

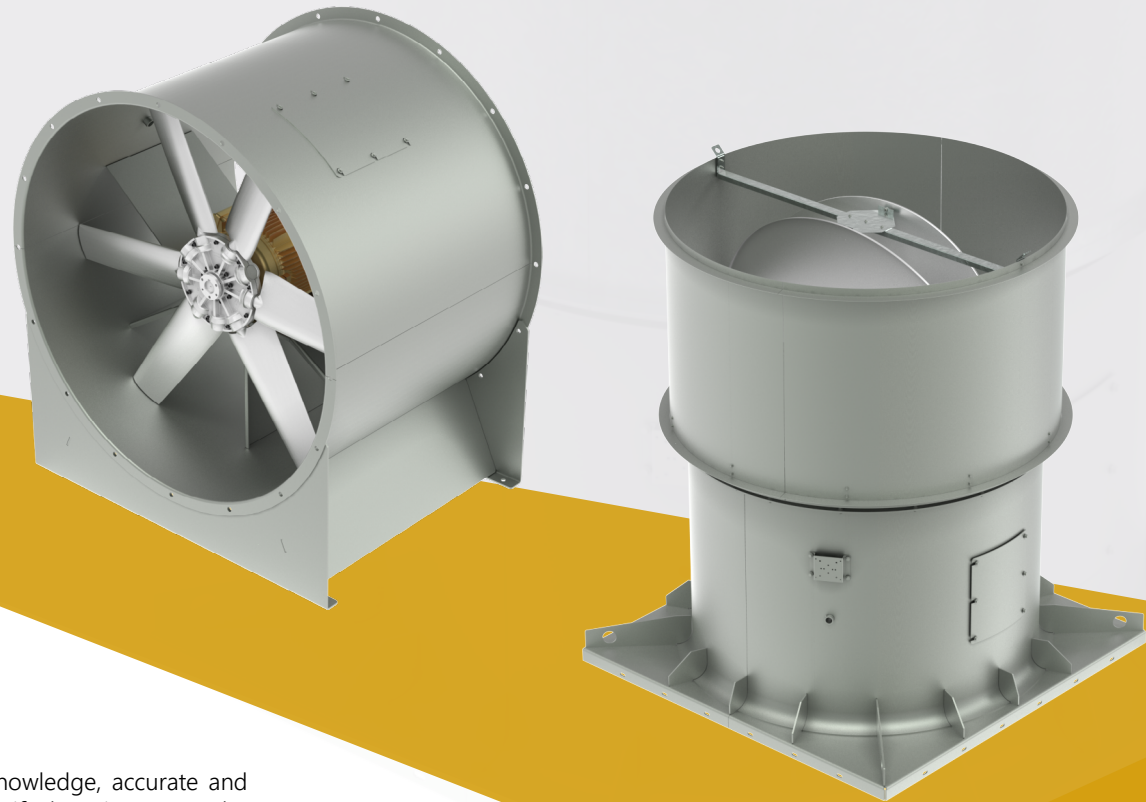
AWX

Axial Warehouse Exhaust

OPERATION AND MAINTENANCE MANUAL



PENNBARRY™



IMPORTANT! Read before proceeding!

The information contained herein is, to the best of our knowledge, accurate and applicable for proper operation and installation of the specified equipment at the time this document entered service. Before proceeding, it is recommended that you check for a more current version of this Installation Operation Manual (IOM) on our website at www.pennbarry.com. Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage! Retain instructions for future reference.

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GENERAL SAFETY INFORMATION

General safety information regarding installation and service.

Only qualified personnel should install and service these fans. Comprehension of these instructions and general safety precautions is required by the installation personnel. Failure to properly install the fans could result in electrical shock, other bodily harm, and potential hazards to the installation personnel or others.

