IM-5500
June 2026

Centrifugal Powered Roof & Wall Exhausters

Installation, Operation & Maintenance Manual

Review AMCA Bulletin 410 Prior to Installation

This manual has been prepared to guide the users of centrifugal powered roof and wall exhausters in the proper installation, operation and maintenance procedures to ensure maximum equipment life with trouble-free operation. For safe installation, startup and operational life of this equipment, it is important that all involved with the equipment be well versed in proper fan safety practices and read this manual. It is the user's responsibility to make sure that all requirements of good safety practices and any applicable safety codes are strictly adhered to. Because of the wide variety of equipment covered in this manual, the instructions given here are general in nature. Additional product and engineering information is available at *www.tcf.com*.

SAFETY NOTICE

Refer to the Safety section(s) in this manual prior to installing or servicing the fan. The most current version of this installation and maintenance manual can be found on our website at *www.tcf.com/resources/im-manuals*.

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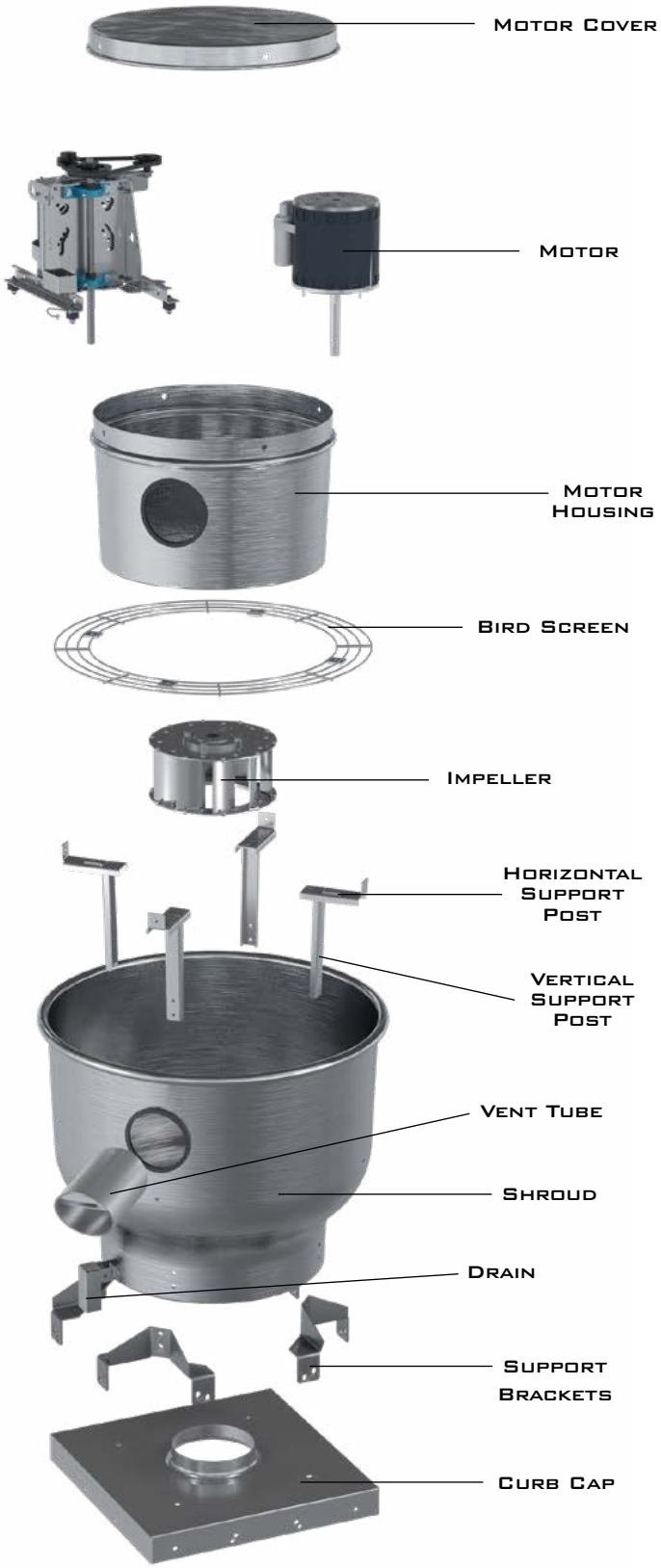
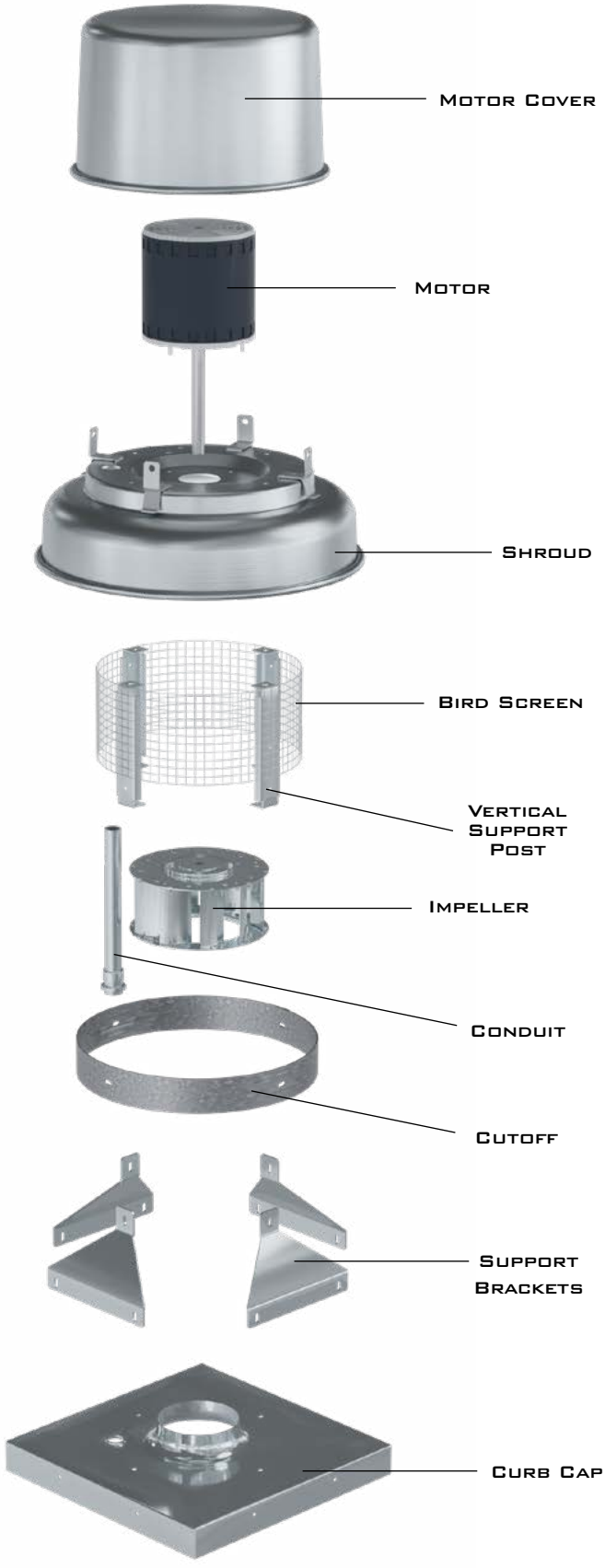
Exploded Views



Upblast Exhaust Fan,
Models VCU & VCUB



Downblast Exhaust Fan,
Model VC
(size 077-120 shown)

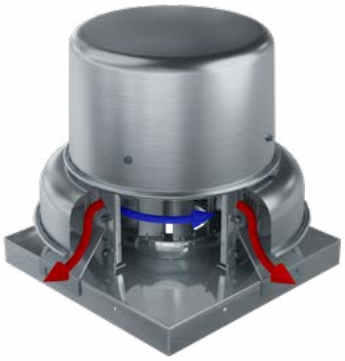
Fan Overview

Precisely designed for use in roof and wall exhaust applications, the fans covered in this manual offer a broad range of end-use applications and should be carefully integrated to provide best use. Upblast direct drive fans are available with nominal impeller sizes from 8.5” to 19.7” and belt driven with nominal impeller sizes 12.2” to 19.7”. Downblast direct drive fans are available in nominal impeller sizes from 8.5” to 12.0”. Maximum continuous operating temperature for standard build fans is 122°F, with an option for UL 705 Supplement SC (formerly UL 762) rated upblast units for continuous airstream temperatures of up to 300°F for restauraunt applications. Each fan bears an affixed manufacturer nameplate with the model number and serial number. See below.

