



Installation, Safety, Operation & Maintenance Instructions And Parts List For Model DDF, Direct Drive Tube Axial Fans Arrangement 4

NOTE

READ ENTIRE MANUAL INCLUDING "SECTION IV. INITIAL UNIT STARTUP" BEFORE ATTEMPTING TO INSTALL AND OPERATE THIS EQUIPMENT.

FAN SPECIFICATIONS

FAN SERIAL NUMBER: _____ **MFG. DATE:** _____

NOTE: The serial number above is a required reference for any assistance. It is stamped on the fan nameplate.

FAN SPECIFICATIONS:

Model: _____ **Wheel Size and Type:** _____

FAN PERFORMANCE DATA: (If entered on order)

CFM: _____ **SP:** _____ (Inches of Water Gauge) **Motor BHP:** _____

Density: _____ **Altitude:** _____ (Ft. above S.L.) **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:** _____ **Efficiency:** _____

IF Motor is EXP, Class(es) & Group(s) are: _____

Manufacturers Model Number: _____ **CFV Part Number:** _____

ATTENTION: RECEIVING DEPARTMENT

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 11. Failure to follow all applicable long term storage instructions, will void your warranty. This fan should be stored indoors in a clean, dry location.

 **DANGER**






				
Hazardous voltage can cause electrical shock and death.	High speed rotating equipment can cause severe personal injury.	Lock out/Tag out to prevent personal injury <u>BEFORE</u> starting <u>ANY</u> service or inspection.	Avoid injury. <u>NEVER</u> operate without <u>ALL</u> required safety guards in place.	Avoid injury. You <u>MUST</u> read and understand all instructions in this manual <u>BEFORE</u> installing.

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I. GENERAL

A. 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 of 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. Some fan models have lifting eye locations provided in the fan base. **NEVER lift the fan by the motor shaft, motor eye bolt, or any other part of the fan assembly that could cause distortion of the fan assembly.**

B. Safety Instructions & Accessories:

1. 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. Additional copies can be requested by writing us at Cincinnati Fan, 7697 Snider Rd., Mason, OH 45040-9135

2. 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.

3. 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. 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.

⚠ WARNING

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.

4. Temperature:

Some 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.

5. Spark Resistance; (Per AMCA Standard 99-0401-86 and ISO 13499)

⚠ DANGER

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.

6. Safety Accessories:

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.

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 propeller should be carefully secured to prevent any rotational turning **BEFORE** working on any parts of the fan/motor assembly that could move.

7. Access or Inspection Doors:

⚠ DANGER

NEVER OPEN ANY ACCESS OR INSPECTION DOORS WHILE THE FAN IS OPERATING. SERIOUS INJURY OR DEATH COULD RESULT FROM THE AFFECTS OF AIR PRESSURE OR AIR SUCTION. DISCONNECT OR LOCK OUT POWER TO THE FAN AND LET THE PROP COME TO A COMPLETE STOP BEFORE OPENING ANY TYPE OF ACCESS OR INSPECTION DOOR.

II. INSTALLATION

A. 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 prop and/or motor bearing failure, that is not covered under warranty. Vibration eliminator pads, springs or flexible connectors should be properly installed to prevent any fan vibration from transmitting to the foundation, support structure or ducting.

⚠ WARNING

SHUT THE FAN DOWN IMMEDIATELY IF THERE IS ANY SUDDEN INCREASE IN VIBRATION.

B. Mounting Methods:

1. In Duct Work

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.

Model **DDF** 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 motor shaft in a horizontal or vertical up-blast (motor shaft up) configuration.

 **DANGER**

If this fan will be mounted in a vertical down-blast configuration, with motor shaft down, the propeller MUST be secured to the motor shaft with a pin or locking collar. If there is no pin or locking collar to additionally secure the propeller to the motor 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 rod should be used to connect the support clips to the building structure. Each rod should be strong enough to support two (2) 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.

The connectors should be selected to handle the operating conditions for air volume and pressure that the fan will produce. **All ducting or accessories, added by the user, should be independently supported. DO NOT use the fan/motor assembly to support any additional weight.** Inlet and/or discharge duct elbows should be located a minimum of 3 fan diameters from the fan. Any duct elbows located closer than 3 wheel diameters to the fan inlet or discharge **WILL** reduce the air performance and fan efficiency.