- Make sure unit is stopped and electrical power is locked out before putting hands into inlet or outlet opening or near belt drive. We suggest a LOCK-OUT and a warning sign on the start switch cautioning not to start the unit.
- Follow maintenance instructions.
- Make sure all drive guards are installed at all times fan is in operation. If the inlet or outlet is exposed, a suitable guard should also be installed.
- Take special care not to open any fan or system access panels while the system is under pressure (negative or positive).
- Never allow untrained or unauthorized persons to work on equipment.
- Take special care when working near electricity. Also insure the power is off and can not be turned on while servicing the fan.
- Keep area near equipment clean.
- Follow local electrical, safety, and installation codes, along with NEC (National Electric Code) and National Fire Protection Agency (NFPA), where applicable.
- Please refer to ACMA Publication 410 for further information on safe practice details involving industrial and commercial fans.
- Failure to follow the general safety information and installation instructions could result in death or serious injury.
- Fans are required to run with proper protective devices in place. Reference local codes to ensure protective devices compliance.
- Ensure the fan inlet and outlet (outlet guard not needed on curb mounted up-blast fan with discharge wind band and butterfly discharge damper) are guarded sufficiently so unwanted objects do not get sucked into the inlet nor unwanted objects would be discharged out the fan outlet possibly causing injury or property damage.
- Verify the installation surface will be able to support the weight of the fan, motor, and accessories.
- Verify the installation surface is level.
- Inspect the fan for any damage and ensure it is in operating condition. Turn the impeller to verify it spins freely. Free rotation of the impeller is critical. Ensure the impeller rotates freely without rubbing other stationary components. Check all fasteners for tightness. If equipped, verify the fan shaft, pulleys, and belts are aligned.
- Be sure to check power supply (voltage, frequency, phase, and current capacity of the electrical wires) matches the motor nameplate.
- Ground the motor adequately and securely.
- Fan motors, and electrical components, should have electrical disconnects installed within close visual proximity of the so the disconnect can be located to turn off electrical service.
- Due to the high forces of inlet suction, be sure the fan is completely shut off, and stopped when walking around the fan. Ensure the inlet area is clear of people and loose objects before starting the fan.
- Before servicing, or inspecting a fan, be sure the impeller is no longer rotating and is secured so it will not rotate while the fan is being serviced/inspected. The fan should never be run without the fan properly installed and secured.
- When the fan is being serviced it should be locked out at the service disconnect and the fan wheel should be secured so it will not spin while being serviced.
- Power loss and friction inside rotating equipment may result in extremely high surface temperatures. All fan parts should be approached cautiously and, if needed, allowed to cool before servicing.
- Adjustments made to increase fan speed will affect the motor load. If the fan speed is increased, motor load should be verified so the current rating is not exceeded.
- Impeller must not exceed maximum allowable Fan RPM. Refer to Product Guide for maximum allowable Fan RPM.

Caution

1. DO NOT put hands near or allow loose or hanging clothing to be near belts or sheaves while the unit is running.
2. DO NOT put hands into inlet or outlet while unit is running. It is sometimes difficult to tell whether or not it is running. Be sure it is not running and cannot be operated before doing any inspection or maintenance.
3. DO NOT operate fan with guards removed.
4. DO NOT take chances.

RECEIVING AND HANDLING

Receiving and Inspection

PennBarry fans are carefully inspected before leaving the factory. When the unit is received, inspect the packaging for any signs of tampering. Inspect the unit for any damage that may have occurred during transit and check for loose, missing or damaged parts. Mishandled units can void the warranty provisions. If units are damaged in transit, it is the responsibility of the receiver to make all claims against the carrier. PennBarry is not responsible for damages incurred during shipment.

Avoid severe jarring and/or dropping. Handle units with care to prevent damage to components or finishes. If the unit is scratched due to mishandling, the protective coating may be damaged. Incorrect lifting may damage the fan and void the warranty.

Handling

1. Reference industry standard lifting and rigging practices. The rigging company has full responsibility for safely rigging this unit and the below details are only provided to demonstrate where the lifting points are intended for this unit.
2. Fans should be hoisted at holes/lift lugs, using suitable lifting straps or chains. (Ref. Figure 1 When a single hoist is used, a "spreader" will keep the sling from slipping on the housing. If it is necessary to use hooks placed in lifting holes of fan, BE CAREFUL NOT TO DISTORT OR BEND THE HOUSING.
3. All lifting brackets are to be used at the same time.
4. Never use the shaft, motor, or accessories as lifting points.
5. Keep the fan level during lifting and installation.
6. Spreader bars must span the unit to prevent damage to the unit by the lifting cables. (Ref. Figure 2)
7. Use padding and/or sufficiently padded chains to protect the fan and coating from damage.
8. Chain or wire slings should be well-padded where they contact the fan, especially where special coatings and paints are involved. Rubber, phenolic enamels, etc. require special care as they may easily be damaged by contact in lifting. Even a small chip will destroy the corrosion prevention seal of the coating and allow corrosion to start. Always repair scratched surfaces with touch up of like coating prior to installation.
9. Test-lift the fan to check for proper balance and rigging before moving to desired location.
10. Do not lift the fan in windy conditions.

Figure 1



Figure 2



STORAGE

Storage

Store in a dry, protected area being sure fan shaft, bearings and impeller are protected against dust and corrosion. If it is necessary to store outdoors or within a building under construction, special care must be taken to prevent moisture, corrosion, dirt or dust accumulation. Coat the shaft with grease or rust preventative compound. Cover and seal bearings to prevent entrance of contaminants. Impeller should be rotated at least once a month to circulate the grease in bearings. If stored outdoors over seven (7) days, cover completely with a light colored tarp (to prevent the promotion of condensation) or heavy waterproof paper. Electrical connections and leads must be protected from moisture. Block impeller to prevent natural rotation. Do not allow material of any kind to be piled on top or inside of fan.