Impeller Rotation and Airflow

Upblast Exhauster

Blue Arrows = Impeller Rotation
Red Arrows = Airflow

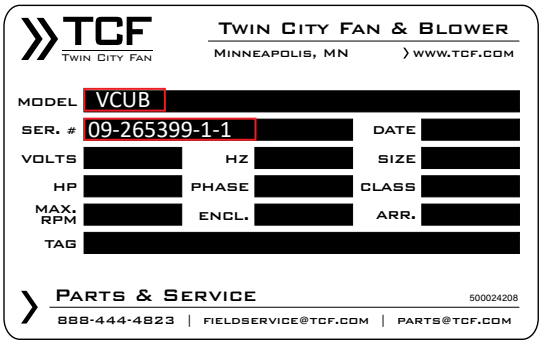


Downblast Exhauster

Nameplate

The serial number and fan type can be found on our permanent nameplate of the fan.

Check to ensure the nameplated voltage matches the line voltage being supplied to the unit.



Dimensional Data – Models VCU, VCUB (Upblast)

SIZE	CURB CAP	DAMPER	ROOF/WALL OPENING	WALL OPENING WITH MOUNTING BRACKETS	WALL MOUNTING BRACKET SQUARE	APPROX. WEIGHT (lbs.)		SHAFT DIAMETER (VCUB ONLY)
						VCU	VCUB	
085	17.00	10.00	10.50	17.00	16.75	60	N/A	N/A
089 – 112	20.00	14.00	14.50	20.00	19.75	65	N/A	N/A
122 – 135	24.00	18.00	18.50	24.00	23.75	95	135	3/4
140 – 165	24.00	18.00	18.50	24.00	23.75	100	135	3/4
177 – 197	30.00	24.00	24.50	30.00	29.75	135	180	3/4

Dimensional Data – Model VC (Downblast)

SIZE	CURB CAP	DAMPER	ROOF OPENING	APPROX. WEIGHT (lbs.)
77-120	17.00	10.00	10.50	45
124-157	24.00	18.00	18.50	115
177-197	30.00	24.00	24.50	195
220-248	34.00	28.00	28.50	250

NOTES:
1. All dimensions are in inches unless otherwise noted.
2. Approximate weights shown above include only the bare fan and motor (heaviest at time of publication), not accessories.

Receiving, Inspection & Unpacking

When the equipment is received all items should be carefully checked against the bill of lading to be sure all crates and cartons have been received. Before accepting delivery, carefully inspect each carton or crate for visible shipping damage. If any damage is noticed, the carrier should make the proper notation on the delivery receipt acknowledging the damage. Make notations of all damage on all copies of the bill of lading and have all copies countersigned by the delivering carrier. The carrier should also fill out a Carrier Inspection Report. The factory Traffic Department should then be contacted. File claim for damage with the carrier. Physical damage to the unit after acceptance is not the responsibility of Twin City Fan Companies, Ltd.

Unpack each carton or crate and verify that all required parts and proper quantities of each item have been received. Refer to drawings for part descriptions. Report shortages or missing items to your local representative to arrange for replacement parts. Due to availability of carriers and truck space, it is not possible to guarantee that all items will be shipped together. Verification of shipments must be limited to only those items on the bill of lading.

Safety & Hazard Warnings

For general safety practices for air moving equipment, see AMCA Bulletin 410. Twin City Fan & Blower offers many safety accessories. These safety devices include (but are not limited to) Firestat, inlet and discharge screens. The use and suitability of safety devices is the responsibility of the purchaser.

All fans should be powered through switches that are easily accessible to service personnel from the fan. Fan power must have the ability to be “locked out” by service personnel trained in lockout/tagout procedures per OSHA requirements (29CFR1910.147). When performing lockout, be aware of factors, such as building pressure and additional fans in the system that can influence unwanted fan rotation (wind milling). If you have any doubt about your ability to perform a task, seek a person qualified to do that task. Before any work is done on a fan, ensure that the fan is isolated from the electrical supply using a 'lockout/tagout system.'

Note: A stationary, non-rotating fan does not mean that the fan is isolated from the electrical supply. A non-rotating fan could be subject to controls or other circuit protection devices that may start the fan without notice.

The following safety precautions should be followed, where applicable:

- Do not attempt to slow a rotating impeller even when it is isolated from the electrical supply. Fan impellers have a high inertia and injury could result from an attempt to stop it. It is recommended that the impeller is isolated by closing off the inlet or outlet to prevent wind-driven rotation. If an impeller is chocked to prevent rotation, ensure that the chocks are removed prior to start up.
- Wear appropriate personal protective equipment. This may include protective clothing, eye protection, ear protection, respiratory equipment, hand and foot protection when installing or servicing the fan.
- Always use caution when entering a fan's air path. High velocity airflow can cause you to lose your balance.
- Motor, bearings and drives can be hot, and similarly if the fan is subject to processes that are hot, the fan housing could be hot.
- Sharp edges – wear protective gloves when handling, installing or servicing a fan.
- Fans can operate at high decibel sound levels. Wear proper ear protection to protect from excessive noise levels.

Throughout this manual, there are a number of HAZARD WARNINGS that must be read and adhered to in order to prevent possible personal injury and/or damage to equipment. Two signal words "WARNING" and "CAUTION" are used to indicate the severity of a hazard and are preceded by the safety alert symbol. It is the responsibility of all personnel involved in installation, operation and maintenance to fully understand the warning and caution procedures by which hazards are to be avoided.

WARNING: Used when serious injury or death MAY result from misuse or failure to follow specific instructions.

CAUTION: Used when minor or moderate injury or product / equipment damage MAY result from misuse or failure to follow specific instructions.

NOTICE: Indicates information considered important, but not hazard-related.

Handling

Handling of all air moving equipment should be conducted by trained personnel and be consistent with safe handling practices. Verify the lift capacity and operating condition of handling equipment. When using hoisting equipment, only qualified and trained personnel should operate the equipment.

Units shipped completely assembled may be lifted with slings and spreader bars. (Use well-padded chains, cables or nylon straps, rated to lift the required weight.) On most units, lifting lugs are designed to protect the fan and fan housing from damage. Never lift a fan by the inlet or discharge flange, shafting or drives, impeller, motor or motor base, or in any other manner that may bend or distort parts. Never lift with slings or timbers passed through the fan inlets.

⚠ CAUTION

1. **Maintain handling equipment to avoid serious personal injury and do not stand under the load.**
2. **If supplied, only use the provided lifting lugs to lift the equipment.**
3. **Ensure that the lifting equipment is rated for the capacity to be lifted.**

Model VC fans:
Sizes 077-157: The fan may be lifted by the lip of the shroud. This can either be done manually (total fan weight is between 50 – 115 lbs.) or with a minimum four-point hook system. Take precautions to not cause any damage to the shroud.

