CINCINNATI FAN

user manual

Arrangement 9 axial fan

Model BAF

INSTALLATION - OPERATION - MAINTENANCE

CF-12-IOM-24 ISSUED 5/2024

READ AND UNDERSTAND THIS MANUAL PRIOR TO OPERATING OR SERVICING THIS PRODUCT

Serial Number _____

overview

Note

Read entire manual, including "Initial Unit Startup" before attempting to install and operate this equipment.

Specifications

Serial Number _____ Mfg Date _____

Note: The serial number above is a required reference for ant assistance. It is stamped on the lower nameplate.

Fan Specifications

Model _____ Propeller Number _____

Fan Performance Data

CFM _____ SP _____ Motor bhp _____

Density _____ Altitude ft _____ Airstream Temperature _____ °F

Fan RPM _____ Maximum Safe Fan RPM _____ **Do Not Exceed this RPM**

Motor Data: (This section is completed only if the motor was supplied by Cincinnati Fan)

hp _____ RPM _____ Voltage _____ Phase _____

Hz _____ Frame Size _____ Enclosure _____ Efficient _____

If Motor is EXP, Class(es) and Group(s) are _____

Manufacturer's Model Number _____ CFV Part Number_____

Drive Data:

Fan Sheave _____ Motor Sheave _____ Belts _____

No. of Grooves _____ Fixed Speed Size ✔ Adjustable Speed ✔

Note

All Cincinnati Fan products are packaged to minimize any damage during shipment. The freight carrier is responsible for delivering all items in their original condition as received from Cincinnati Fan. The individual receiving this equipment is responsible for inspecting this unit for any obvious or concealed damage. If any damage is found, it should be noted on the bill of lading before the freight is accepted and the receiver must file a claim with the freight carrier.

Long Term Storage Notice

If this fan will not be installed and put into operation within 30 days, refer to the **Long Term Storage** Instructions on page 20. Failure to follow all applicable long term storage instructions, will void your warranty. This fan should be stored indoors in a clean, dry location.

contents

Note

The following defined terms are used throughout this manual to bring attention to the presence of hazards of various risk levels, or to important information concerning the life of the product.

⚠ Warning

Indicates presence of a hazard which can cause severe personal injury, death or substantial property damage if ignored.

⚠ Caution

Indicates presence of a hazard which will or can cause personal injury or property damage if ignored.

Note

Indicates special instructions on installation, operation or maintenance which are important but not related to personal injury hazards.

general

Receiving

Unpacking

Be careful not to damage or deform any parts of the fan when removing it from the packaging container. All the packaging material should be kept in the event the fan needs to be returned.

Handling

Handling the fan should be performed by trained personnel and be consistent with all safe handling practices. Verify that all lifting equipment is in good operating condition and has the proper lifting capacity. The fan should be lifted using well-padded chains, cables or lifting straps with spreader bars. **Never** lift the fan by an inlet or discharge flange, fan or motor shaft, motor eye bolt, or any other part of the fan assembly that could cause distortion of the fan assembly.

Safety Instructions and Accessories

Safety Instructions:

All installers, operators and maintenance personnel should read AMCA Publication 410-96, *Recommended Safety Practices for Users and Installers of Industrial and Commercial Fans*. This manual is included with the fan.

Sound

Some fans can generate sound that could be hazardous to personnel. It is the responsibility of the user to measure the sound levels of the fan and/or system, determine the degree of personnel exposure, and comply with all applicable safety laws and requirements to protect personnel from excessive noise.

Air Pressure and Suction

In addition to the normal dangers of rotating machinery, the fan can present additional hazards from the suction or pressure created at the fan inlet or discharge.

⚠ Warning

Suction at the fan inlet can draw materials into the fan where they become high velocity projectiles at the discharge and cause severe personal injury or death.

It can also be extremely dangerous to persons in close proximity to the inlet or discharge as the forces involved can overcome the strength of most individuals.

general

⚠ **Caution**

Never operate a fan with a non-ducted inlet and/or discharge. If the fan inlet and/or discharge is non-ducted, it is the users responsibility to install an inlet and/or discharge guard.

Temperature

Many fans, fan components and all motors operate at temperatures that could burn someone if they come in contact with them. If this potential hazard could exist in your installation, steps must be taken by the user to protect anyone from coming in contact with this equipment.

Spark Resistance: Per AMCA Standard 99-0401-86 and ISO 13499

⚠ **Warning**

No guarantee of any level of spark resistance is implied by spark resistant construction. It has been demonstrated that aluminum impellers rubbing on rusty steel can cause high intensity sparks. Air stream material and debris or other system factors can also cause sparks.

Safety Guards

All moving parts must be guarded to protect personnel. Safety requirements can vary, so the number and types of guards required to meet company, local, state and OSHA regulations must be determined and specified by the actual user or operator of the equipment.

⚠ **Caution**

Never start any fan without having all required safety guards properly installed. All fans should be checked on a regular schedule, for missing or damaged guards. If any required guards are found to be missing or defective, the power to the fan should be immediately turned off and locked out in accordance with OSHA regulations. Power to the fan should Not be turned back on until the required guards have been repaired or replaced.

This fan can become dangerous due to a potential “windmill” effect, even though all electrical power has been turned off or disconnected. The fan propeller should be carefully secured to prevent any rotational turning before working on any parts of the fan/motor assembly that could move.

Access or Inspection Doors

⚠ **Caution**

Never open any access or inspection doors while the fan is operating. Serious injury or death could result from the effects of air pressure, air suction or material that is being conveyed. Disconnect or lock out power to the fan and let the fan propeller come to a complete stop before opening any type of access or inspection door.

installation

Installation

Vibration

Before any mounting method is selected, the user should be aware of the effects vibration will have on the fan, motor and other parts. Improper fan installation can cause excessive vibration causing premature propeller and/or bearing failure, that is not covered under warranty. Vibration eliminator pads or springs should be properly installed to prevent any fan vibration from transmitting to the foundation or support structure.

⚠ **Caution**

Shut the fan down immediately if there is any sudden increase in vibration.

Duct Work Mounting Methods

Any component of a building structure that will be supporting the fan and any duct work must have the weight load capacity and be rigid enough to support the weight of the fan without bending, bowing or flexing during operation. If not, severe vibration can occur that could lead to fan and/or structural failure. Consult an architectural or structural engineer for assistance.