Long term storage is defined as storage for period exceeding one month from the date the equipment was received. Fans and motors should be stored in a dry, low humidity area indoors. Equipment which is to be installed, but not operated for several months, should be blocked to take the weight off of the vibration isolators (if provided), and then given the same protection, periodic inspection and maintenance as a unit in storage. To prevent puddle corrosion of fan bearings that undergo long-term storage the following preventive maintenance must be performed:

Motors should be protected and maintained as recommended by the motor manufacturer.

Surface Protection - Most fans are provided from the factory with a protective coating suitable for indoor or outdoor use. Care must be taken not to damage the fan coating to prevent the coating from being compromised.

Clearance - Maintenance clearance of the fan does not have any specific requirements. It is up to the customer to define the appropriate amount of clearance for access and maintenance of the unit.

INSTALLATION

Installation

Carefully inspect the fan and ensure any loose fasteners are secured. Hand rotate the impeller to make sure it spins freely and without a wobble. This fan requires a solid surface rated for the weight of the fan and must be installed level.

Mounting holes have been provided for mounting to a solid level surface, isolators, and/or using isolator rails. Fans must be located and fastened firmly in a level position. The motor and drive are then mounted in their proper relative positions, if not already mounted on the fan.

Rooftop up-blast fans with a curb cap and discharge wind band assembly are designed for attaching to a roof curb. Fans must be located and fastened firmly in a level position. These fans are provided with lifting lugs for hoisting onto rooftops.

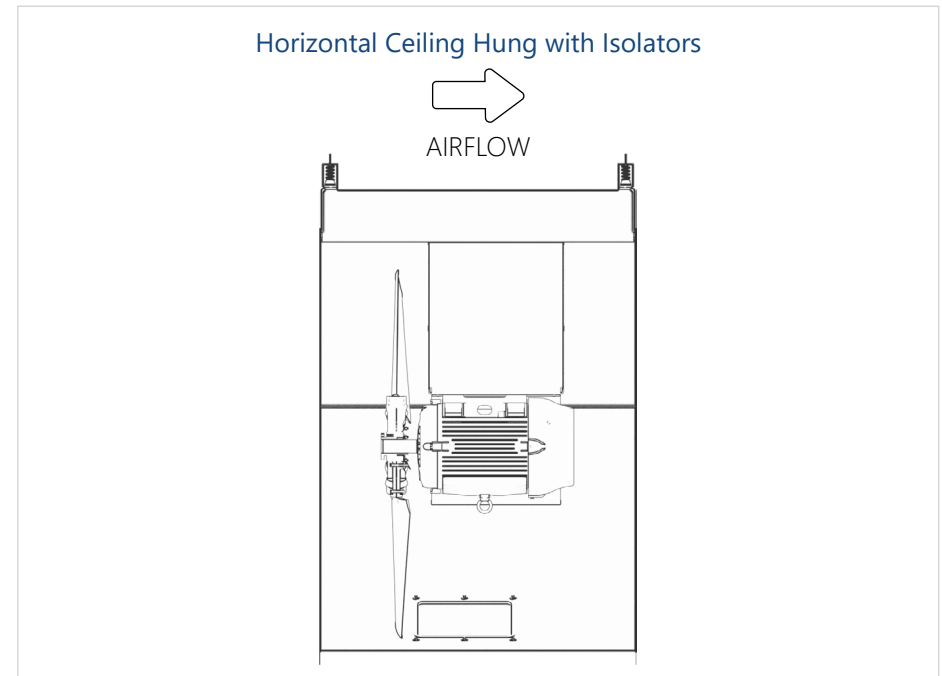
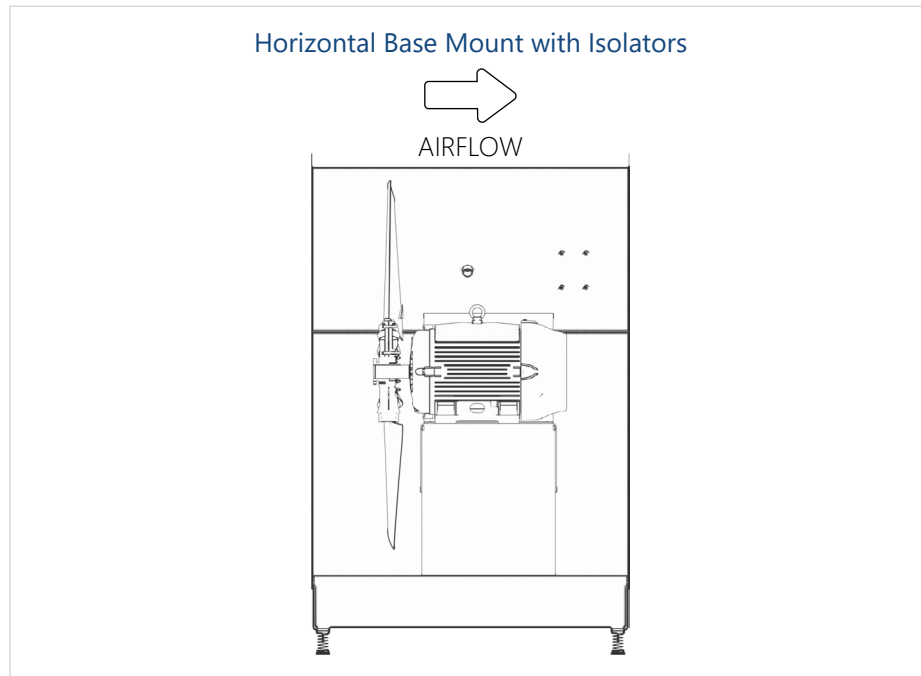
Propeller Clearance