Sizes 177-248: The fan may be lifted from the lifting points located under the motor cover. Fans may be lifted using the two (2) hooks with spreader bar on the motor base. Alternatively, the four (4) hooks on the motor rails with a spreader bar may be used.

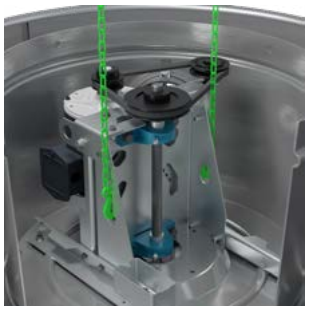
Model VC with lifting points (Sizes 077-157)

Model VCU fans:
All Sizes: Fans may be lifted using hooks around the four (4) horizontal support posts with a minimum of four lifting straps with spreader bars to ensure that no contact is made with the motor housing.

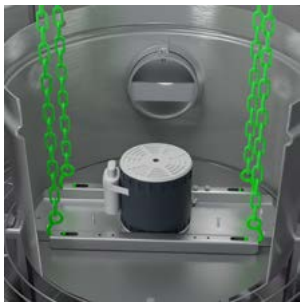
Sizes 122 and greater: An alternative method for direct drive units between Sizes 122 and 197 is to utilize the lifting holes located on the motor support plate within the housing. To lift the unit, four straps and hooks should be used to lift by all four points.

Model VC with lifting points (Sizes 177-248, two hooks)

Model VCUB fans: Two lifting lugs located on the bearing support plate provide easy access lifting points. There are also four holes located on the drive frame bars from which the fan can be lifted.



Model VCUB (Bearing support plate features two points for lifting)



Model VCU (Motor support plate features four lifting points)

Model VCU (all sizes method)

Model VC with lifting points (Sizes 177-248, four hooks)

Wall Mount Fans: Use two lifting straps around the shroud of the fan. One should be located around the neck of the shroud and the other near to the shroud lip.

Unit Storage

If fan installation is to be delayed, store the unit in an environmentally stable and protected area. During storage, the fan should not be subjected to vibration from external sources or bearing damage may occur. The unit should be reasonably protected from any accidental impacts. Cover the fan to protect coatings and to prevent any foreign material or moisture from entering the inlet or discharge. Take care to protect the motor, drives and bearings.

Extended storage requires monthly inspections. Check for corrosion or damage to the unit and for debris within the fan.

Bearings tend to take on moisture if the atmosphere in which they are stored is not at a constant temperature. To avoid corrosion, it is necessary to keep the bearings full of grease and to rotate them periodically. Even when full of grease, bearings will take on moisture, so it is necessary to purge the bearings with new grease to expel moisture every thirty days. It is recommended that the bearings be purged with grease while being rotated by hand. Do not use high pressure greasers as they may ruin the bearing seals. Remove old/excess grease and regrease the bearing in accordance with the bearing manufacturer's instructions.

The drives and belts should be removed if the fan is to be stored for a prolonged period. The drives should be labeled for service and stored in a dry place. Belts should be removed, coiled without kinks, placed in a heavy carton and stored in a dry, well-ventilated place. To prevent belt deterioration storage conditions should not exceed 85°F and 70% humidity. If belts show signs of deterioration, they should be replaced prior to startup.

Motors should be stored in a clean, dry, vibration-free location. The packaging should be opened up enough to allow air circulation around the motor. The winding temperature should be kept slightly above that of the surroundings to prevent condensation. This can be accomplished by energizing the internal heaters, if the motor is so equipped, or by using space heaters. If it is impossible to heat the windings, the motor should be wrapped tightly with a waterproof material that also encloses several bags of desiccant. Replace the desiccant regularly to prevent moisture problems. The motor rotor should also be rotated regularly (monthly) to assure the bearing parts are well greased. Shafts on motors equipped with shaft grounding rings must remain rust free. Failure to do so renders the grounding feature inoperative. Consult the motor manufacturer for further detail on motor storage and start up after longer periods of storage.

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General Installation

The installation of this equipment shall be in accordance with the regulations of authorities having jurisdiction and all applicable codes.

This equipment is to be installed by an experienced installation company and fully trained personnel.

The mechanical installation of the exhaust ventilator consists of making final connections between the unit and building services, duct connections.

⚠ CAUTION

Sheet metal parts, screws, clips and similar items inherently have sharp edges and it is necessary that the installer and service personnel exercise caution.

1. Install an appropriate roof curb for the fan size and use. Ensure proper caulking and flashing are installed for a water-tight seal.
   a. Sidewall Mounted Units: A wall mounting bracket is shipped for all fans meant for sidewall installation. Bolt the wall mount bracket to the wall by pre-drilling pilot holes and then using eight lag screws to secure the bracket.
2. Any backdraft damper, insect screen or performance baffle should be installed now. Refer to the *Performance Baffle Installation* section for details.
3. Perform fan pre-check. See *Check, Test & Start Procedure* section for a full checklist.
4. Perform installation of any externally mounted accessories that were shipped loose with the fan.
5. Remove the fan motor housing cover by removing the four screws. See Motor Housing Cover Removal images to the right for reference on screw location.
6.
   a. Roof Mounted Units: Place the unit onto the roof curb. Secure the fan to the curb with eight lag screws or other suitable fasteners. Verify that the fan is oriented to facilitate installation of wiring.
   b. Sidewall Mounted Units: Align and then affix the fan onto the wall mounting bracket using the hardware provided. NOTE: The drain should always be facing directly down and the vent tube to the lower right corner. See image below for drain and vent tube location.
   c. NOTE: If curb hinge, security latch or retaining chain accessories are selected, please reference the Curb Hinge, Security Hasp and/or Retaining Chain installation instructions towards the back of this manual.
7. Follow the *Motor Wiring and Installation* instructions section. Verify installation of any accessories that were shipped loose with the unit.
8. Affix the motor housing cover back onto the unit.

NOTE:
See *Miami-Dade / High Wind Installation* section on the next page for Miami-Dade / High Wind application installations.

Motor housing cover removal

Upblast

Downblast

Wall mounted unit with correct drain and vent tube location

TCF Twin City Fan

Miami-Dade / High Wind Installation

The installation of this equipment shall be in accordance with the regulations of authorities having jurisdiction and all applicable codes.

This equipment is to be installed by an experienced installation company and fully trained personnel.

The mechanical installation of the exhaust ventilator consists of making final connections between the unit and building services, duct connections.

⚠ CAUTION

Sheet metal parts, screws, clips and similar items inherently have sharp edges and it is necessary that the installer and service personnel exercise caution.

1. Install an appropriate roof curb or sidewall bracket for the fan size and use. Ensure proper caulking and flashing are installed for a water-tight seal.
   a. For specific instructions, see Miami-Dade County NOA 26-0518.03 (https://www.miamidade.gov/building/library/productcontrol/noa/26051803.pdf).
      i. Drawing for VC is on page 5/15
      ii. Drawing for VCU Roof Mount is on page 11/15
      iii. Drawing for VCU Wall Mount is on page 12/15
2. Any backdraft damper, insect screen or performance baffle should be installed now. Refer to the *Performance Baffle Installation* section for details.
3. Perform fan pre-check. See *Check, Test & Start Procedure* section for a full checklist.
4. Perform installation of any externally mounted accessories that were shipped loose with the fan.
5. Remove the fan motor housing cover by removing the four screws. See Motor Housing Cover Removal images to the right for reference on screw location.
6.
   a. Roof Mounted Units: Place the unit onto the roof curb. Secure the fan to the curb with a suitable number and type of fasteners per NOA 26-0518.03. Verify that the fan is oriented to facilitate installation of wiring.
   b. Sidewall Mounted Units: Align and then affix the fan onto the wall mounting bracket using the hardware provided. NOTE: The drain should always be facing directly down and the vent tube to the lower right corner. See image below for drain and vent tube location.
7. Follow the *Motor Wiring and Installation* instructions section. Verify installation of any accessories that were shipped loose with the unit.
8. Affix the motor housing cover back onto the unit.