BAF fans are designed to be mounted in duct work of the same diameter as the fan. The flange rings are pre-punched and should be bolted to duct flanges having the same dimensions. We do offer companion rings, as an option, to make the connection process easier. These fans can be mounted with the fan and motor shaft in a horizontal or vertical up-blast (motor shaft down) configuration.

⚠ **Warning**

If this fan will be mounted in a vertical down-blast configuration, with the motor shaft up, the propeller Must be secured to the fan shaft with a pin or locking collar. If there is no pin or locking collar to additionally secure the propeller to the fan shaft, Do Not use the fan without adding this feature. Not providing this feature could lead to property damage, injury or death.

The use of flexible connectors on the inlet and outlet of the fan will make it possible to mount this fan in a duct system and isolate any fan/motor vibration from the duct work. If flexible connectors will be used, the fan should be equipped with horizontal or vertical support clips. Threaded rods should be used to connect the support clips to the building structure. Each rod should be strong enough to support two times the weight of the entire fan/motor assembly. Spring hangers would be needed on the rods to isolate any fan vibration from the building.

installation

Machinery Mounting Methods

If this fan will be mounted on machinery, the surface it will be mounted to must be strong and rigid enough to support the weight of the entire fan without flexing, bowing, bending or oil-canning and thus causing vibration. Companion rings are available that will match the flanges on the BAF fan. To minimize any leakage, it is recommended that some type of caulking be used between the fan flange and the machine.

Safety Guards

Cincinnati Fan offers guards, as options, to keep your fan in compliance with OSHA safety regulations. These include inlet or discharge guards and belt guards. It is the responsibility of the user to make sure this fan meets all local, state and OSHA safety regulations. If you have a specific guard requirement not covered by OSHA, please contact the local Cincinnati Fan sales office for assistance.

Dampers and Shutters (airflow control devices)

If the fan is supplied with any type of air flow control device, it should be closed before initial startup of the fan to minimize overloading of the motor. Any airflow control device, with bearings, should be maintained in accordance with the manufacturers instructions. Any air flow control device, with an automatic control mechanism, should be adjusted per the manufacturers recommendations.

Set Screw and Taper-Lock Bushing Torque Values

All propeller set screws are tightened to the proper torque prior to shipment. Some propellers may have taper-lock hubs and split, taper-lock bushings to secure the propeller to the fan shaft.

Note

Check all set screw or taper-lock bushing torques. Forces encountered during shipment, handling, rigging and temperature can affect factory settings. For correct torque values, see Tables 1 and 2.

Table 1

Diameter and Number of Threads/Inch	Hex Wrench Size (across flats)	Required Torque $in{\cdot}lb_f$
1/4-20	1/8"	65
5/16-18	5/32"	165
3/8-16	3/16"	228
7/16-14	7/32"	348
1/2-13	1/4"	504
5/8-11	5/16"	1104

Table 2

Taper-Lock Busing Size	Required Torque in·lb$_f$
H	95
B	192
P	192
Q	350
R	350

⚠ **Caution**

Set screws should never be used more than once. If the set screws are loosened, they must be replaced. Use only knurled, cup-point, set screws with a nylon locking patch.

Fan Bearings

The bearings used in BAF fans are sealed-for-life bearings that require no additional lubrication for the life of the bearings. The bearings are pressed into the bearing housing and are held in place, on the fan shaft, with locking rings and Lock-Tite®. If the bearings wear out, the entire shaft/bearings/bearing housing assembly should be replaced. The maximum airstream temperature for this fan is 175°F (79°C).

V-Belt Drive

If Cincinnati Fan supplied the belts and sheaves (drives package), they were carefully selected for the specific operating conditions supplied to us by the customer.

⚠ **Warning**

Changing any of the V-belt drive component selections, supplied with the fan, could result in unsafe operating conditions which could cause equipment failure, personal injury and death.

If the user is supplying the sheaves and/or belts, it is their responsibility to make the correct component selections for the specific operating conditions. Their selection must also **not allow** the fan to exceed its maximum safe speed or hub load. If you do not know the maximum safe speed or hub load for this fan, **do not** make any drive selection without first consulting Cincinnati Fan or the sales office for your area. Timing belts should never be used on fans. If replacing belts and/or sheaves, check belt tension and proper alignment. See **Figure 1** and **Belt Replacement Section**. Sheave set screws or taper-lock bushing bolts should be tightened to the torque values as indicated in **Tables 1 and 2**.

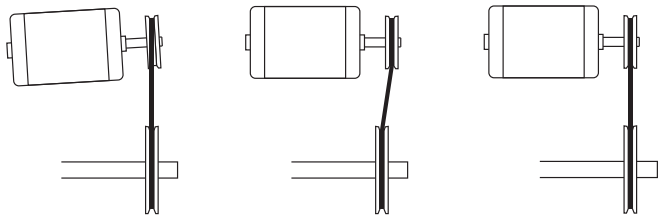
installation

V-Belt Drive Installation

All Tube Axial fans shipped from Cincinnati Fan are supplied with belts and sheaves even if the motor is not supplied by Cincinnati Fan. If you are supplying the motor, you will also need to install the drives after the motor is installed onto the motor base. **No power should be connected to the motor until AFTER the drives are properly installed.**

If installing the drives, the most critical steps are alignment of the sheaves and proper belt tension. Misaligned sheaves and/or improper belt tension are the two leading causes of excessive fan vibration and premature belt and/or bearing failure of the fan and/or motor bearings. This is a non-warranty event.

The fan and motor shafts must be parallel and the sheaves must be in-line with each other. See **Figure** 1.



Shafts not parallel Shafts not aligned Proper Alignment

Figure 1

Note

If installing the drives along with the motor on a new fan, see Belt Replacement Section.

Electrical

Disconnect Switches:

All fan motors should have an independent disconnect switch located in close visual proximity to turn off the electrical service to the fan motor. **Disconnects must be locked out in accordance with OSHA "lock out-tag out" procedures any time inspection or maintenance is being performed on the fan and/or motor assembly.** The"lock out-tag out" procedure should be performed by a licensed electrician or authorized personnel.

