 604 735 582 604	1255 11/2 230 256 273 319 346 397 412 501 509 572 11/2 344 382 408 476 517 593 615 749 761	1277 1275 261 279 326 354 406 421 513 521 585 1 389 415 484 526 603 626 762 774	1/2 240 267 285 333 361 414 430 524 532 598 1/2 356 395 395 395 422 493 356 395 614 637 776 878	1322 Closed 0 246 273 369 423 435 535 543 611 0 369 423 433 543 611 0 362 402 423 402 429 544 628 648 789 801 901
28K80H 3 to 5 HP BX BELTS BLOWER PULLEY 285V278 285V250 285V124 285V10 245V160 285V154 285V110 7-1/2 to 10 HP BX BELTS BLOWER PULLEY 285V278 285V230 285V234 285V230 285V234 285V124 285V110 15 to 20 HP BX BELTS	DATUM DIAMETER 27,8 25 23,4 20 18,4 16 15,4 12,6 12,4 11 DATUM DIAMETER 27,8 23,4 20 18,4 16 15,4 23,4 20 18,4 16 15,4 12,6 12,4 11	7.7 MOTOR PULLEY 2VP42 PITCH DIAMETER 28.1 25.3 23.7 20.3 18.7 16.3 15.7 12.9 12.7 11.3 MOTOR PULLEY 2VP60 PITCH DIAMETER 28.1 23.7 20.3 18.7 16.3 15.7 12.9 12.7 11.3 MOTOR PULLEY 2VP75	1053 Dd1 2.9 Open 6 184 2055 277 317 317 330 401 407 458 Dd1 407 458 Dd1 407 458 0pen 342 399 342 349 434 497 516 628 638 717 518 628 638 717	1075 Dd2 3.9 51/2 189 210 224 262 284 262 339 412 419 471 Dd2 5.5 51/2 295 327 349 408 508 527 349 462 652 733 Dd2 7	1098 Pd1 3 5 194 216 230 269 292 335 348 423 430 483 430 483 Pd1 4.7 5 301 4.7 5 301 4.7 5 301 4.7 5 5 304 4.5 5 519 538 455 666 666 748 Pd1 6.2	1120 Pd2 4 200 222 337 276 300 344 357 441 496 Pd2 5.9 Pd2 5.9 441 364 451 529 549 669 679 763 Pd2 7.4	4 205 227 243 353 366 446 453 509 446 453 509 446 453 509 446 453 509 682 693 779	TURNS 3 1/2 210 233 249 290 315 362 375 457 464 522 TURNS 3 1/2 319 355 378 442 522 319 355 378 442 550 571 695 706 794	1187 ON MOTOR 3 215 237 323 370 385 468 475 534 0N MOTOR 3 255 297 323 370 385 468 475 534 0N MOTOR 386 450 489 561 582 709 720 809 ON MOTOR	1210 PULLEY 2 1/2 220 244 261 304 331 379 394 487 547 9ULLEY 2 1/2 331 368 393 459 571 593 459 571 593 824 PULLEY PULLEY	2 225 250 267 312 338 403 498 560 498 560 498 560 498 560 498 560 498 560 498 560 498 560 498 560 497 582 604 400 467 407 582 607 407 582 607 582 607 582 607 582 607 582 607 582 607 582 507 507 507 507 507 507 507 507 507 507	1255 11255 11/2 230 256 397 412 509 572 11/2 344 382 408 476 476 593 615 749 761 855	1277 1277 1277 1279 326 354 406 421 521 585 521 585 1 1 359 415 485 603 626 603 626 762 774 870	1/2 240 267 333 361 414 430 524 532 598 1/2 356 395 422 493 535 614 637 776 788 885	1322 Closed 0 246 271 340 369 423 433 535 543 611 0 362 402 402 402 429 501 544 624 624 624 624 628 789 801 901 Closed
28K80H 3 to 5 HP BX BELTS BLOWER PULLEY 285V278 285V250 285V124 285V200 285V184 285V154 285V154 285V154 285V126 285V124 285V110 7-1/2 to 10 HP BX BELTS BLOWER PULLEY 285V220 285V184 285V230 285V184 285V230 285V184 285V136 285V136 285V134 285V136 285V124 285V126 285V124 285V124 285V124 285V126 285V124 285V	DATUM DIAMETER 27.8 25 23.4 20 18.4 16 15.4 12.6 12.4 11 DATUM DIAMETER 27.8 25 23.4 20 18.4 16 15.4 12.6 12.4 11 11 DATUM DIAMETER	7.7 MOTOR PULLEY 2VP42 PITCH DIAMETER 28.1 25.3 23.7 20.3 18.7 16.3 15.7 12.9 12.7 11.3 MOTOR PULLEY 2VP60 PITCH DIAMETER 25.3 