Motor housing cover removal

Upblast

Downblast

Wall mounted unit with correct drain and vent tube location

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Check, Test & Start Procedure

WARNING

1. **Electric shock hazard. Could cause severe injury or death. Failure to bond the frame of this equipment to the building electrical ground by use of the grounding terminal provided or other acceptable means may result in electrical shock. Disconnect electric power before servicing equipment. Service to be performed only by qualified personnel. Make sure power is turned off and locked in the OFF position.**
2. **Impeller rotation is critical. All units are designed to rotate in a CCW direction. If spun in the opposing direction, fan performance is heavily degraded and the motor will overload and burn out prematurely.**
3. **Three-phase units are especially susceptible to incorrect rotation due to the ease of incorrectly connecting the wires. If the unit is checked on temporary wiring, impeller rotation should be rechecked when permanently installed. Motor burn out or tripped overload protection devices are key indications of a fan left to run in the wrong rotation.**

1. General unit check:
   a. Check for any defects or damage. Contact your local representative if any damage is present.
   b. Verify that all accessories are installed and operational.
   c. Validate all fasteners are secure and there are no loose parts.
2. Impeller check:
   a. Validate that the impeller is free and able to rotate.
   b. Validate that the impeller to inlet venturi overlap is maintained. See *Impeller to Inlet Venturi* table below for the specified overlap.
   c. Apply power to the unit and check the rotation of the impeller. The label within the motor housing indicates the direction. See images in the *Impeller Rotation and Airflow* section for visual aid.
   d. Verify fan RPM using a tachometer. If a speed controller is used, check that the maximum and minimum RPM are as desired. If the minimum RPM is not as desired, see *Speed Control Installation* section for instructions on how to adjust.
3. Drive and belt check (VCUB fans ONLY):
   a. Verify that sheaves and idler pulley (auto-tensioner if accessory was selected) are aligned parallel.
   b. Verify that the belt is taut with minimal deflection. Adjustment can be made by sliding the idler pulley along the groove to either tighten or loosen the belt. See image to the right.
   c. Verify the RPM of the impeller. Adjustment can be made via the variable speed sheave attached to the motor to reach the desired RPM.
   d. Bearings should be properly greased from the manufacturer.
   e. See the *V-Belts* section for further information.

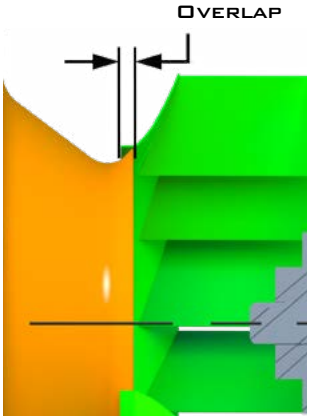
NOTICE

The impeller was balanced at the factory to be within stringent vibration levels before shipment. However, there are several things that may cause vibration, such as rough handling in shipment and installation, weak foundations and alignments.

Model VCUB Idler Pulley

Impeller to Inlet Venturi

FAN TYPE	SIZE	OVERLAP (+/- 0.05")
VCU	085	0.20"
	089	0.13"
	098	0.13"
	110	0.13"
	112	0.20"
VCU & VCUB	122	0.20"
	124	0.13"
	135	0.20"
	140	0.13"
	150	0.20"
	157	0.13"
	165	0.20"
	177	0.20"
	182	0.20"
	197	0.20"
VC	077-124	0.13"
	140	0.14"
	157	0.16"
	177	0.18"
	197	0.20"
	220	0.22"
	248	0.25"



Impeller Overlap

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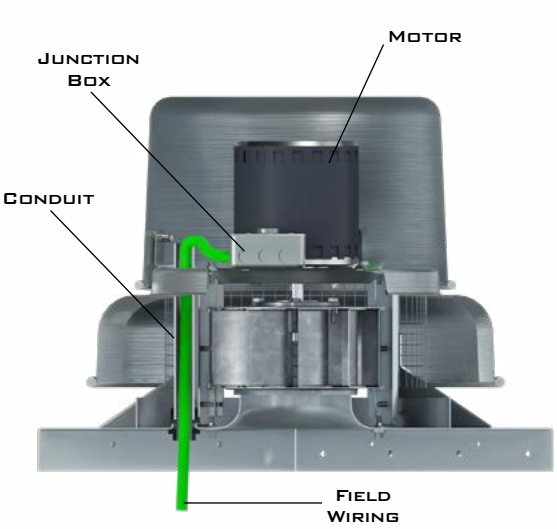
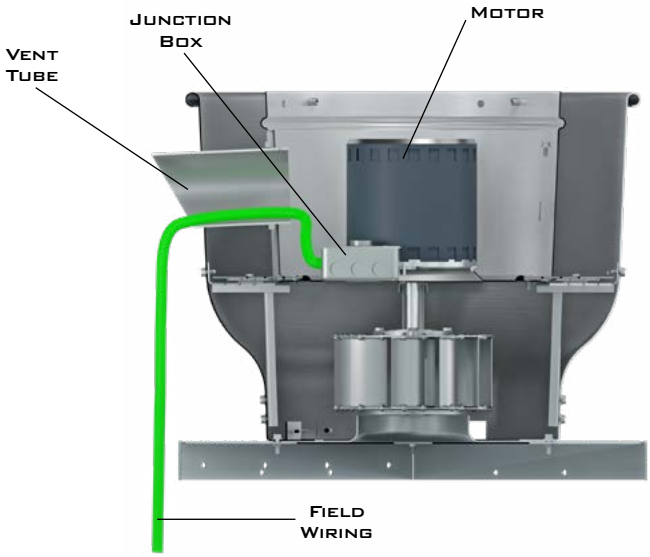
Motor Wiring & Installation

1. Proper Lockout/Tagout procedures should always be followed as discussed in the *Safety & Hazard Warnings* section. Verify that no power is on the circuit to which the fan is being connected.
2. Run appropriately rated wiring for the installation method to the junction box located within the motor housing; only ½" knockouts available.
   Downblast Fans: The electrical supply is routed through conduit between the curb cap and motor compartment.
   Upblast Fans: The electrical supply is routed through the vent tube.
   See images below for electrical routing.
   a. Refer to the accessory installation portion towards the end of this manual for additional wiring instructions for various wired accessories.
3. Leave enough slack in the wiring for maintenance accessibility.





Electrical Information

1. Check the wiring diagrams on the motor for connections.
2. The motor is factory set at the voltage marked on the fan nameplate. Check the line voltage with the nameplate voltage and wiring diagrams.
3. The main power wiring should be sized for the ampacity shown on the dataplate. Size wires in accordance with the ampacity tables in Article 310 of the National Electrical Code. If long wires are required, it may be necessary to increase wire size to prevent excessive voltage drop. Wires should be sized for a maximum of 3% voltage drop.
4. Disconnect switches are not fused. The power leads must be protected at the point of distribution in accordance with the fan dataplate.
5. On fans without a thermal protector integral to the motor (refer to unit or motor dataplate to determine if protector is present) a separate overload device is required. Refer to Sections 430-32 of the N.E.C. for sizing.
6. All units must be electrically grounded in accordance with local codes or, in the absence of local codes, with the latest edition of the National Electrical Code (ANSI/NFPA 70). A ground lug is provided as standard in the unit terminal box. Size grounding conductor in accordance with Table 250-95 of the National Electrical Code. DO NOT use the ground lug for connecting a neutral conductor.
7. Supply voltage to the power ventilator should not vary by more than 10% of the value indicated on the unit dataplate. Phase unbalance must not exceed 2%.