All disconnects should be sized in accordance with the latest NEC codes (National Electric Codes) and any local codes and should be installed only by a licensed electrician. "Slow blow" or "time delay" fuses or breakers should be used since the initial start-up time for the fan motor, although rare, can be up to 10 seconds.

installation

Motor

⚠ **Warning**

All wiring connections, inspection and maintenance of any motor must be performed by a licensed electrician in accordance with the motor manufacturers recommendations, all electrical codes and OSHA regulations. Failure to properly install, make wiring connections, inspect or perform any maintenance to a motor can result in motor failure, property damage, explosion, electrical shock and death.

1. **Do Not connect or operate a motor without reading the motor manufacturers instructions supplied with the motor.** The basic principle of motor maintenance is: Keep the motor clean and dry. This requires periodic inspections of the motor. The frequency of the inspections depends on the type of motor, the service and environment it will be subjected to and the motor manufacturers instructions.
2. **Cleaning:** Cleaning should be limited to exterior surfaces only. Follow motor manufacturers cleaning instructions.
3. **Lubrication:** Most small motors have sealed bearings that are permanently lubricated for the life of the motor. Some larger motors have grease plugs that should be replaced with grease fittings to perform re-lubrication. These motors, or any motor with grease fittings, should be lubricated in accordance with the motor manufacturers recommendations. Lubrication frequency depends on the motor horsepower, speed and service. **Be sure** you use compatible grease and **Do not** over grease.
4. **Location:** A standard Open Drip Proof or Totally Enclosed type motor is suitable in a clean, dry location below 104°F (40°C). If the location will be wet, dirty or reach temperatures above 104°F (40°C), a different type of motor may be necessary. Consult our local sales office for your area for proper motor selection assistance. All wiring must meet NEC (National Electric Codes) standards.
5. **Wiring Connections:** All wiring connections should be made for the proper voltage and phase as shown on the motor nameplate. Connections should follow the motor manufacturers recommendations as shown on the wiring schematic. This wiring diagram will be located on the outside of the motor, inside of the motor conduit box or on the motor nameplate. Reversing some wires might be necessary to get the correct fan rotation.

6. **Motors with Thermal Overload Protection:** If a motor is equipped with thermal overloads, the thermal overload must be wired per the wiring schematic to be operable. There are three types of thermal overloads:

   Automatic: These will automatically shut the motor down if the internal temperature exceeds the design limits.

⚠ **Caution**

Make sure you lock out the power to the motor before inspecting any motor with automatic thermals, when the thermals cool down, they will allow the motor to automatically start up again, unless you have locked out the power to the motor.

   Manual: These motors will have a button on them. If the motor overheats, it will shut down. After you have inspected the motor and eliminated the over-heating problem, you will need to "reset" it by pushing the button. Lock out the power Before inspecting the motor.

   Thermostats: This type of thermal is a temperature sensing device **only**. If the motor overheats, the thermostats will open or close (depending on the type) and send a "signal" to the electrical box. **They will not turn the motor off**. These are pilot circuit devices that must be connected to the magnetic starter circuit.

7. **Explosion Proof Motors:** No motor is explosion proof. Explosion proof motors are designed so if there is an explosion **within** the motor, the explosion will be **contained inside** the motor and not allowed to get out to the atmosphere. All explosion proof motors must be selected based on the atmosphere and/or the environment the motor will be operating in. Explosion proof motors are designed, rated, and labeled for their operating conditions based on Classes, Groups and T Codes. The Class, Group and T Code of an EXP motor MUST be selected based on the atmosphere and/or environmental conditions the motor will be operating in. Consult the NEC (National Electric Code) and the NFPA (National Fire Protection Association) for the proper EXP motor Class, Group and T Code required for your specific application and location..

⚠ **Warning**

If an explosion proof motor is used in an area containing volatile liquids, gases, fumes or dust for which the motor was not designed to operate in, an explosion and/or fire may occur.

Note

All EXP motors have some type of thermal overload as required by UL (Underwriters Laboratories).

All EXP motors are required to have the UL and CSA (Canadian Standards Association) listing numbers on the motor name plate or on a separate plate attached to the motor. The Class, Group and T Code the motor is designed for must also be listed.

8. **Normal Motor Operating Temperatures:** The normal operating temperature of a fully loaded, open type, electric motor operating in a 70°F. (21°C) ambient temperature is 174°F (79° C).

Maximum Fan Speed and Motor Speed Controllers:

If you will be using any type of motor speed controller with this fan, do not exceed the maximum safe fan speed. Installing and using a speed control device requires special training and certification as required by the speed control manufacturer. See the manufacturers instructions for proper use, installation and wiring connections for the maximum speed settings. It may be necessary to "block out" some speeds to eliminate a resonant vibration problem. The maximum safe fan speed is shown on the data sheet shipped with the fan. If you have lost the data sheet, contact Cincinnati Fan or the sales office for your area. You must have the serial number from the fan name plate for us to determine the maximum safe fan speed.

Cincinnati Fan will only extend the motor manufacturers warranty, when used with a speed controlling device, if the motor has the words **"Inverter Duty"** marked on the motor name plate. If the motor does not have "Inverter Duty" marked on the motor name plate, and you have a motor failure, you will be required to contact the motor manufacturer for any service or warranty claims.

Pre-Startup and Post-Startup Check (Check blocks as each step is completed. Retain for you records)

Note

Failure to complete and document all the following Pre-Startup checks, Post-Startup checks and Vibration checks, could void all warranties.

Pre-Startup Check completed by: _____ Date _____

Eight Hour Post-Startup Check completed by: _____ Date _____

Three-Day Post-Startup Check completed by: _____ Date _____

Make sure power to the motor is locked out before starting pre-start or post-start checks.

1 ☐ ☐ ☐ Check the propeller by spinning it by hand to ensure it rotates freely.

2 ☐ ☐ ☐ Check the propeller set screws to make sure they are tight per **Table 1**.

3 ☐ ☐ ☐ If the propeller has a taper-lock bushing, make sure the bolts are tightened per **Table 2**.

4 ☐ ☐ ☐ Make certain there is no foreign material in the fan or duct work that can become a projectile.

5 ☐ ☐ ☐ Ensure all electrical power components are properly sized and matched for your electrical system.

6 ☐ ☐ ☐ Record the Full Load Amps listed on the motor nameplate. You will need to refer to this later

Low Voltage Amps: _____

High Voltage Amps: _____

After Mounting Fan in Duct Work or On a Machine

7 ☐ ☐ ☐ Check all duct work hardware to make sure it is tight.