18.7 16.3 15.7 12.9 11.7 16.3 15.7 12.9 12.7 16.3 15.7 12.9 12.7 16.3 15.7 12.9 12.7 11.3 MOTOR PULLEY 2VP5 PITCH DIAMETER	1053 Dd1 2.9 Open 6 184 205 277 317 330 407 407 458 Dd1 407 458 Dd1 407 458 0pen 6 289 320 040 342 399 434 497 516 638 638 717 Dd1 5.6 0 289 320 137 137 137 137 137 137 137 137	1075 Dd2 3.9 5 1/2 189 210 262 224 262 224 326 339 412 419 471 Dd2 5.5 5 1/2 295 327 642 527 645 733 Dd2 7 5 1/2	1098 Pd1 3 5 194 216 230 269 292 335 348 430 483 430 483 430 483 430 483 7 416 452 519 538 666 666 748 Pd1 6.2	1120 Pd2 4 200 222 337 276 300 344 357 435 7 435 7 435 7 435 7 435 7 435 7 435 7 435 7 435 7 431 441 496 Pd2 5.9 Pd2 5.9 24 9 669 6679 6679 763 Pd2 7.4 41/2	4 205 227 243 283 307 353 366 446 453 509 445 371 433 371 433 371 433 470 560 682 693 779 4	TURNS 3 1/2 210 233 290 315 290 315 375 457 457 457 457 378 31/2 319 3550 571 695 706 794 TURNS 3 1/2	0N MOTOR 3 215 239 2255 297 323 370 385 468 475 534 7534 0N MOTOR 3 25 361 582 709 720 809 20N MOTOR 3 0N MOTOR	1210 PULLEY 2 1/2 220 244 304 331 379 394 479 487 547 PULLEY 2 1/2 331 368 571 593 459 459 571 593 722 733 824 PULLEY 2 1/2	2 225 250 312 338 403 490 498 560 2 338 375 560 2 338 375 560 400 467 507 582 604 467 582 604 467 582 604	1255 11/2 230 256 273 319 346 397 412 509 572 11/2 344 382 408 476 517 593 615 749 761 855 11/2	1277 1275 261 279 326 354 406 421 513 521 585 585 1 389 415 484 526 603 626 603 626 774 870 1	1/2 240 267 285 333 361 414 430 524 532 598 1/2 356 395 422 493 535 614 637 776 614 637 7788 885	1322 0 246 273 340 369 423 439 535 543 611 Closed 0 362 400 362 429 501 544 648 789 901 Selat 901 Closed 0
28K80H 3 to 5 HP BX BELTS BLOWER PULLEY 285V278 285V250 285V250 285V124 285V160 285V134 285V136 285V134 285V110 7-1/2 to 10 HP BX BELTS BLOWER PULLEY 285V278 285V278 285V278 285V214 285V184 285V1	DATUM DIAMETER 27.8 25 23.4 20 18.4 16 15.4 12.6 12.4 11 DATUM DIAMETER 27.8 25 23.4 20 18.4 16 15.4 12.6 11.4 11 DATUM DIAMETER 27.8	7.7 MOTOR PULLEY 2VP42 PITCH DIAMETER 28.1 25.3 23.7 20.3 18.7 16.3 15.7 12.9 12.7 11.3 MOTOR PULLEY 2VP60 PITCH DIAMETER 28.1 28.1 28.1 28.1	1053 Dd1 2.9 Open 6 184 205 218 257 277 317 330 401 407 407 407 407 407 407 407 407 407 407	1075 Dd2 3.9 5 1/2 189 210 224 264 326 339 412 419 471 Dd2 5.5 5 1/2 295 327 349 443 508 527 642 652 7 7 Dd2 7 7	1098 Pd1 3 5 194 216 230 269 292 335 348 423 430 483 Pd1 4.7 5 301 334 452 519 538 655 666 452 519 Pd1 6.2 5 303	1120 Pd2 4 200 222 377 276 300 344 357 435 435 441 496 Pd2 5.9 Pd2 5.9 669 679 669 679 763 763 763 763 764 41/2 399	4 205 227 243 283 366 446 453 509 446 453 509 446 453 509 446 453 509 682 693 779 779	TURNS 3 1/2 210 233 362 375 457 464 522 TURNS 3 1/2 31/2 31/2 459 355 378 457 464 522 706 550 551 550 570 695 706 794 794 794 794	0N MOTOR 3 215 239 255 297 323 370 385 468 475 534 475 534 0N MOTOR 3 325 361 386 450 489 561 582 709 720 809 809 809 809 809 809 809 80	1210 PULLEY 2 1/2 220 244 304 3379 394 479 487 547 547 2 1/2 2 1/2 331 368 393 498 571 368 571 722 733 R591 722 733 PULLEY PULLEY 2 1/2 2	2 225 250 267 312 338 388 403 490 498 560 490 498 560 2 338 375 560 