⚠ CAUTION

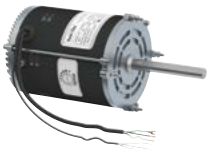
1. **Use copper conductors only.**
2. **Protect wiring from sharp edges. Leave some slack in the line to prevent damage.**

⚠ WARNING

Failure of motor due to operation on improper line voltage or with excessive phase unbalance constitutes product abuse and may cause severe damage to the unit's electrical components.

EC Motor Information

See Single-Phase EC Motors Manual, IM-4055 for EC motor details.



EC Motor

Microdrive Information

See Microdrive Quick Start Guide for details.

Microdrive

Fan Bearing Maintenance (refer to safety section)

Proper lubrication of the fan drive bearings helps assure maximum bearing life. All fans are equipped with decals indicating the recommended relubrication intervals for normal operating conditions.

The standard pillow block bearings on belt driven ventilators are factory lubricated and are provided with external grease fittings. Annual lubrication is recommended, or more frequently if needed (see *Greasing Intervals* table). It is recommended to add fresh grease at start-up, but do not over-grease. Use only 1 or 2 shots of a recommended lubricant with a hand gun in most cases. Maximum hand gun rating 40 P.S.I. Rotate bearings during lubrication where good safety practice permits. The most frequent causes of bearing failure are not greasing often enough, using an excessive quantity of grease or using incompatible greases. Excessive vibration, especially if the bearing is not rotating, will also cause bearings to fail. Bearings must also be protected from water and moisture to avoid internal corrosion.

During the first few months of operation it is recommended that the bearing set screws be checked periodically to ensure that they are tight. The rotating impeller requires particular attention since materials in the air being handled can build up on the blades to cause destructive vibration or weaken the structure of the impeller by corroding and/or eroding the blade metal. Regular inspection and corrective action at intervals determined by the severity of each application are essential to good service life and safety.

Suggested Fan Bearing Greasing Intervals

INTERVAL (MONTHS)	TYPE OF SERVICE
12 to 18	Infrequent operation or light duty in clean atmosphere
6 to 12	8 to 16 hrs./day in clean, relatively dry atmosphere
3 to 6	12 to 24 hrs./day, heavy-duty or if moisture is present
1 to 3	Heavy-duty in dirty, dusty locations; high ambient temperatures; moisture-laden atmosphere; vibration

⚠ CAUTION

Greases of different soap bases (lithium, sodium, etc.) may not be compatible when mixed. Prevent such intermixing by completely purging the bearing of old greases.

Safety & Bearing Lubrication Instructions

⚠ WARNING

1. **This equipment must not be operated without proper guarding of all moving parts. While performing maintenance be sure remote power switches are locked off. See installation manual for recommended safety practices.**
2. **Before starting: Check all set screws for tightness and rotate impeller by hand to make sure it has not moved in transit.**

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Fans with Ball Bearings

Relubrication Schedule (Weeks)* Ball Bearing Pillow Blocks									
Shaft DIA	Speed (RPM)								
	500	1000	1500	2000	2500	3000	3500	4000	4500
¾" (19 mm)	6	6	5	3	3	2	2	2	1

*Suggested lubrication interval under continuous operation in adverse loading or with elevated temperatures. For operation less than 24 hours per day or under ideal conditions, lubrication frequency may be reduced. Relubricate while running, if safety permits, until some purging occurs at seals. Adjust lubrication frequency depending on condition of purged grease. Hours of operation, temperature and surrounding conditions will affect the relubrication frequency required.

1. Lubricate with a high quality NLGI No. 2 lithium-base grease having rust inhibitors and antioxidant additives, and a minimum oil viscosity of 500 SUS at 100°F (38°C). Some greases having these properties are:
   Shell - Gadus S2 V100 2 — Mobil - Ronex MP
   Mobil - Mobilith SHC100 — Mobil - Mobilith SHC220
2. Lubricate bearings prior to extended shutdown or storage and rotate shaft monthly to aid corrosion protection.

Speed Control Installation

When the controller is shipped loose, it can be installed externally, or alternatively it can be installed inside of the fan 90 degrees from the disconnect switch. On Model VCU it can be installed between the rib and the raised motor mounting section of the housing compartment. Speed control is available using 115/60/1 open type PSC motors. Connect control in series with motor and line voltage (115V only). Never connect across line. See Connection Diagrams.

Minimum Speed Setpoint

All controls are factory set to 65V±3V output as standard with an input voltage of 120V. If different minimum speed is desired, the control may be adjusted by turning minimum speed pot clockwise to decrease minimum speed and counterclockwise to increase minimum speed. Refer to *Low End Setpoint Adjustment* figure.

WARNING

1. **If minimum speed is readjusted, verify unit ampere draw does not exceed motor nameplate amps. Do not operate unit in range where amp draw exceeds motor nameplate.**
2. **Certain failure modes of solid-state controls such as half-waving can cause high levels of DC, motor overheating and motor burn-out. Therefore, a thermal overload protection (integral with motor) is required to limit the maximum motor temperature under such a failure.**

CAUTION

These motors operate more efficiently in the ranges set from the factory. Operating motor outside these ranges (see *Speed Controller RPM Range* table) may cause the motor to run hotter and substantially shorten motor life.

NOTICE

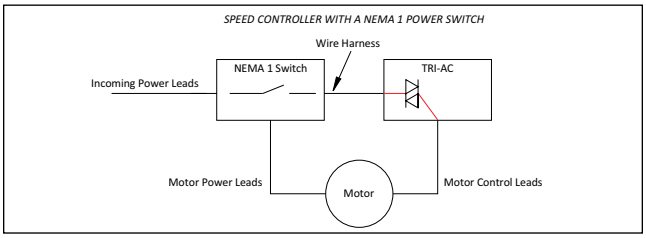
1. **Lowering the minimum speed setpoint may adversely affect motor start-up characteristics.**

Speed Controller Size

MOTOR		SPEED CONTROLLER (FLA)		
HP	RPM	5 AMP	10 AMP	15 AMP
1/30	ALL	X		
1/15	ALL	X		
1/8	ALL	X		
1/6	ALL	X		
1/4	ALL	X		
1/3	<= 1500	X		
1/3	> 1500		X	
1/2	ALL		X	

Typical Speed Control Installation Location

Connection Diagrams, Speed Control



One red wire will be connected to the AC line voltage. The second red wire will be connected to the input power lead for the motor. The green wire is the ground wire.

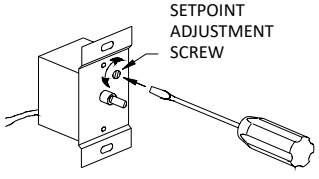
Speed Controller RPM Range

HP	RPM	MAX. RPM	MIN. RPM
1/30	1650/1500/1350[2,3]	1650[4]	1300[4]
1/8		1500[5]	950[5]
1/15	860	860	500
1/8			
1/6			
1/4			
1/2			
1/8	1140	1140	900
1/6			
1/4			
1/2			
1/3	1725	1725	1200
1/2			

NOTES:

1. Speed control available only with 115/60/1 open motors (thermally protected).
2. Three-speed motor (multiple tap winding).
3. Speed control should not be connected to low speed tap on motor because of starting characteristics.
4. Speed control connected to high speed tap on motor.
5. Speed control connected to medium speed tap on motor.

Low End Setpoint Adjustment



NOTE: 5 amp model shown. On 10 and 15 amp models, adjustment is made through clearance hole in heat sink. The faceplate must be removed on the 5 amp model to access this screw.