Before starting up a fan, the impeller should be inspected to assure that the assembly has not shifted while in transit. Incorrect impeller clearance could cause damage to the prop and housing resulting in lower efficiency of the fan. The clearance between the impeller and housing should equal around the entire circumference of the impeller.

Fan Rotation

Fan rotation per AMCA is determined from the discharge end of the fan. PennBarry provides a rotation sticker on the housing for verification. Bump start the fan to confirm rotation is correct before running fan at full speed. Running the fan in reverse may overload and possibly damage the motor.

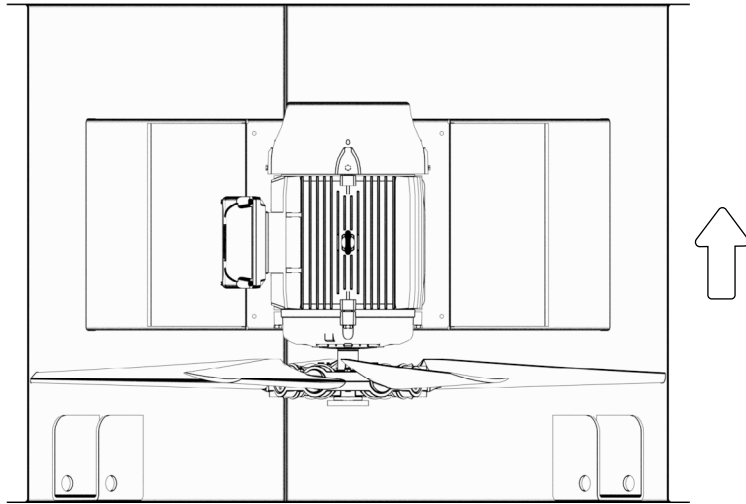
Common Installations



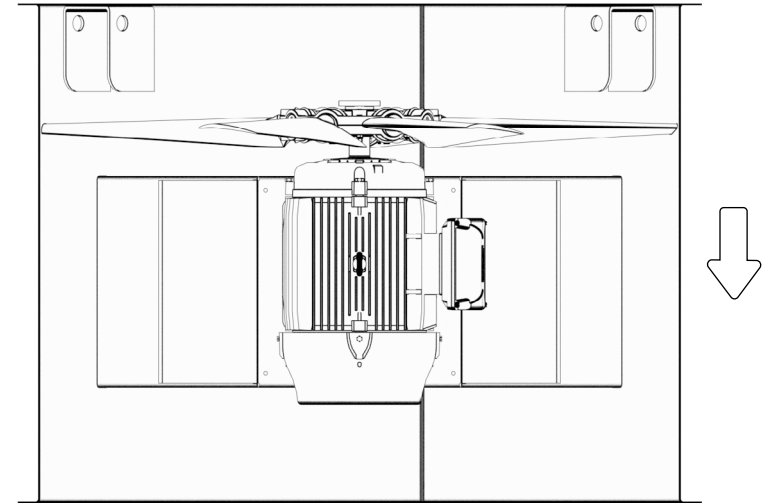
INSTALLATION

Common Installations (Cont.)