407 582 560 407 582 560 407 582 560 407 582 560 407 582 560 2 338 375 400 407 57 560 57 57 57 560 57 57 57 57 57 57 57 57 57 57 57 57 57	1255 11/2 230 256 397 412 509 572 11/2 344 382 408 476 517 593 615 749 761 855 855 11/2 436	1277 1275 261 279 326 354 406 421 521 585 1 350 389 415 484 526 603 626 762 774 870 1 442	1/2 240 267 285 333 414 430 532 598 1/2 356 395 422 356 395 422 422 422 423 614 637 776 788 885	1322 Closed 0 246 273 369 423 433 535 543 611 0 362 402 402 402 423 436 789 801 901 Closed 0 454
28K80H 3 to 5 HP BX BELTS BLOWER PULLEY 285V278 285V250 285V124 285V10 245V160 285V154 285V124 285V110 7-1/2 to 10 HP BX BELTS BLOWER PULLEY 285V278 285V234 285V124 285V136 285V124 285V136 285V124 285V136 285V134 285V136 285V136 285V134 285V136 285V136 285V134 285V136 285V128 285V238 285V28 285V238 285V28 285V8 285V28 285V28 285V28 285V28 285V28 285V28 285V28 285V28 285V28	DATUM DIAMETER 27.8 25 23.4 20 18.4 16 15.4 12.6 12.4 11 DATUM DIAMETER 27.8 25 23.4 20 18.4 16 15.4 25 23.4 20 18.4 16 15.4 12.6 12.4 11 DATUM DIAMETER 27.8 27.8	7.7 MOTOR PULLEY 2VP42 PITCH DIAMETER 28.1 25.3 18.7 16.3 15.7 12.9 12.7 11.3 MOTOR PULLEY 2VP60 PITCH DIAMETER 28.1 15.7 12.9 12.7 11.3 MOTOR PULLEY 2VF5 PITCH DIAMETER 28.1 23.7 20.3 18.7 12.9 12.7 11.3 MOTOR PULLEY 2VP5 PITCH DIAMETER 28.1 28.1 28.1 29.3 20.5 20.5	1053 Dd1 2.9 Open 6 184 2055 277 317 330 401 407 458 Dd1 407 458 Dd1 407 458 0 den 6 289 320 342 399 342 399 342 399 342 399 342 342 399 342 399 342 342 399 342 342 399 342 342 399 342 342 355 56 6 38 717 317 317 317 317 317 317 317 317 317	1075 Dd2 3.9 5 1/2 189 210 224 262 284 326 339 412 244 262 284 326 339 412 5.5 5 1/2 295 327 349 408 443 508 527 642 733 Dd2 7 5 1/2 387 430	1098 Pd1 3 5 194 216 230 269 292 335 348 423 430 483 Pd1 4.7 5 301 334 357 416 55 666 748 Pd1 655 666 748 Pd1 6.2 5 9393 436	1120 Pd2 4 200 222 237 276 300 344 357 435 7 435 7 435 7 435 7 435 7 435 7 435 7 435 7 435 7 431 441 496 Pd2 5.9 441 307 441 364 465 465 669 679 763 Pd2 76 76 76 76 76 76 76 76 76 76 76 76 76	4 205 227 353 366 445 453 509 44 4 4 313 348 371 433 470 540 560 682 693 779 779	TURNS 3 1/2 210 233 249 290 315 362 375 457 464 522 TURNS 3 1/2 319 355 378 442 480 550 571 695 570 695 706 794 794 794 794	1187 ON MOTOR 3 215 297 323 370 385 468 475 534 0N MOTOR 3 215 297 380 475 534 0N MOTOR 3 255 361 386 450 489 561 582 709 720 809 ON MOTOR 3 417 464	1210 PULLEY 2 1/2 220 244 261 304 331 379 394 487 547 901LEY 2 1/2 331 368 393 459 571 593 722 733 824 PULLEY 2 1/2 733 824 PULLEY 2 1/2 4470	2 225 250 267 312 338 403 498 560 498 560 2 338 560 2 338 375 560 400 467 567 582 604 735 2 820 604 477	1255 11/2 230 256 397 412 509 572 11/2 344 382 408 476 579 615 749 761 855 11/2 436 484	1277 1277 1277 1275 261 279 326 406 421 513 521 585 585 1 1 359 415 485 603 626 603 626 762 774 870 1 442 491	1/2 240 267 285 333 361 414 430 524 430 524 598 1/2 356 395 422 493 598 1/2 422 493 598 422 493 598 1/2 448 885	1322 Closed 0 246 273 340 369 423 439 535 543 611 0 362 402 429 501 544 625
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Troubleshooting