8 ☐ ☐ ☐ Make sure any inspection doors in the duct work are securely bolted or locked.

9 ☐ ☐ ☐ Check that any required guards are properly secured.

10 ☐ ☐ ☐ Any dampers or valves should be fully opened and closed to make sure there is no binding or interference.

11 ☐ ☐ ☐ If your fan is mounted on an elevated support structure, make sure the structure is welded at all the joint connections and the structure is properly braced to prevent any “side sway”.

12 ☐ ☐ ☐ Make sure the propeller is stationary prior to startup. **Starting a fan with a propeller that is rotating backwards can cause propeller damage**.

13 ☐ ☐ ☐ Make the necessary wiring connections to the motor per National Electric Code (NEC) regulations..

14 ☐ ☐ ☐ Apply power to the motor momentarily (i.e. “bump start”) to check for propeller fan rotation. If the fan is rotating in the wrong direction, reconnect the motor leads per the motor manufacturers wiring schematic. The fan rotation must match the rotation indicated by the rotation arrow decals on the outside of the fan drum. After reconnecting the leads, repeat this step.

operation

Pre-Startup Check completed by: _____ Date _____

Eight Hour Post-Startup Check completed by: _____ Date _____

Three-Day Post-Startup Check completed by: _____ Date _____

15 ☐ ☐☐ Apply power to the fan motor and let it come up to full speed. Turn off the power. Listen for any unusual noise or mechanical abnormality while the propeller is still spinning. If any are noticed, lock out the power, wait for the propeller to come to a complete stop, locate the cause and correct it.

16 ☐ ☐☐ Unlock power and start the fan.

17 ☐ ☐☐ Measure, record and keep the following motor data for future reference and comparison: (**Single phase motors will only have L1 and L2 leads**)

Amperage draw on each motor lead: L1 _____ **L2** _____ **L3** _____

(Running amps **should not** exceed the motor name plate amps for the voltage being operated on). **Compare these amp readings to the Full Load Amps you recorded in Step 6.**

Voltage coming to motor leads: L1_____ **L2**_____ **L3**_____

(Should be about the same input voltage on all leads)

18 ☐ ☐☐ Run fan for 15-20 minutes to allow belts to "seat" properly. Then turn off and lock out power to the motor.

19 ☐ ☐☐ If the fan has a belt guard or weather hood, remove it at this time.

⚠ **Warning** If fan will be running in an area where other people could come in contact with it, you will need to reinstall the motor cover or belt guard before performing steps 21, 23, 25, and 27.

20 ☐ ☐☐ Check belt tension. Alignment and tension should be as shown in **Figure 2** and **Figure 3**. Adjust if necessary. **Unlock power to the motor**.

21 ☐ ☐☐ Run fan for 8 hours. Then turn off and lock out power to the motor.

22 ☐ ☐☐ Check belt tension as in step 20. Adjust if necessary. Then unlock power to the motor.

23 ☐ ☐☐ Run fan for 24 hours. Then turn off and lock out power to the motor.

24 ☐ ☐☐ Check belt tension as in step 20. Adjust if necessary. Then unlock power to the motor.

25 ☐ ☐☐ Run fan for 100 hours. Then turn off and lock out power to the motor.

26 ☐ ☐☐ Check belt tension as in step 20. Adjust if necessary. Then unlock power to the motor.

27 ☐ ☐☐ Run fan. Repeat these steps periodically, but never more than a one year period.

Vibration

All propellers are balanced to comply with ANSI S2.19, G6.3. However, rough handling in shipment and/or erection, weak and/or non-rigid foundations, and misalignment may cause a vibration problem after installation. After installation, the vibration levels should be checked by personnel experienced with vibration analysis and equipment.

maintenance

Routine Inspection and Maintenance

Periodic inspection of all the fan parts is the key to good maintenance and trouble-free operation. The frequency of inspections must be determined by the user and is dependent upon the severity of the application. **But**, it should **never** exceed a 12 month period. The user should prepare an inspection and maintenance schedule and make sure it is adhered to.

⚠ Caution

Before starting any inspection or maintenance, be sure fan is turned off, power is locked out and the propeller has been carefully secured to prevent wind milling. If the operating conditions of the fan are to be changed (speed, pressure, temperature, etc.) consult Cincinnati Fan or our sales office in your territory to determine if the unit will operate safely at the new conditions.

Hardware

All fan hardware should be checked to make sure it is tight. All set screws or taper-lock bushing bolts should be tightened to the torque values shown in **Tables 2** and **3**.

Note

If any set screws have become loose, they must be replaced. Never use set screws more than once. Replace with knurled, cup-point set screws with a nylon locking patch.

Motor and Fan Bearing Lubrication

Most smaller motors have sealed bearings that never require relubrication for the life of the motor. For any motors with grease fittings, consult the motor manufacturers recommendations with reference to the lubrication frequency and the type of grease that should be used.

Do not over grease the motor bearings. Generally, 1-2 shots should be enough. Use a hand operated grease gun at no more than 40 psi. If possible, **carefully** lubricate the motor bearings while the motor is running.

Fan Bearings

Bearings used in BAF fans are sealed-for-life bearings that require no additional lubrication for the life of the bearings. The bearings are pressed into the bearing housing and are held in place on the fan shaft, with locking rings and Lock-Tite®. If the bearings wear out, the entire shaft/bearings/bearing housing assembly should be replaced. The maximum airstream temperature for this fan is 175°F (79°C).

maintenance

Propeller Balancing

All propellers are balanced at the factory. It is not uncommon that additional "trim balancing" is required after the fan is assembled. Trim balancing of the fan assembly, in the field, is typically always necessary for all replacement propellers.

Airstream material or chemicals can cause abrasion or corrosion of fan parts. This wear is generally uneven and, over time, will lead to the propeller becoming unbalanced causing excessive vibration. When that happens, the propeller must be rebalanced or replaced. The other airstream components should also be inspected for wear or structural damage and cleaned or replaced if necessary. **After cleaning any propeller, it should be balanced**.