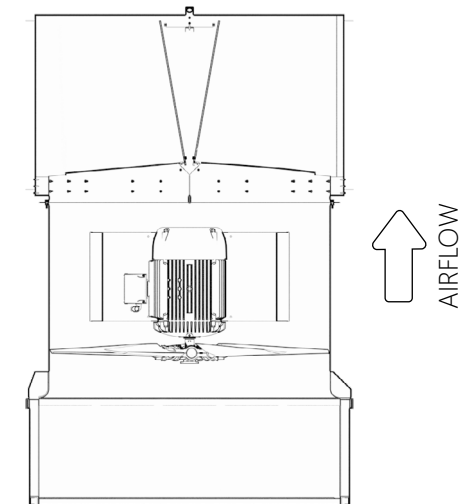
Vertical Base Mount, Upblast



Vertical Ceiling Hung, Downblast



Roof Upblast, Shown with Optional Roof Curb



INSTALLATION

Non-Ducted Installations

If the fan does not have a ducted inlet, then there should be a minimum of one impeller diameter clearance in front of the inlet. See diagram below. If the fan has a free discharge or an abrupt change in outlet area (discharge plenum), fan performance may be negatively impacted because the fan isn't directing the discharge nor achieving required pressure to move the discharge appropriately.

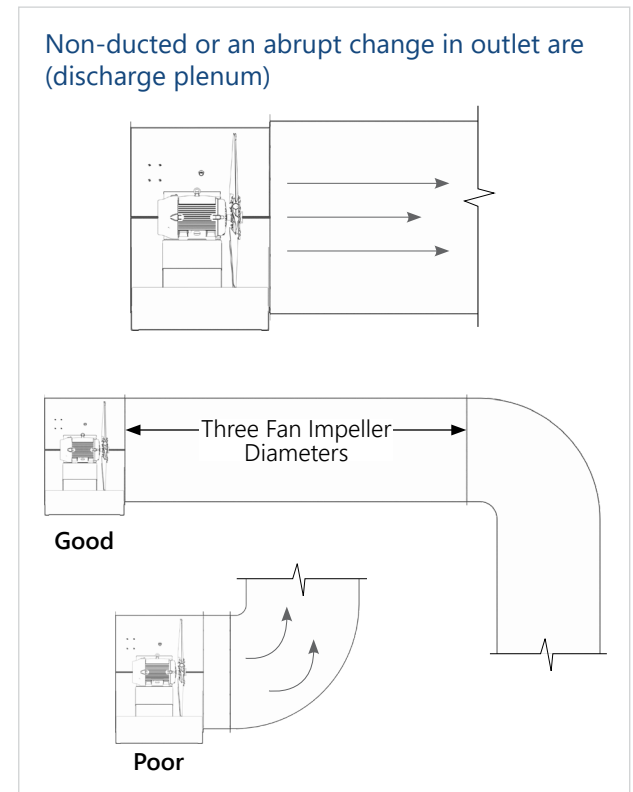
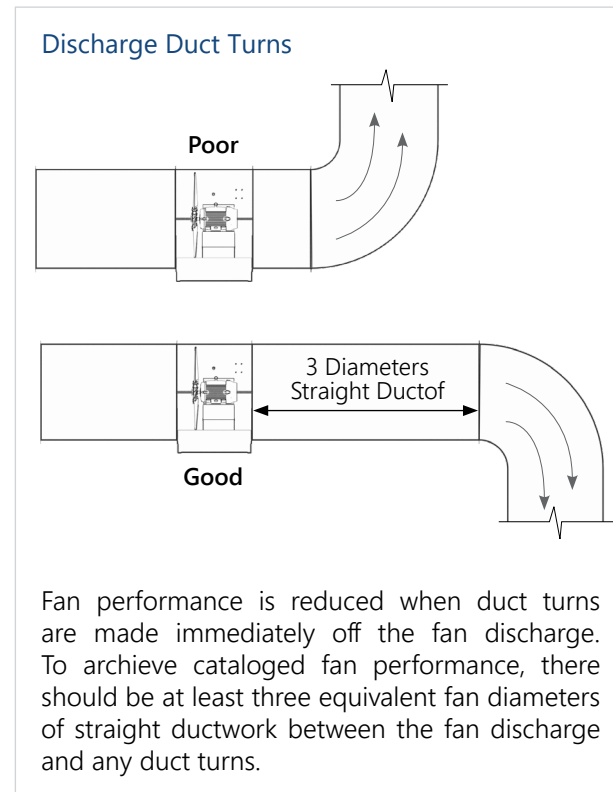
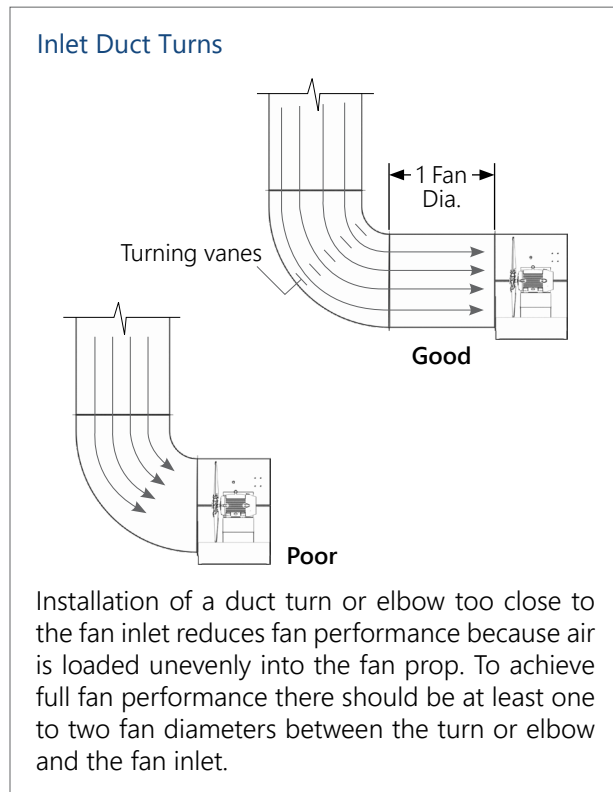
Ducted Inlets