TCF Twin City Fan

V-Belts (refer to safety section)

V-belts on these belt driven fans are oil, heat and static resistant type and oversized for continuous-duty. With proper installation and maintenance, years of operating efficiency can be added to the lifespan of the V-belt drive.

The condition of V-belts and the amount of belt tension should be checked prior to start-up (see Figure 1). When it becomes necessary to adjust belt tension, do not over-tension as bearing damage will occur. Recommended belt tension should permit $^{1}/_{64}$" deflection per inch of span of the belt at the center of the belt span. To find this point, measure halfway between the pulley centerlines as shown in Figure 2. Extreme care must be exercised when adjusting V-belts as not to misalign the pulleys. Any misalignment will cause a sharp reduction in belt life and will also produce squeaky, annoying noises (see Figure 3).

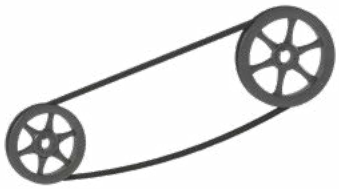
1. Always loosen tension adjustment enough to place belts on sheaves without running belts over the edge of either sheave. A new belt may be seriously damaged internally by careless handling (see Figure 4).

WARNING

When removing or installing belts, never force belts over pulleys without loosening the idler pulley or auto belt tensioner first to relieve belt tension.

2. Fan speed can be increased by closing the adjustable motor pulley or decreased by opening it. Always check the load on the motor when increasing the fan speed.

Figure 1. Eliminate Slack



Slack belts wear excessively, cause slippage and deliver less power. For longest belt life, always provide proper tension.

Figure 2. Belt Deflection

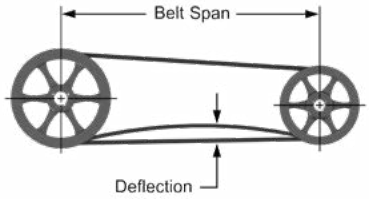
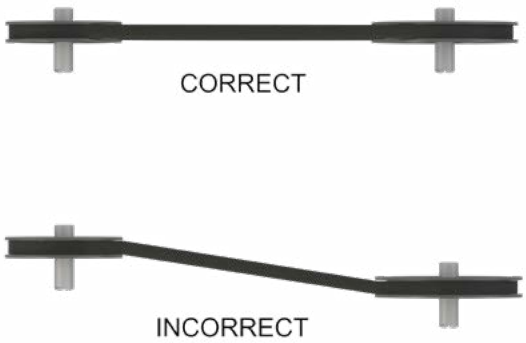
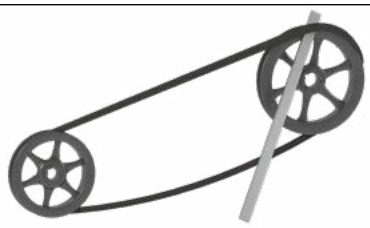


Figure 3. Alignment



Mount belts straight. Shafts must be parallel and sheaves in alignment to prevent unnecessary belt wear.

Figure 4. Belts



Do not force belt. Forcing the belt will break the cords and cause belt failure.

Maintenance (refer to safety section)

Installation and maintenance are to be performed only by qualified personnel who are familiar with local codes and regulations and experienced with this type of equipment. Preventive maintenance is the best way to avoid unnecessary expense and inconvenience. Start-up and routine maintenance should cover the following items:

a. Tighten all set screws, bolts and wire connections.
b. Cleaning of unit, impeller and damper (if present).

All motors containing ball bearings are permanently lubricated from the factory. No additional maintenance is required.

CAUTION

Sharp edges and screws are a potential injury hazard. Avoid them.

WARNING

Hazardous moving parts. Unit may contain protected fan motor that may start automatically and cause injury. Allow time for reset. Disconnect power before servicing.

1. Before performing any maintenance on the fan, be sure power is turned off and locked in the OFF position at the service entrance.
2. Ventilators should be carefully checked at least once a year. For critical or rugged applications, a routine check every two or three months is suggested.
3. All motors supplied with Twin City Fan & Blower ventilators carry a one-year limited warranty from date of shipment. For repairs within the warranty period, the motor must be taken to the motor manufacturer's authorized service dealer. Contact your representative for additional warranty details.
4. A periodic motor check should consist of spinning the motor shaft with the power off to be sure the motor turns freely and the bearings run smoothly.
5. The rotating impeller requires particular attention since materials in the air being handled can build up on the blades to cause destructive vibration or weaken the structure of the impeller by corroding and/or eroding the blade metal. Regular inspection and corrective action at intervals determined by the severity of each application are essential to good service life and safety.

TCF Twin City Fan

Curb Hinge Installation

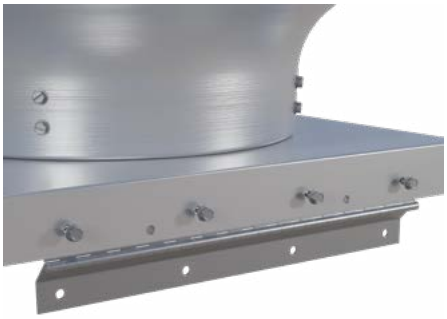
Parts Included
Curb Hinge
1/4-20 x 0.50" Lg Self-Tap Screw (Qty 8, 10 or 12)

Step 1: Align the holes on the curb hinge to the holes on the curb cap. This should be on the opposite side of the drain.

A.

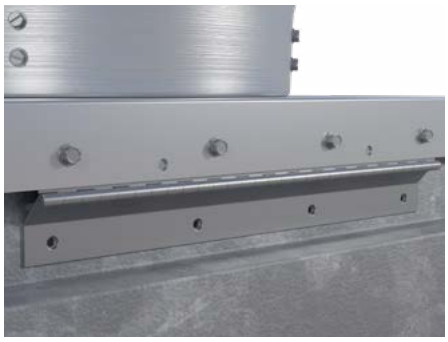
B.

Step 2: Insert provided screws to affix the hinge to the curb cap.

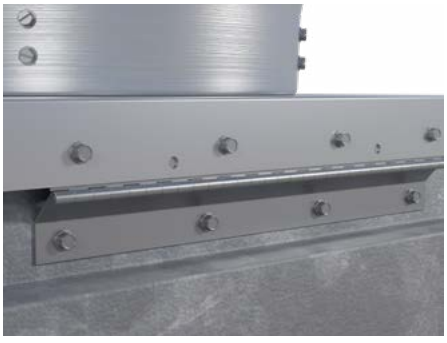


Step 3: Place and install fan onto the roof curb.

Step 4: Properly align the fan with the roof curb. Pre-drill holes for securing hardware.



Step 5: Fasten hinge to roof curb with customer provided hardware.



Security Hasp Installation

Parts Included
10-32 x 3/4", Bolt, Hex (4)
#10 , Star Washer (4)
#10 , Nut Hex (4)
Security Hasp, Hinged

Properly mated security hasp

Step 1: Drill (4) 0.19 holes on center curb cap from either corner.

Step 2: Attach the hasp to the curb cap by using the included #10 hardware.

Step 3: Drill (4) 0.19 holes on center of roof curb, 2" from curb cap edge to top edge of staple.

Step 4: Fasten staple with screws on roof curb.

TCF Twin City Fan

Retaining Chain Installation

Parts Included
Chain, 42" (2)
1/4-20 x 3/4" Bolt (4)
1/4-20 Nylon Hex Nut (4)
1/2" Washer (8)

Step 1: Drill two 1/4" diameter holes, one each corner of curb base.

Step 2: Attach chain to outside of curb base with bolt head on inside of curb base.