There are two ways to balance a propeller:

Add balancing weights for fabricated aluminum, steel or stainless steel propellers:

Balance weights should be rigidly attached to the propeller at a location that will not interfere with the fan housing nor disrupt air flow. They should (if at all possible) be welded to the propeller. When trim balancing the propeller, on the fan shaft, be sure to ground the welder directly to the propeller. Otherwise, the welding current will likely pass through the fan shaft and damage the fan and/or motor bearings.

Grinding off material for cast aluminum propellers:

When grinding on the propeller to remove material, be very careful not to grind too much in one area. That could affect the structural integrity of the propeller.

Vibration

As mentioned previously in this manual, excessive vibration can cause premature motor and/or fan bearing failure that could lead to catastrophic failure of the fan. After performing any routine maintenance, vibration readings should be taken. New readings should be taken (maximum every 12 months) and compared to the readings previously recorded. If any major differences are present, the cause should be determined and corrected before the fan is put back into operation.

The most common causes of vibration problems are:

- Propeller unbalance
- Bearing Failure
- Foundation stiffness
- Mechanical looseness
- Misaligned sheaves and/or belts
- Poor fan inlet and/or discharge conditions

Belt Replacement Only — All Fan Sizes

Note

The propeller does not need to be removed from the system

Before any maintenance or inspection should only be performed by qualified, trained maintenance personnel.

⚠ Warning

Before ***starting*** **any** ***maintenance or inspection, make sure the power to the fan motor is turned off and locked out in accordance with OSHA "lock-out/tag-out" procedures. Use this procedure anywhere in this manual when instructed to "lock out power to the motor".***

1. Lock out power to the motor.
2. Remove the belt guard or weather cover, if present.
3. The adjustable motor base is used to adjust the belt tension. Loosen the tension by first loosening the four **locking bolts** in the **side** of the motor base assembly. **Do not remove these bolts**.
4. Next, turn the four tensioning bolts in the **top** of the motor base counterclockwise so the motor base moves as close to the fan drum as possible. This will reduce the tension on the belts.
5. Remove the belt(s) from the motor sheave, and then the fan sheave. Remove the belt(s) through the belt tube.
6. Slide the new belt(s) into the belt tube and into the fan sheave grooves. **If there is more than one belt, the belts should be a matched set.**
7. Slide the belt(s) over the motor sheave and into the motor sheave grooves. **Do not** force, pry or roll the belt(s) as this can cause damage to the cords in the belt(s).
8. Since the sheaves on the motor shaft and fan shaft have not been moved and the location of the motor on the motor base has not changed, the fan and motor sheaves should still be aligned as shown in **Figure 1**. Still check it to be sure.
9. You **will** need to check that the motor shaft and fan shaft are parallel with each other as indicated in **Figure 1**. This will require just checking that the belts are perpendicular with the sheave grooves just by site.
10. Adjust the tension on the belts by turning the four tensioning bolts in the **top** of the motor base clockwise until the belts appear to be just snug.
11. Re-check the sheave alignment and shaft parallelism again as you did in Steps 8 and 9.

12. Now tighten the four locking bolts in the **side** of the motor base.

⚠ **Warning**

Use extreme caution while performing the following steps 13 and 14.

13. Unlock power to the motor and run the fan for 20 minutes. This will allow the belts to seat in the sheave grooves
14. After 20 minutes, **carefully** look down the belt tube to observe if the belts are running as indicated in **Figure 3**.
15. **Turn off and lock out power to the motor**.

16a. If the belts were running as per **Figure 3**, re-install the belt guard or weather cover if supplied, then go to Step 17

16b. If the belts were **not** running as indicated in **Figure 3**, repeat Steps 2, 3, 10 through 14 and 16a.

17. Unlock power to the motor and run the fan for 8 hours.
18. After running the fan for 8 hours, turn off and lock out power to the motor.
19. Remove the belt guard or weather cover, if present.
20. Unlock power to the motor and run the fan.
21. **Carefully** look down the belt tube to observe if the belts are still running as indicated in **Figure 3**.
22. T**urn off and lock out power to the motor.**

23a. If the belts **are** running as per **Figure 3**, re-install the belt guard or weather cover if present, then proceed to Step 24.

23b. If the belts **are not** running as indicated in **Figure 3**, repeat Steps 2, 3, 10 through 14 and 16a.

24. Unlock power to the motor and run the fan for 24 hours.
25. After running the fan for 24 hours, turn off and lock out power to the motor.
26. Remove the belt guard or weather cover, if present.
27. Unlock power to the motor and run the fan.
28. **Carefully** look down the belt tube to observe if the belts are still running as indicated in **Figure 3**.
29. Turn off and lock out power to the motor..

30a. If the belts **are** running as per **Figure 3**, re-install the belt guard or weather cover present, then proceed to Step 31.

30b. If the belts **are not** running as indicated in **Figure 3**, repeat Steps 2, 3, 10 through 14 and 16a.

31. Unlock power to the motor and run the fan for 100 hours.

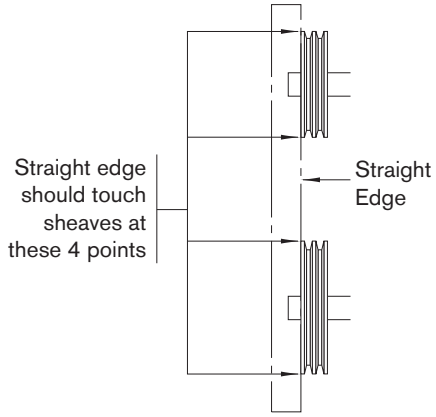


Figure 2

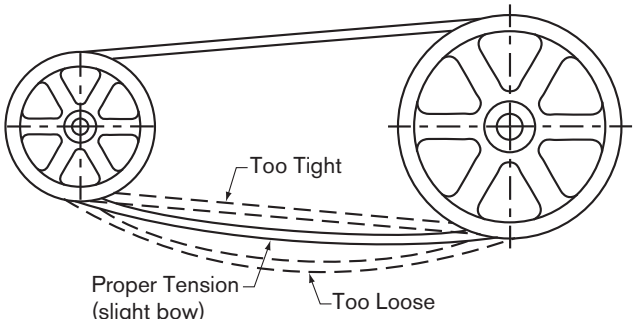


Figure 3

32. After running the fan for 100 hours, turn off and lock out power to the motor.
33. Remove the belt guard or weather cover, if present.
34. Unlock power to the motor and run the fan.
35. **Carefully** look down the belt tube to observe if the belts are still running as indicated in **Figure 3**.