Non-Ducted Fan Inlet:

Any fan with no ducting on the inlet **must** have an inlet guard. The fan should be located so the inlet is, at least, 3 fan diameters away from any wall or bulkhead to eliminate a reduction in air flow.

Non-Ducted Fan Discharge:

Any fan with no ducting on the discharge **must** have a discharge guard.

2. On Machinery

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 **DDF** fan. To minimize any leakage, it is recommended that some type of caulking be used between the fan flange and the machine.

C. Safety Guards:

Cincinnati Fan offers guards, as optional, to keep your fan in compliance with OSHA safety regulations. These include inlet or discharge 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.

D. 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 start-up 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. Automatic shutters are opened and closed by the airflow from the fan.

E. Set Screw and Taper-lock Bushing Torque Values:

All propeller set screws are tightened to the proper torque prior to shipment. Some props may have taper-lock hubs and split, taper-lock bushings to secure the prop to the motor 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** below.

Table 1

SET SCREW TORQUE VALUES		
Diameter & Number of Treads/Inch	Hex Wrence Size (Across Flats)	Required Torque (Inch Pounds)
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

TORQUE VALUES FOR TAPER-LOCK BUSHINGS	
Taper-lock Bushing Size	Required Torque (Inch Pounds)
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.

III. ELECTRICAL

A. 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.

B. Motors:

DANGER

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 fan.** 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:** On Model **DDF** fans, the motor is in the airstream. The standard motor is a Totally Enclosed type motor which is suitable in a clean, dry airstream below 104°F. (40°C). If the airstream will be wet, dirty or reach temperatures above 104°F (40°C), a completely different type of fan should be used. Consult our local sales office for your area for proper fan selection assistance. On 12” and 15” fan sizes, if the motor is an Explosion Proof type, the motor conduit box will not fit on the motor inside the fan drum. It is removed from the motor, shipped loose with the fan, and will require the Purchaser of User to install it outside the drum. All wiring and connections between the conduit box and the motor must meet NEC (National Electric Codes) standards. This assembly process should only be completed by a licensed electrician.

NOTICE

In order to properly perform the pre-start and the post-start checks on page 7, it is strongly recommended that an additional conduit box be purchased and mounted on the outside of the fan drum. This will allow you to make electrical connections from the conduit box on the motor to the outside of the fan and take motor amperage checks outside of the fan. It will also allow you to make any fan rotation changes, if necessary. Additional motor conduit boxes can be purchased from your local electrical supply house, motor distributor or repair shop.

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 3 types of thermal overloads:**
 - a. **Automatic:** These will automatically shut the motor down if the internal temperature exceeds the design limits.

⚠ DANGER

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.

- b. 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. **You should still lock out the power BEFORE inspecting the motor.**
- c. 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 (EXP) 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.**

⚠ DANGER

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 CAN OCCUR.

NOTICE:

- a. All EXP motors have some type of thermal overload as required by UL (Underwriters Laboratories). Refer to all of Section 6 on page 5 and above.**
- b. All EXP motors are required to have the UL (Underwriters Laboratories) 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:

Using your hand to test the normal running temperature of a motor can be a very painful experience;

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.)

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 also 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 our 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.

IV. INITIAL UNIT STARTUP

NOTICE: Failure to complete and document all the following pre-startup and both post-startup checks, listed in Sections A and B (below), could void all warranties.

A. Pre-Startup & Post-Startup Checks: (Check blocks as each step is completed. Retain this for your records.)

A1. Pre-Startup Checks Completed By: _____ DATE: _____

A2. 8 Hour, Post-Startup Checks Completed By: _____ DATE: _____

A3. 3 Day, Post-Startup Checks Completed By: _____ DATE: _____

MAKE SURE POWER TO THE MOTOR IS LOCKED OUT BEFORE STARTING PRE-STARTUP OR POST-STARTUP CHECKS.

BEFORE MOUNTING FAN IN DUCT WORK OR ON A MACHINE:

If you will be mounting this fan into a duct system, and there is no access door in the fan drum, it is strongly recommended that an access door be installed in the duct work section next to the fan. That will allow you access to perform the post-startup checks more easily.