It is highly recommended inlet have 3 impeller diameters of straight duct into the inlet. It is also recommended duct turns have turning vanes to reduce inlet turbulence (Inlet Spin/Swirl).

Ducted Outlets

Discharge ducts should have 3 impeller diameters before any duct turns. When the duct does turn it should use turning vanes. When discharge duct work is present, it should closely match the fan diameter or utilize a transition section to minimize performance losses.

See below diagrams for reference.



START-UP AND OPERATION

Start-Up

Before Start-Up:

All fasteners, bolts, set screws, etc. - should be checked for tightness before start-up.

Access Doors - should be tight and sealed.

NOTE: The maximum torque values for weld studs are as follows:

STUD SIZE	TORQUE (FL. LBS.)
1/4"	5
15/16"	10
3/8"	17
1/2"	39
5/8"	83

Impeller

Turn rotating assembly by hand to see that it runs free and does not bind or strike fan housing. If impeller strikes housing, it may have moved on the shaft. Check location of impeller in relation to fan inlets. Be sure fan housing is not distorted. See ALIGNMENT section.

Electrical

Check electrical wiring to the motor. See MOTOR Section.

Guards

Make certain all safety guards are installed properly.

Duct Connections

The connections from fan to ductwork must not be distorted. Ducts should never be supported by the fan. Expansion joints between duct connections should be used where expansion is likely to occur or where the fan is mounted on vibration isolators. All joints should be sealed to prevent air leaks and all debris removed from ductwork and fan.

At first indication of trouble or vibration, shut down and check for cause of difficulty.

START-UP AND OPERATION

Prior to applying power to the motor, check the following

1. Turn off and LOCK OUT the power source.
2. Check line voltage, phase, and frequency with motor nameplate, and electrical accessories.
3. On single phase motors, set-up the terminal blocks in accordance with the nameplate instructions (or wiring diagram). The set up must match the line voltage.
4. If the motor is three phase, group and connect the winding leads as shown on the wiring diagram. The line voltage must correspond with proper grouping of motor leads.
5. For a fan is ordered with an induction motor, but not a soft start device, it is recommended the service disconnect have a time delay fuse/breaker for in-rush current.
6. Ensure guarding (if equipped) is in place before the fan runs.
7. Dampers, if supplied, should operate freely with blades closed tightly. All dampers (with actuators) should be partially closed during starting periods to reduce power requirements.



Always disconnect or shut off electrical power before attempting to service the fan and/or motor.

All AC induction motors will perform satisfactorily with a 10% variation in voltage, a 5% variation in frequency or a combination voltage-frequency variation of 10%. For motors rated 208-220 volts, the above limits apply only to 220 volt rating. To select control for 208-220 volt motors, use same amps for either 208 or 220 volts.

Motors are received with bearings lubricated and require no lubrication for some time depending on operating conditions. (See MAINTENANCE section on Motor Bearings)

TO REVERSE DIRECTION OF ROTATION

Three Phase Motors

To reverse rotation, interchange any two line leads.

Normal operation of motors results in temperature rise. Permitted temperature rise depends on type of motor installation. The total motor operating temperature includes ambient temperature plus motor temperature rise. The motor temperature rise includes nameplate temperature rise, service factor allowance and hot spot allowance.

IMPORTANT NOTE:

MOTORS ARE WARRANTED BY THE MOTOR MANUFACTURER. PENNBARRY WILL ASSIST IN LOCATING A LOCAL VENDOR APPROVED REPAIR SHOP, IF REQUIRED.