37a. If the belts **are** running as per **Figure 3**, re-install the belt guard or weather cover if present, then proceed to Step 38.

37b. If the belts **are not** running as indicated in **Figure 3**, repeat Steps 2, 3, 10 through 14 and 16a on page 9

38. Unlock power to the motor and run the fan. You should periodically check the belt tension but never less than once a year.

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Belt, Sheave and Bearing Assembly Replacement

Note

You must remove the fan from the system to complete the following steps.

If you need to replace both the belts and the sheaves, you should also replace the fan shaft and bearing assembly at the same time. This will save you additional down time later. If the sheaves are worn, the shaft and bearings are generally worn also. The below instructions are for replacing the belts, sheaves and fan shaft/ bearing assembly.

Before any maintenance or inspection should only be performed by qualified, trained maintenance personnel.

⚠ Warning

Before *starting* any *maintenance or inspection, make sure the power to the fan motor is turned off and locked out in accordance with OSHA "lock-out/ tag-out" procedures. Use this procedure anywhere in this manual when instructed to "lock out power to the motor".*

1. Lock out power to the motor.
2. Remove the belt guard or weather cover, if present.
3. Disconnect the wiring from the power supply to the motor.
4. While supporting the fan with a crane or hoist, unbolt the flanges that connect the fan to the duct work or machine. **Save the hardware for later.**
5. Remove the fan drum and motor assembly from the duct work or machine to a work bench or on the floor.
6. Set the fan down on the flanges, with the motor at the 12:00 position. **Brace the fan on both sides so it cannot roll**.
7. The adjustable motor base is used to adjust the belt tension. Loosen the tension by first loosening the four locking bolts in the **side** of the motor base assembly. **Do Not** remove these bolts.
8. Now, turn the four tensioning bolts in the **top** of the motor base counter-clockwise so the motor base moves as close to the fan as possible. This will reduce tension on the bolts.

Note—There is a difference in the construction for 12" to some 24" fans and some 24" fans to 42".

a. All size 12" to 18" fans have a solid back belt tube with **no** access hole in the center.

b. All size 24" fans, with 3/4" fan shafts have a solid back belt tube with **no** access hole in the center.

c. All size 24" fans, with 1" fan shafts have a belt tube **with** an access hole in the center

d. All size 30" to 42" fans have a belt tube **with** an access hole in the center.

- On the fan sizes **without** the access hole, remove the belts from the end of the belt tube.

- On fan sizes **with** the access hole, remove the four screws in the cover plate to remove the cover plate from the belt tube. This will make it easier to remove the belts from the grooves of the sheaves on the larger fans with multiple belts. All other steps will be the same regardless of the fan size.

9. Remove the belt(s) from the motor sheave, and then the fan sheave.
10. Measure and record the location from the end of the motor shaft to the motor sheave.
11. Remove the motor sheave from the motor shaft. **Do Not** move the location of the motor on the motor base.
12. Measure and record the location from the end of the fan shaft to the front of the propeller hub.
13. Remove the set screws from the propeller or loosen the bolts from the taper-lock hub in the propeller and discard.
14. **Carefully** remove the propeller from the fan shaft.
15. Unbolt the bearing housing/shaft assembly from the belt tube flange. Save this hardware for later.
16. Remove the fan shaft, bearing housing assembly from the belt tube flange.
17. Measure and record the location from the end of the fan shaft to the fan sheave.
18. Install a new fan sheave onto a new fan shaft / bearing housing assembly. Install the sheave at the same location on the shaft that you measured in Step 17.
19. Tighten the set screws in the sheave or the bolts in the taper-lock bushing of the sheave. Tighten per **Table 1** or **Table 2**.
20. Install the new fan sheave and shaft / bearing housing assembly into the belt tube of the fan.
21. Re-install the hardware removed in Step 15 to bolt the bearing housing to the belt tube flange. Tighten the bolts.

22. **Carefully** re-install the propeller onto the fan shaft. **Do Not** pound the propeller hub with a hammer.
23. Locate the propeller hub at the same position on the shaft that was measured in Step 12.
24. Line up the keyway in the propeller hub with the keyway in the fan shaft and insert a new key.
25. Insert new set screws into the hub of the propeller or replace the locking bolts into the taper-lock bushing of the propeller.
26. Tighten the set screws in the propeller or the bolts in the taper-lock bushing of the propeller. Tighten per **Table 1** or **Table 2**.
27. Install a new motor sheave at the same location on the motor shaft that was measured in Step 10.
28. Tighten the set screws in the sheave or the bolts in the taper-lock bushing of the sheave. Tighten per **Table 1** or **Table 2**.
29. Install new belt(s) into the belt tube and into the fan sheave grooves.
30. Slide the belt(s) over the motor sheave and into the motor sheave grooves. **Do Not** force, pry or roll the belts as this can cause damage to the cords in the belts. Re-install the belt tube access hole cover plate if present.
31. Adjust the tension on the belts by turning the four tensioning bolts in the **top** of the motor base clockwise until the belts appear to be just snug.
32. Nest tighten the four locking bolts in the **side** of the motor base.
33. Since all the components were re-installed at the same original dimensions, they should still be aligned and parallel with each other as shown in Figure 1 and Figure 2. Check the belts to make sure they are aligned and the belts are perpendicular to the grooves in the sheaves.
34. Re-install the fan into the duct system or onto the machine using the hardware you removed in Step 4.
35. Re-connect power to the motor.
36. Turn the power on just for 3-4 seconds, then turn the power off and observe that the fan is turning the proper rotation.
37. If the fan **is not** turning the proper rotation, lock out power to the motor and reconnect the leads. If the fan is turning the proper rotation, proceed to Step 38.
38. Unlock power to the motor and run the fan for 20 minutes. This will allow the belts to “seat” themselves in the sheave grooves.

39. After 20 minutes, **carefully** look down the belt tube to observe if the belts are running as indicated in **Figure 3**.
40. Turn off and lock out power to the motor.

41a. If the belts **are** running as per Figure 3, re-install the belt guard or weather cover if present, then proceed to Step 42.

41b. If the belts **are not** running as indicated in Figure 3, repeat Step 2 and Steps 31 through 33.