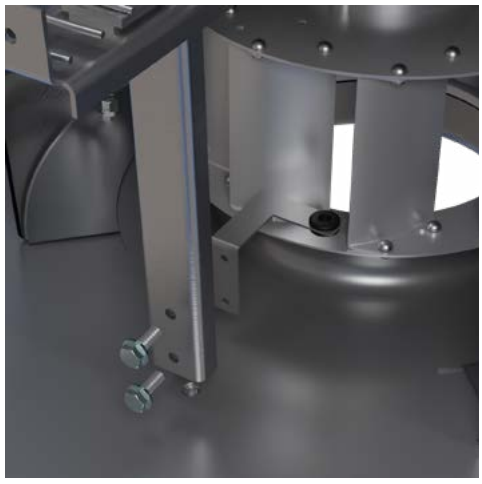
Step 3: Use one flat washer under bolt head and one on top of chain.

Step 4: Use remaining fasteners to attach other end of chain to anchor point.

TCF Twin City Fan

Firestat Installation

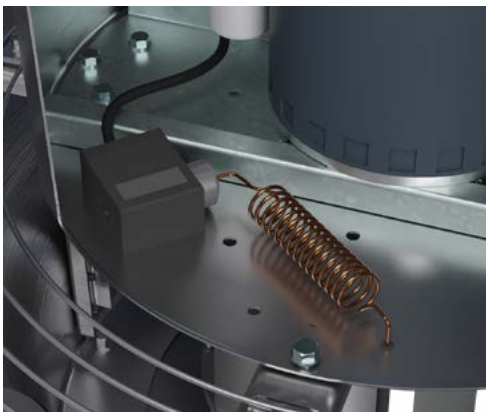
Step 1: Attach the bracket provided to the motor housing support using the self-tapping screws that are fastened to the support post.



Step 2: Drill holes and install firestat. Holes must be near a support post. *Note: The hole drilled in the motor housing must be close to in line with the hole in the bracket provided.*

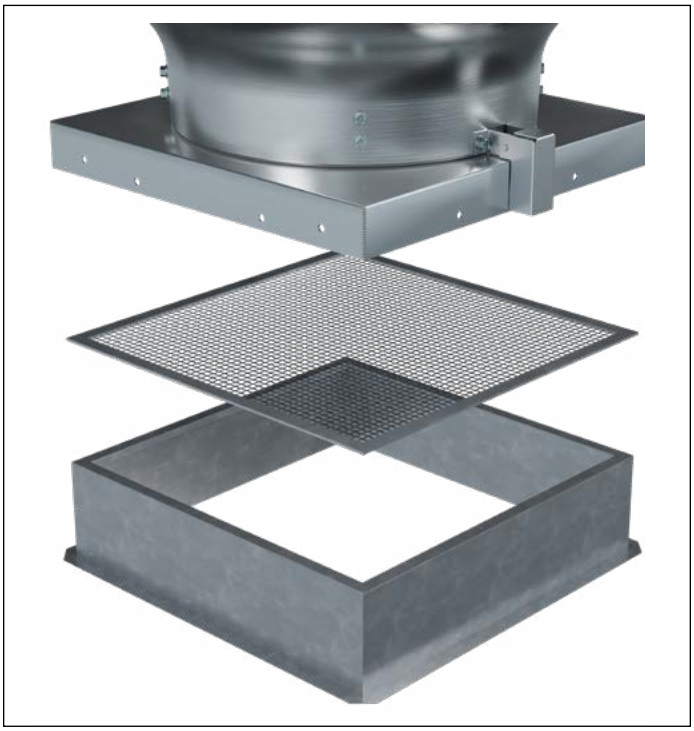
Step 3: Cable tie sensing bulb to the nearest vertical support post.

Step 4: Wire the firestat to the disconnect switch and motor.



Insect Screen Installation

Step 1: Place the insect screen between the fan inlet and the roof or roof curb. Fasten with screws or nails, if desired.



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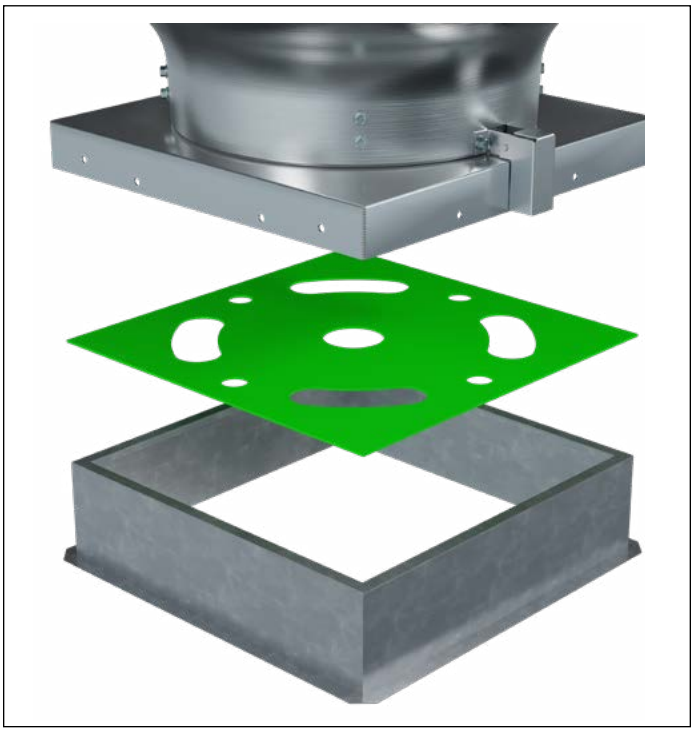
Performance Baffle Installation

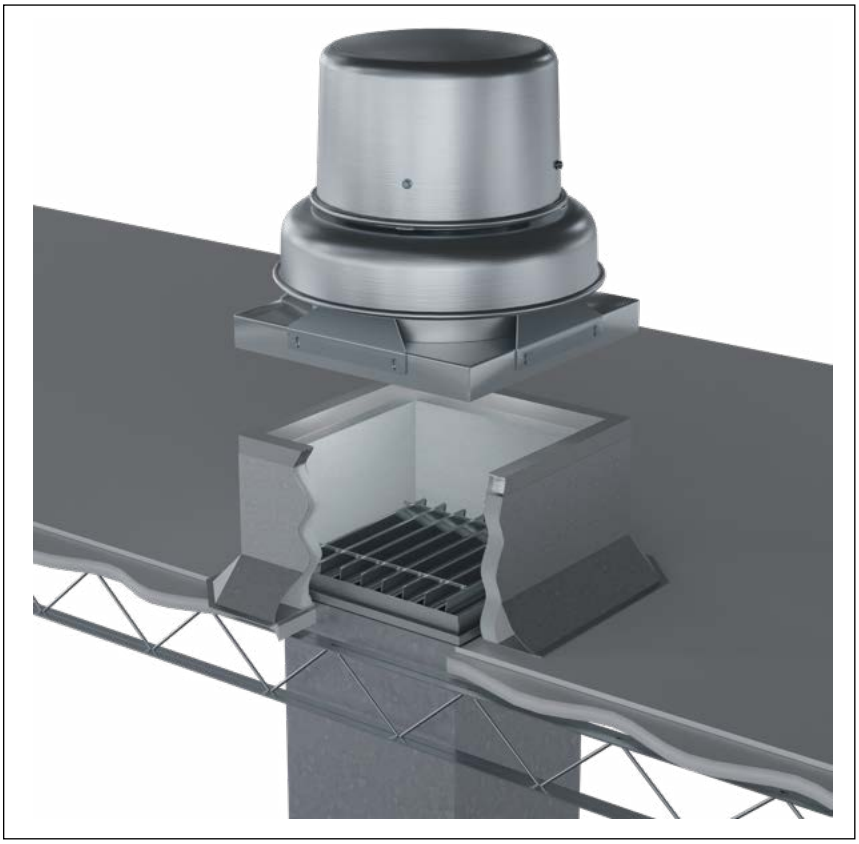
Step 1: Place the performance baffle between the fan inlet and the roof or roof curb. Fasten with screws or nails, if desired.