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 the **Table 1** on page 4.
3. If the propeller has a taper-lock bushing, make sure the bolts are tightened per **Table 2** on page 4.
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.
Also refer back to the NOTICE in Section B-4 on page 5 regarding an additional motor conduit box.
6. Record the Full Load Amps listed on the motor nameplate. You will need to refer to this later.

Low Voltage: _____

High Voltage: _____

AFTER MOUNTING FAN IN DUCT WORK OR ON A MACHINE:

7. Check all duct work hardware to make sure it is tight.
8. Check that any required guards are properly secured.
9. Any dampers or shutters should be fully opened and closed to make sure there is no binding or interference.
10. 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".
11. Make sure the propeller is stationary prior to startup. **Starting a fan with a prop that is rotating backwards can cause propeller damage.**
12. Apply power to the fan motor momentarily (i.e. "bump start") to check the propeller 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.
13. Apply power to the blower motor and let it come up to full speed. **Turn off the power.** Look and 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.
14. Unlock power and start the fan.
15. 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 nameplate amps for the voltage being operated on). Compare these amp readings to the Full Load Amps you recorded in Step 6 above.

Voltage coming to motor leads: L1 _____ L2 _____ L3 _____

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

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

B. Vibration:

All props 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 vibration analysis equipment.

V. ROUTINE INSPECTION & 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.

WARNING

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 FOR YOUR TERRITORY, TO DETERMINE IF THE UNIT WILL OPERATE SAFELY AT THE NEW CONDITIONS.

A. Hardware:

All fan and hardware should be checked to make sure it is tight. Propeller set screws or taper-lock bushings should be tightened to the torque values shown in **Tables 1 and 2** on page 4.

NOTE: If any set screws have come loose, they must be thrown away and replaced. **NEVER** use set screws more than once. **Replace with knurled, cup-point set screws with a nylon locking patch.**

B. Motor Bearing Lubrication:

1. Motor Bearings:

Most smaller motors have sealed bearings that never require re-lubrication 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. **DO NOT attempt to lubricate the motor bearings while the motor is running.**

C. Prop Balance:

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

There are two ways to balance a fan propeller:

1. Add balancing weights for fabricated aluminum, steel or stainless steel props:

Balance weights should be rigidly attached to the prop 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 prop. When trim balancing the prop, **on the fan**, be sure to ground the welder **directly** to the propeller. Otherwise, the welding current will likely pass through the motor and damage the motor bearings.

2. Grinding off material for cast aluminum propellers:

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

D. Vibration:

As mentioned previously in this manual, excessive vibration can cause premature motor bearing failure that could lead to catastrophic failure of the fan. After performing any routine maintenance, the vibration readings should be taken again. New readings should be taken (maximum every 12 months) and compared to the previous readings. **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:

1. Propeller unbalance.
2. Mechanical looseness.
3. Poor fan inlet and/or discharge conditions.
4. Foundation stiffness.

E. Dampers and Shutters: (Airflow control devices)

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 fan components. Any bearings or seals should be checked for their proper function. The manufacturers maintenance instructions should be followed.

F. Safety Equipment & Accessories:

It is the users responsibility to make sure that all safety guards required by the 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 manufacturers maintenance manuals should be referred to for correct maintenance procedures. These accessories include, but are not limited to, the following:

Seals, inspection doors, vibration isolators, air flow or pressure measuring equipment, hoods, controls, special coatings, silencers, expansion joints, flexible connectors and filters.

VI. ORDERING 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.

NOTICE:

- 1. If this fan is vital to any process that could cost you lost revenue, we strongly recommend that you keep a replacement propeller and motor at your location.**
- 2. 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 any parts or complete units, contact us for the name of our sales office for your area. Or you can find them on our website at: **www.cincinnati-fan.com**

WE MUST HAVE THE FAN SERIAL NUMBER FROM THE FAN NAME PLATE TO IDENTIFY PARTS CORRECTLY.

VII. TROUBLESHOOTING:

⚠ DANGER

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. Failure to follow proper procedures can cause property damage, severe bodily injury and death.

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.