42. Unlock power to the motor and run the fan for 8 hours.
43. After running the fan for 8 hours, turn off and lock out power to the motor.
44. Remove the belt guard or weather cover, if present.
45. Unlock power to the motor and run the fan.
46. **Carefully** look down the belt tube to observe if the belts are still running as indicated in **Figure 3**. Turn off and lock out power to the motor.

47a. If the belts **are** running as per **Figure 3**, re-install the belt guard or weather cover if present, then proceed to Step 48.

47b. If the belts **are note** running as indicated in **Figure 3**, repeat Step 2 on and Steps 31 through 33.

48. Unlock power to the motor and run the fan for 24 hours.
49. After running the fan for 24 hours, turn off and lock out power to the motor.
50. Remove the belt guard or weather cover, present.
51. Unlock power to the motor and run the fan.
52. **Carefully** look down the belt tube to observe if the belts are still running as indicated in **Figure 3**.
53. Turn off and lock out power to the motor.

54a. If the belts **are** running as per **Figure 3**, re-install the belt guard or weather cover if present, then proceed to Step 55.

54b. If the belts Are not running as indicated in **Figure 3**, repeat Step 2 and Steps 31 through 33.

55. Unlock power to the motor and run the fan for 100 hours.
56. After running the fan for 100 hours, turn off and lock out power to the motor.
57. Remove the belt guard or weather cover, if present.
58. Unlock power to the motor and run the fan.

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59. **Carefully** look down the belt tube to observe if the belts are still running as indicated in **Figure 3**.
60. Turn off and lock out power to the motor.

61a. If the belts **are** running as per **Figure 3**, re-install the belt guard or weather cover if present, then proceed to Step 62.

61b. If the belts **are not** running as indicated in **Figure 3**, repeat Step 2 and Steps 31 through 33.

62. Unlock power to the motor and run the fan. Periodically check the belt tension but never less than once a year

Dampers and Shutters: (airflow control device)

Turn off and lock out power to the fan motor. Any dampers or shutters should be periodically inspected to make sure all parts are still operable within their full range and there is no interference with any other damper or fan components. Any bearings or seals should be checked for their proper function. The manufacturers maintenance instructions should be followed.

Safety Equipment and Accessories

It is the user's responsibility to make sure that any safety guards required by company, local, state and OSHA regulations are properly attached and fully functional at all times. If any guards become defective or non-functional at any time, the power to the fan **must** be turned off and locked-out until complete repairs and/or replacements have been made, installed and inspected by authorized personnel. Any accessories used in conjunction with the fan should also be inspected to make sure they are functioning within their intended limits and design specifications. The manufacturer's maintenance manuals should be referred to for correct maintenance procedures. These accessories include, but are not limited to, the following:

- Shaft seals, inspection doors, vibration isolators or vibration bases, air flow or pressure measuring equipment, hoods, controls, special coatings, silencers, expansion joints, valves, flexible connectors, filters, sheaves and belts.

Replacement Parts

Under normal conditions, you should not need any spare or replacement parts for at least 24 months after shipment from Cincinnati Fan. That does not include any wear due to abrasion, corrosion, excessive temperatures, abuse, misuse, accident or any severe conditions the fan was not designed for.

- If this fan is vital to any process that could cost you lost revenue, we strongly recommend that you keep a fan propeller and motor at your location.

- If this fan is vital for the safety of any people and/or animals, we strongly recommend that you keep a complete fan/motor assembly, as originally ordered, at your location.

To order parts or complete units, contact us for the name of our sales office in your area or locate them on our website at **cincinnatifan.com.**

Note

The fan serial number from the fan name plate is required to identify parts correctly.

Troubleshooting

Potential problems and causes listed below are in no order of importance or priority. The causes are only a list of the most common items to check to correct a problem. If you find the cause of a problem, **do not** assume it is the **only** cause of that problem. Different problems can have the same causes.

⚠ Warning

Troubleshooting should only be performed by trained personnel. Any potential electrical problems should only be checked by a licensed electrician. All safety rules, regulations and procedures must be followed.

Trouble	Cause
Excessive Vibration	Loose mounting bolts, set screws or taper-lock hub bolts
	Misalignment motor shaft and fan shaft
	Worn or corroded propeller
	Accumulation of foreign material on propeller
	Bent motor or fan shaft
	Worn motor and/or fan bearings
	Motor out of balance
	Inadequate structural support
	Support structure not sufficiently cross braced
	Weak or resonant foundation
Airflow (CFM) Too Low	Propeller turning in wrong direction (rotation)
	Actual system static pressure (SP) is higher than expected
	Motor speed or fan speed to low
	Damper or shutter not adjusted properly
	Leaks or obstructions in duct work
	Filters dirty
	Inlet and/or discharge guards are clogged
	Duct elbow too close to fan inlet and/or discharge
	Improperly designed duct work
Airflow (CFM) Too High	Actual system static pressure (SP) is lower than expected
	Motor or fan speed (RPM) to high
	Filter not in place
	Damper or shutter not adjusted properly

Motor Overheating	Actual system static pressure (SP) is lower than expected
	Voltage supplied to motor is too high or too low
	Motor speed (RPM) too high or defective motor
	Air density higher than expected
	Motor wired incorrectly and/or loose wiring connections
	Note – a normal motor will operate at 174°F
Excessive Noise	Propeller rubbing inside of housing
	Worn or corroded propeller
	Accumulation of foreign material on propeller
	Loose mounting bolts, set screws or taper-lock hub bolts
	Bent motor shaft or fan shaft
	Worn motor and/or fan bearings
	Motor out of balance
	Motor and/or fan bearings need lubrication
	Vibration originating elsewhere in system
	System resonance or pulsation
	Inadequate or faulty design of fan support structure
	Fan operating near stall condition due to incorrect system design or installation
Fan Doesn't Operate	Motor wired incorrectly or loose wiring connections
	Incorrect voltage supply
	Defective fuses or circuit breakers
	Power turned of elsewhere
	Defective motor

Long Term Storage

Storage exceeding 30 days after receipt of equipment.

Failure to adhere to these instructions voids all warranties in their entirety.