Motor Lubrication and Maintenance

Regrease or lubricate motor bearings according to manufacturer's recommendations. DO NOT OVER LUBRICATE. Motor manufacturer's lubrication recommendations are printed on tags attached to motor. Should these tags be missing the following will apply:

FRACTIONAL HORSEPOWER BALL BEARING MOTORS: Under normal conditions, ball bearing motors will operate for five years without relubrication. Under continuous operation at higher temperature (but not to exceed 140°F ambient) relubricate after one year.

START-UP AND OPERATION

INTEGRAL HORSEPOWER BALL BEARING MOTORS: Motors having pipe plugs or grease fittings should be relubricated while warm and at a stand still. Replace one pipe plug on each end shield with grease fitting. Remove other plug for grease relief. Use low pressure grease gun and lubricate until grease appears at grease relief. Allow motor to run for 10 minutes to expel excess grease. Replace pipe plugs.

RECOMMENDED RELUBRICATION INTERVALS: GENERAL GUIDE ONLY.

Motor Lubrication and Maintenance

Regrease or lubricate motor bearings according to manufacturer's recommendations. DO NOT OVER LUBRICATE. Motor manufacturer's lubrication recommendations are printed on tags attached to motor. Should these tags be missing the following will apply:

H.P. Range	Standard Duty 8 Hr./Day	Severe Duty 24 Hr./Day Dirty, Dusty	Extreme Duty Very Dirty High Ambients
1 1/2 - 7 1/2	5 Years	3 Years	9 Months
10 - 40	3 Years	1 Years	4 Months
50 - 150+	1 Years	9 Months	4 Months

These ball bearing greases or their equivalents are satisfactory for ambient temperatures from 20°F to 200°F.

Chevron SRIU #2 (Standard Oil of California)

Chevron BRB #2 (Standard Oil of California)

Premium RB (Texaco, Inc.)

Alvania No. 2 (Shell Oil Company)

Make certain motor is not overloaded. Check amps. with nameplate.

KEEP MOTORS DRY. Where motors are idle for a long time, single phase heaters or small space heaters might be necessary to prevent water condensation in windings.

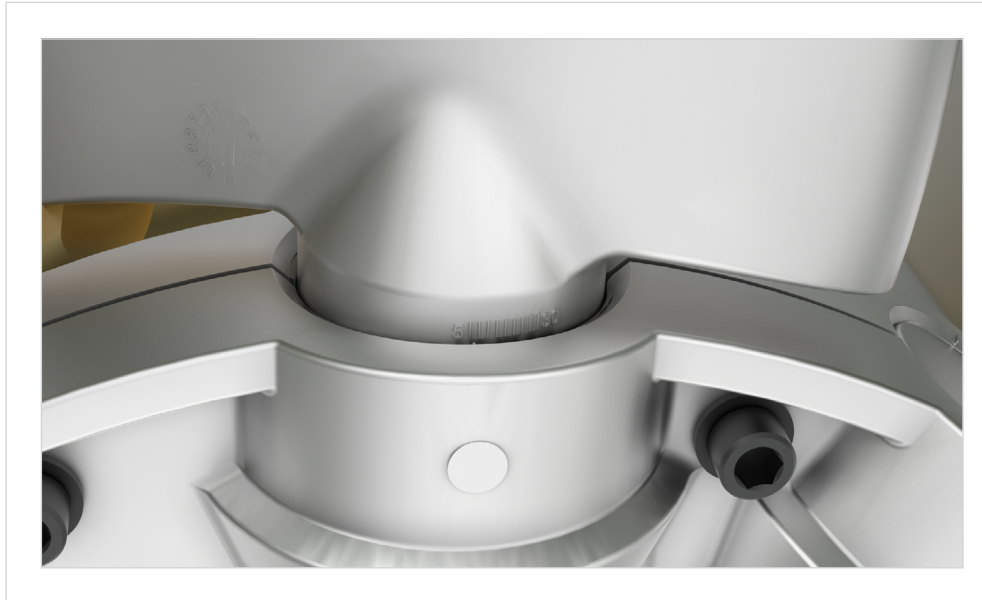
START-UP AND OPERATION

Field Fan Performance Adjustments

The performance of the AWX fan may be changed through the use of a variable speed drive (VFD) or adjusting the impeller blade pitch. Either a VFD or blade pitch adjustment can be used for air balancing. Increasing or decreasing in fan speed (RPM) or blade pitch, can significantly change the power required from the motor. Check motor load amperage and compare to nameplate rating when changing the fan speed or blade pitch.