PROBLEM	CAUSE
Excessive Vibration	<ol style="list-style-type: none"> 1. Loose mounting bolts, prop set screws, taper-lock hubs. 2. Worn or corroded propeller. 3. Accumulation of foreign material on propeller. 4. Bent motor shaft. 5. Worn motor bearings. 6. Motor out of balance. 7. Inadequate structural support. 8. Support structure not sufficiently cross braced. 9. Weak or resonant foundation. 10. Foundation not flat and level.
Airflow (CFM) Too Low	<ol style="list-style-type: none"> 1. Propeller turning in wrong direction (rotation). 2. Actual system static pressure (SP) is higher than expected. 3. Motor speed (RPM) too low. 4. Dampers or shutters not adjusted properly. 5. Leaks or obstructions in duct work. 6. Filters dirty. 7. Inlet and/or discharge guards are clogged. 8. Duct elbow too close to fan inlet and/or discharge. 9. Improperly designed duct work
Airflow (CFM) Too High	<ol style="list-style-type: none"> 1. Actual system static pressure (SP) is lower than expected. 2. Motor speed (RPM) too high. 3. Filter not in place. 4. Dampers or shutters not adjusted properly.
Motor Overheating	<p>NOTE: A normal motor will operate at 174°F. See B-8 on page 6.</p> <ol style="list-style-type: none"> 1. Actual system static pressure (SP) is lower than expected. 2. Voltage supplied to motor is too high or too low. 3. Motor speed (RPM) too high or defective motor. 4. Air density higher than expected. 5. Motor wired incorrectly or loose wiring connections. 6. Cooling fan cover on back of motor is clogged. (Fan cooled motors only.)
Excessive Noise	<ol style="list-style-type: none"> 1. Propeller rubbing inside of housing. 2. Worn or corroded propeller. 3. Accumulation of foreign material on propeller. 4. Loose mounting bolts, wheel set screws, or taper-lock hubs. 5. Bent motor shaft. 6. Worn motor bearings. 7. Motor out of balance. 8. Motor bearings need lubrication. 9. Vibration originating elsewhere in system. 10. System resonance or pulsation. 11. Inadequate or faulty design of fan support structure. 12. Fan operating near "stall" condition due to incorrect system design or installation.
Fan Doesn't Operate	<ol style="list-style-type: none"> 1. Motor wired incorrectly. 2. Incorrect voltage supply. 3. Defective fuses or circuit breakers. 4. Power turned off elsewhere. 5. Motor wired incorrectly or loose wiring connections. 6. Defective motor.

VIII. LONG TERM STORAGE INSTRUCTIONS: (Storage exceeding 30 days after receipt of equipment)

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

1. Storage site selection:
 - a. Level, well-drained, firm surface, in clean, dry and warm location. Minimum temperature of 50°F (10°C).
 - b. Isolated from possibility of physical damage from construction vehicles, erection equipment, etc.
 - c. Accessible for periodical inspection and maintenance.
2. The fan should be supported under each corner of its base to allow it to “breathe”. Supports (2 x 4’s, timbers, or rail-road ties) should be placed diagonally under each corner.
3. 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**.
4. Storage Maintenance:

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.

EXAMPLE:

Storage / Maintenance Schedule Log

ITEM	ACTION	DATES CHECKED
1	Re-inspect units to insure any protective devices used are functioning properly. Check for scratches in the finish which will allow corrosion or rust to form.	
2	Rotate fan propeller a minimum of 10 full revolutions to keep the motor bearing grease from separating and drying out. <i>This is a critical step.</i>	

5. 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.

 - a. 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.
 - b. **DO NOT** lubricate the motor bearings during storage. Motor bearings are packed with grease at the factory.
 - c. 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.

NOTE:

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

IX. LIMITED WARRANTY:

Cincinnati Fan & Ventilator Company (Seller) warrants products of its own manufacture, against defects of material and workmanship 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 Seller's nameplate or any generic fan nameplate containing the fan serial number voids all warranties, either written 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.

RESPONSIBILITY:

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 or Users 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.

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, 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: **www.cincinnati-fan.com**



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X. PARTS DRAWING:

PLEASE NOTE

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 1. 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 for your area. **www.cincinnati-fan.com**