Note

- Storage site selection:
  - Level, well-drained, firm surface, in clean, dry and warm location. Minimum temperature of 50°F (10°C).
  - Isolated from possibility of physical damage from construction vehicles, erection equipment, etc.
  - Accessible for periodical inspection and maintenance.
- The fan should be supported under each corner of its base to allow it to "breathe". Supports (2 x 4s, timbers, or railroad ties) should be placed diagonally under each corner.
- If the equipment is to be stored for more than three (3) months, the entire fan assembly must be loosely covered with plastic, **but not tightly wrapped.**
- Initial inspections must be made of the fan components, and immediate cor-

rective action taken if discrepancies are found, to insure adequate protection of the equipment during storage.

- Sheave center distance should be reduced to reduce tension on the belts.

• Storage Maintenance:

Note

A periodic inspection and maintenance log, by date and action taken, must be developed and maintained for each fan. See example below. Each item must be checked monthly.

Storage/Maintenance Schedule Log Example	
Action	Date Checked
Reinspect units to insure any protective devices used are functioning properly. Check for scratches in the finish which will allow corrosion or rust to form	
Rotate propeller a minimum of 10 full revolutions to keep the moor bearing grease from separating and drying. **This is a critical step.**	

• General Motor Procedure:

If the motor is not put into service immediately, the motor must be stored in a clean, dry, warm location. Minimum temperature of 50°F. (10°C,). Several precautionary steps must be performed to avoid motor damage during storage.

- Use a “Megger” each month to ensure that integrity of the winding insulation has been maintained. Record the Megger readings. Immediately investigate any significant drop in insulation resistance.
- **Do not** lubricate the motor bearings during storage. Motor bearings are packed with grease at the factory. Excessive grease can damage the insulation quality in the motor.
- If the storage location is damp or humid, the motor windings must be protected from moisture. This can be done by applying power to the motor’s space heaters, (if available) while the motor is in storage. If the motor does not have space heaters, storing it in a damp or humid location will, very quickly, cause internal corrosion and motor failure which is not warranted.
- Rotate motor shaft a minimum of 10 full turns each month to keep bearing grease from separating and drying out.

Note

For specific storage instructions, for the actual motor and any accessory parts that were supplied, refer to the manufacturer’s instructions.

information

Limited Warranty

Cincinnati Fan and Ventilator Company (Seller) warrants products of its own manufacture, against defects of material and workman-ship under normal use and service for a period of eighteen (18) months from date of shipment or twelve (12) months from date of installation, whichever occurs first. This warranty does not apply to any of Seller's products or any part thereof which has been subject to extraordinary wear and tear, improper installation, accident, abuse, misuse, overloading, negligence or alteration. This warranty does not cover systems or materials not of Seller's manufacture. On products furnished by Seller, but manufactured by others, such as motors, Seller extends the same warranty as Seller received from the manufacturer thereof. Expenses incurred by Purchaser's in repairing or replacing any defective product will not be allowed except where authorized in writing and signed by an officer of the Seller.

The obligation of the Seller under this warranty shall be limited to repairing or replacing F.O.B. the Seller's plant, or allowing credit at Seller's option. **This warranty is expressly in lieu of all other warranties either expressed or implied including the warranties of merchantability and fitness for a particular purpose and of all other obligations and liabilities of the seller. The purchaser acknowledges that no other representations were made to purchaser or relied upon by purchaser with respect to the quality or function of the products herein sold.**

Removal of the Sellers nameplate or any generic fan nameplate containing the fan serial number voids all warranties, either writ-ten or implied. Failure to complete and document all the pre-startup and post startup checks and perform the suggested routine maintenance checks voids all warranties, either written or implied.

Limitation of Liability

Notice of any claim, including a claim for defect in material or workmanship, must be given to Seller in writing within 30 days after receipt of the equipment or other products. Seller reserves the right to inspect any alleged defect at Purchaser's facility before any claim can be allowed and before adjustment, credit, allowance replacement or return will be authorized. See RETURNS below. Seller's liability with respect to such defects will be limited to the replacement, free of charge, of parts returned at Purchaser's expense F.O.B. Seller's plant and found to be defective by the Seller.

In no event will seller be liable for special, indirect, incidental or consequential damages, whether in contact, tort, negligence, strict liability or otherwise, including without limitation damages for injury to persons or property, lost profits or revenue, lost sales or loss of use of any product sold hereunder. Purchaser's sole and exclusive remedy against seller will be the replacement of defective parts as provided herein or refund of the purchase price for defective products, at seller's sole option. Seller's liability on any claim, whether in contract, tort, negligence, strict liability or otherwise, for any loss or damage arising out of or in connection with purchaser's order or the products or equipment purchased hereunder, shall in no case exceed the purchase price of the equipment giving rise to the claim.

Responsibly

It is the understanding of the Seller that Purchaser and/or User will use this equipment in conjunction with additional equipment or accessories to comply with all Federal, State and local regulations. The Seller assumes no responsibility for the Purchaser's and/or User's compliance with any Federal, State and local regulations.

Returns

Cincinnati Fan & Ventilator Company assumes no responsibility for any material returned to our plant without our permission. An RMA (Return Material Authorization) number must be obtained and clearly shown on the outside of the carton or crate and on a packing slip. Any items returned must be shipped freight prepaid. Failure to comply will result in refusal of the shipment at our receiving department.

information

Disclaimer

This manual, and all its content herein, is based on all applicable known material at the time this manual was created. **Any parts of this manual are subject to change at any time and without notice.**

If any statements, diagrams and/or instructions contained herein, for components not manufactured by the Seller, conflict with instructions in the manufacturer's manual (i.e.: motors, bearings, dampers, etc.), the instructions in the manufacturer's manual, for that component take precedent.

Should you want the latest version of this manual, please contact us or our sales office for your area. Or, you can print a current version by going to our website at: **cincinnatifan**.com.

Parts Drawing

Cincinnati Fan manufactures many models and arrangements with special variations. For that reason, the maintenance manuals contained on our website do not include a parts drawing nor the completed blower or fan specifications on page 2.

For the parts drawing of all the standard components and specifications for the specific blower or fan that you have, please contact our local Cincinnati Fan sales office for your area.

You will need to give them the serial number shown on the blower or fan nameplate so they can supply you the correct information.

Click on "Contact a Sales Rep" on our website for the name and contact information for our local sales office in your area.

Axial Fan

USER MANUAL

SPX ENGINEERED AIR MOVEMENT
7697 SNIDER ROAD
MASON, OH 45040 USA
513 573 1000 | **spxairmovement**.com

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