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

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

Airflow Troubleshooting Chart

MSC Troubleshooting

Fault	Problem	Potential Cause	Corrective Action
	Feedback Fault on	Disconnected/faulty wiring	Secure connections to fan. If faulty wiring is found, repair or replace as required.
Feedback Fault	MSC Display	No feedback for 30 seconds	Check parameters.
		Less than 70% of RPM	Check duct/fan for obstructions.
Modbus	Modbus fault on MSC	Faulty Cat 5 connection/cable	Find and replace faulty cable.
Modbus	Display	ECPM03 does not recognize device	Verify Modbus # on device is set correctly.
Variable Device Fault	Motor not responding to changes made on	Defective potentiometer	Replace potentiometer.
	variable device (potentiometer)	Faulty wiring to motor	Find and replace faulty wiring.
		2-Speed switch not working	Check switch and wiring.
Motor not responding	Motor not functioning as expected	Wiring to motor defective	Find and replace faulty wiring.
		Check for other faults on MSC display	If no other faults are present, motor maybe defective.

TURN OFF POWER TO THE MOTOR WHILE PROGRAMMING THIS DEVICE.

- If the device has a potentiometer or a 2-Speed switch, a jumper wire can be placed in between the 10V In and 10V Out terminals to rule out a defective device. This will cause the motor to go to HIGH SPEED.
- The IO STATUS menu can be used to verify the inputs and outputs of the device are functioning as expected.
- The FAULT HISTORY menu can be used to keep track of faults while working on the device.

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.

General Maintenance

- 1. Fan inlet and approaches to ventilator should be kept clean and free from any obstruction.
- 2. All fasteners and electrical connections should be checked for tightness each time maintenance checks are performed before restarting unit.
- 3. These units 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.
- 4. Motors are normally permanently lubricated. Check bearings periodically. If they have grease fittings lubricate each season. Use caution when lubricating bearings. Wipe the fittings clean and lubricate the unit while rotating with your hand. Caution: Use care when touching the exterior of an operating motor. Components may be hot enough to burn or cause injury.
- 5. If bearings require lubrication, very little is needed. A general rule is one-half pump from a grease gun for 1/2" to 1-7/16" shaft diameters and one full pump for 1-11/16" and large diameter shafts for every 1500 to 3000 hours of operation. A lithium-based grease should be used. Bearings should be rotated as they are lubricated to evenly distribute the grease, either by hand or via extended grease lines. Do not attempt to grease bearings from inside the enclosure while the motor is energized. Caution: Bearings are sealed, over-greasing can cause damage to the bearings. Do not grease until grease comes out of seals. Only add the appropriate amount of grease.

2 Weeks After Start-up

- 1. Belt tension should be checked after the first 2 weeks of fan operation. **See "Pulley Alignment/ Proper Belt Tension" on page 45.**
- 2. All fasteners should be checked for tightness each time maintenance checks are performed before restarting unit.

Every 3 Months

- 1. Belt tension should be checked quarterly. **See "Pulley Alignment/Proper Belt Tension" on page 45.** Over-tightening will cause excessive bearing wear and noise. Too little tension will cause slippage at start-up and uneven wear.
- 2. Filters need to be cleaned and/or replaced quarterly, and more often in severe conditions. Washable filters can be washed in warm soapy water. When re-installing filters, be sure to install with the **airflow in the correct direction** as indicated on the filter.

Yearly

- 1. Inspect bearings for wear and deterioration. Replace if necessary.
- 2. Inspect belt wear and replace torn or worn belts.
- 3. Inspect bolts and set screws for tightness. Tighten as necessary.
- 4. Inspect motor for cleanliness. Clean exterior surfaces only. Remove dust and grease 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.

Notes



Start-up and Maintenance Documentation

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

Job Information

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

Fan Unit Information

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

Blower Rotation				
Correct				
Incorrect				
Field Measure Information				
Voltage				
Amperage**				
RPM				

Cleaning and Maintenance

Date	Service Performed	Date	Service Performed	

**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.

As a result of our dedication to constant improvements and quality, the MANUFACTURER reserves the right to update specifications without notice. Please refer to MANUFACTURER'S website for up to date documentation.

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