TCF Twin City Fan

Damper Installation

Step 1: Attach using sheet metal screws. (Roof curbs come with damper trays.)



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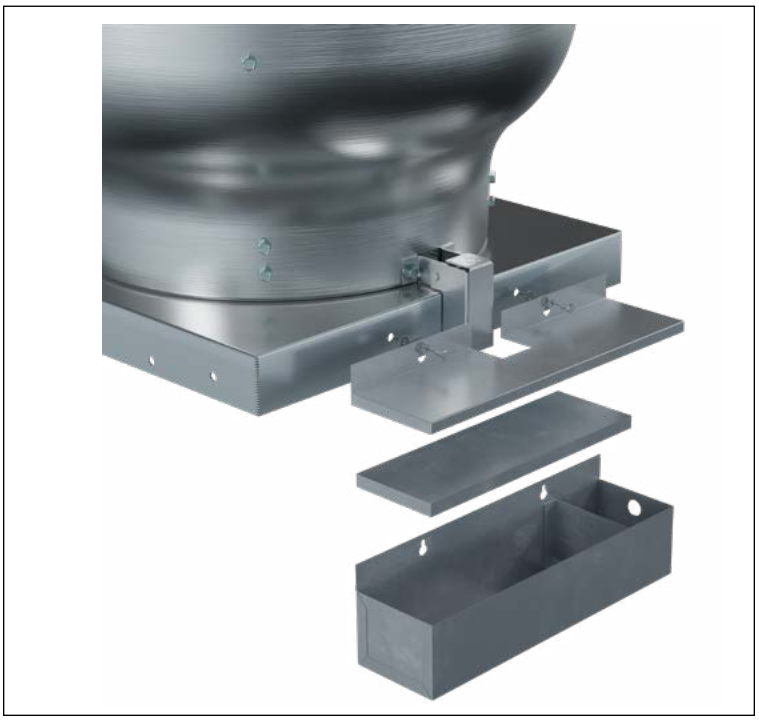
Grease Box Installation

Step 1: Fasten the grease box to the curb cap under the drain, using supplied hardware.
Step 2: Regular inspection and cleaning of the grease trap is recommended. The recommended interval for cleaning is monthly.



Parts Included
Grease Box
Cover
Grease Pad
1/4-20 x 5/8" Lg Hex Bolt
1/4-20 Hex Nut
Washer, Flat, 1/4"

TCF Twin City Fan

Troubleshooting Guidelines

Use current safety practices when investigating fan or system performance problems. General safe practices and performance troubleshooting guidelines can be found in AMCA Publications 410 and 202, respectively. Fan application and field measurement procedures can be found in AMCA Publications 201 and 203.

Below is a list of possible areas to check when air or sound values do not match expectations. Most fan problems can be pinpointed to one of these common causes.

Air Capacity Problems

1. Resistance of the system is not at design rating. If resistance is lower than expected, both airflow and horsepower may be up. If resistance is higher than anticipated, air volume will be down.
2. Fan speed is not at design speed.
3. Air density is not at the design value. Also check air performance measurement techniques/procedures.
4. Devices for air modulation are closed or plugged. Also check filters.
5. Impeller mounted improperly or is rotating in reverse.
6. Parts of the system or fan have been damaged or need cleaning.

Noise Problems

1. Air performance is incorrect and the fan is not at design point of operation. Fan is being forced to operate in an unstable flow region near peak or to the left of the peak of the curve.
2. Supply voltage high or inconsistent supply frequency. Adjustable frequency controllers can generate motor noise.
3. Objects, including flow sensors, that are installed in a high velocity airstream can generate noise.
4. Poor fan inlet conditions.
5. Acoustics or sound measurement procedure incorrect.

Vibration Problems

1. Poor foundation or mounting structure (resonances).
2. Foreign material attached to rotating components.
3. Damaged rotating components (bearings, shaft, fan, impeller, sheaves).
4. Broken, loose or missing set screws.
5. Loose hardware.
6. Vibration transmitted by another source.
7. Fan is operating in stall or unstable flow region.

Motor Problems

1. Incorrect wiring.
2. Speed of fan too high.
3. Parts improperly installed; binding.
4. WR^2 capability of motor too low for application.
5. Protection devices may be improperly sized.
6. VFD compatible electrically? Effective shaft grounding?
7. Is cabling and grounding correct?

NOTICE

All fans manufactured by Twin City Fan & Blower are factory balanced prior to shipment. Installation variables, handling and movement of the fan during shipment may cause the rotating assembly to shift. Balance should be checked once the fan is installed. If a final trim balance is required, it is the end user's responsibility to bring the fan back to factory specifications. Final trim balancing is not the responsibility of Twin City Fan & Blower. Refer to the Vibration Guidelines table below.

Vibration Guidelines

Condition	Fan Application Category	Rigidly Mounted mm/s (in./s)	Flexibly Mounted mm/s (in./s)
Start-up	BV-3	6.4 (0.25)	8.8 (0.35)
	BV-4	4.1 (0.16)	6.4 (0.25)
Alarm	BV-3	10.2 (0.40)	16.5 (0.65)
	BV-4	6.4 (0.25)	10.2 (0.40)
Shutdown	BV-3	12.7 (0.50)	17.8 (0.70)
	BV-4	10.2 (0.40)	15.2 (0.60)

Values shown are peak velocity, mm/s (inches/s), Filter out. Table taken from ANSI/AMCA Standard 204-05, Table 6.3. AMCA defines BV-3 for applications up to 400 HP; BV-4 for applications over 400 HP.

TCF Twin City Fan

Installation/Start-Up Checklist

Become familiar with the equipment by looking at the fan assembly drawing for special instructions and accessories.

Initial Fan Check

- ☐ Inspect fan for damage
- ☐ Check bolt tightness

Fan Impeller

- ☐ Impeller overlap checked
- ☐ Fasteners tight
- ☐ Impeller rotates freely

Bearings

- ☐ Bearings aligned
- ☐ Bearings greased
  Note: Rotate while greasing
- ☐ Set screws tight

V-Belts (if equipped)

- ☐ V-belt drives aligned
- ☐ Sheaves retightened
- ☐ Belt tension correct
- ☐ Motor bolts retightened

Electrical Components

- ☐ Motor wired for proper voltage
- ☐ Motor grounded
- ☐ Leads are properly insulated
- ☐ Accessories wired per instructions supplied.

WARNING

Verify that proper safety precautions have been followed. Electrical power must be locked off.

Energize

- ☐ Energize motor long enough to start assembly rotating, shut down
- ☐ Verify direction of impeller rotation, rewire if necessary *Note: Refer to Impeller Rotation section*
- ☐ Run the fan up to speed
- ☐ Check for excess vibration and listen for unusual noise. Refer to the *Vibration Guidelines* table in the *Troubleshooting Guidelines* section for vibration limits.
- ☐ Bearing temperatures should stabilize after a few hours. Less than 200°F.
  Note: Use sense of smell to identify possible electrical, belt issues.

After One Week

- ☐ Verify bolt tightness.
- ☐ Verify belt tension and adjust as necessary

NOTICE

Always observe site specific and regulatory safety precautions.

Serial Number: _____

Completed By: _____

Date Completed: _____

TCF Twin City Fan

Fan Maintenance Log

Model Number _____

Serial Number _____

Date	Completed Maintenance	Performed By	Comments

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