Fan Performance Adjustments - Blade Pitch

1. Determine the blade pitch required for adjusting the fan performance. Blade pitch changes can be obtained by your mechanical sales representative.
2. Remove power source to fan and be sure to use required lock out - tag out procedures.
3. Obtain access to the propeller by removing the fan.
4. Loosen bolts on the impeller hub. The bolts should spin freely so the blades can be moved.
5. Adjust blade angle by hand only. The angle markings on the blade root are between 5 and 30 degrees with 3.125 degree incremental markings. Refer image below.
6. Adjust the blade angle of the remaining blades and verify all blades are at the same pitch.
7. Tighten the hub bolts once blade pitches have been set. Torque requirements are 20 ft-lbs for the hub bolts and 29 ft-lbs for the bushing bolts.
8. Install fan back to its prior location.
9. Once installed follow start-up procedures and when the fan is running, measure the motor amp draw to verify the motor is not overamping.



MAINTENANCE

Fan maintenance

Always disconnect and lock out power to the fan before attempting any maintenance. A definite time schedule for inspecting all rotating parts should be established. The frequency of inspection depends on the severity of operation and the location of the equipment.

Foundation bolts and all set screws should be inspected for tightness.

Fans should be inspected for wear and dirt periodically. Any dirt accumulated in housing should be removed. The impeller may have to be cleaned. A wash down with steam or water jet is usually sufficient, covering bearings (if equipped) so water will not enter the pillow blocks. Impellers having worn blades should be replaced. Impellers require careful rebalancing before being returned to service. Replacement impellers should have the balance checked upon start-up and corrected as required to operate properly in its specific application.

Repairing of exterior and interior parts of fans and ducts will extend the service life of the installation. Select a paint which will withstand the operating temperatures. For normal temperatures a good machinery paint may be used. Corrosive fumes require all internal parts to be wire brushed, scraped clean and repainted with an acid resisting paint. Competent advice should be sought when corrosive fumes are present.

Blow out open type motor windings with low pressure air to remove dust or dirt. Air pressure above 50 psi should not be used, as high pressure may damage insulation and blow dirt under loosened tape. Dust can cause excessive insulation temperatures. Do not exceed OSHA air pressure requirements.

Excessive vibration will shorten the life of any mechanical device. Correct any imbalance situation before returning fan to service.

Lubrication lines

Lubrication lines installed at the factory are not filled with grease at the factory. Caution must be used when first greasing the bearings to purge air from the lines without blowing bearing seals or over greasing a bearing.

Lubrication of Hinge Bearings on Power Roof Ventilators

Stack cap damper hinge bearings are oil impregnated and may never need lubrication. A drop or two of 10W30 motor oil every 6 to 12 months will not hurt the bearings. Check damper operation to detect binding or checking. Adjust hinge pin bearing bracket to resume free damper operation.

Fan mechanical balancing

Fan impellers are balanced statically and dynamically by the factory, but may require further trim balancing. The final installed vibration level of the fan is also dependent upon its installation and foundation. Fans shipped completely assembled have been trim balanced at the factory. Before any attempt is made at balancing, check for any other causes of vibration or unbalance as listed in the TROUBLESHOOTING CHECKLIST. A fan handling clean air should not need a field balancing after original balance. Dust build-up on fan blades or wear can cause fan unbalance. Periodic inspection of the fan should be made to determine the amount of dirt build-up or wear. Each fan has a Quality Assurance label affixed to the fan. All pertinent information on factory balance is recorded on the label for the owner's information and use.

IMPORTANT NOTE:

The fan must be checked and corrected for any out of balance condition any time a component of the rotating assembly is replaced or altered.

MAINTENANCE

Disassembly of Fan

Before removing any equipment, the fan's power source should be locked "off" for personal safety. The position of mating parts such as bearing, drive, etc., should be marked in their relative position for simplifying assembly bolts and maintained with the clamping bolts.

1. Remove all safety guards.
2. Disconnect ducting or supports to remove fan.
3. Remove drive cover plate to provide access to inner housing (Arr. 9 fan only)
4. Remove drive from fan.
5. Clean off the shaft, removing dirt and burrs and lubricate with oil for bearing and impeller removal.
6. Impeller removal - Direct Drive, Roof Mounted Upblast. The fan will need to be removed from the curb base. The fan will need to be positioned horizontally on surface capable of supporting the fan's weight. Note, the discharge end of the fan will either need to be supported so the discharge windband isn't damaged or the discharge windband assembly will need to be removed before positioning the fan horizontally. If the discharge windband assembly is removed, place the assembly vertically on a sturdy surface. The arrangement 4 (direct drive) fans have a standard foot mounted motor directly coupled to the impeller. The impellers are mounted to the motor shaft with taper-lock bushings to the impeller hub. On arrangement 4 (direct drive) axial fans with standard NEMA frame motors, no impeller wheel retaining device is used.

Assembly of Fan

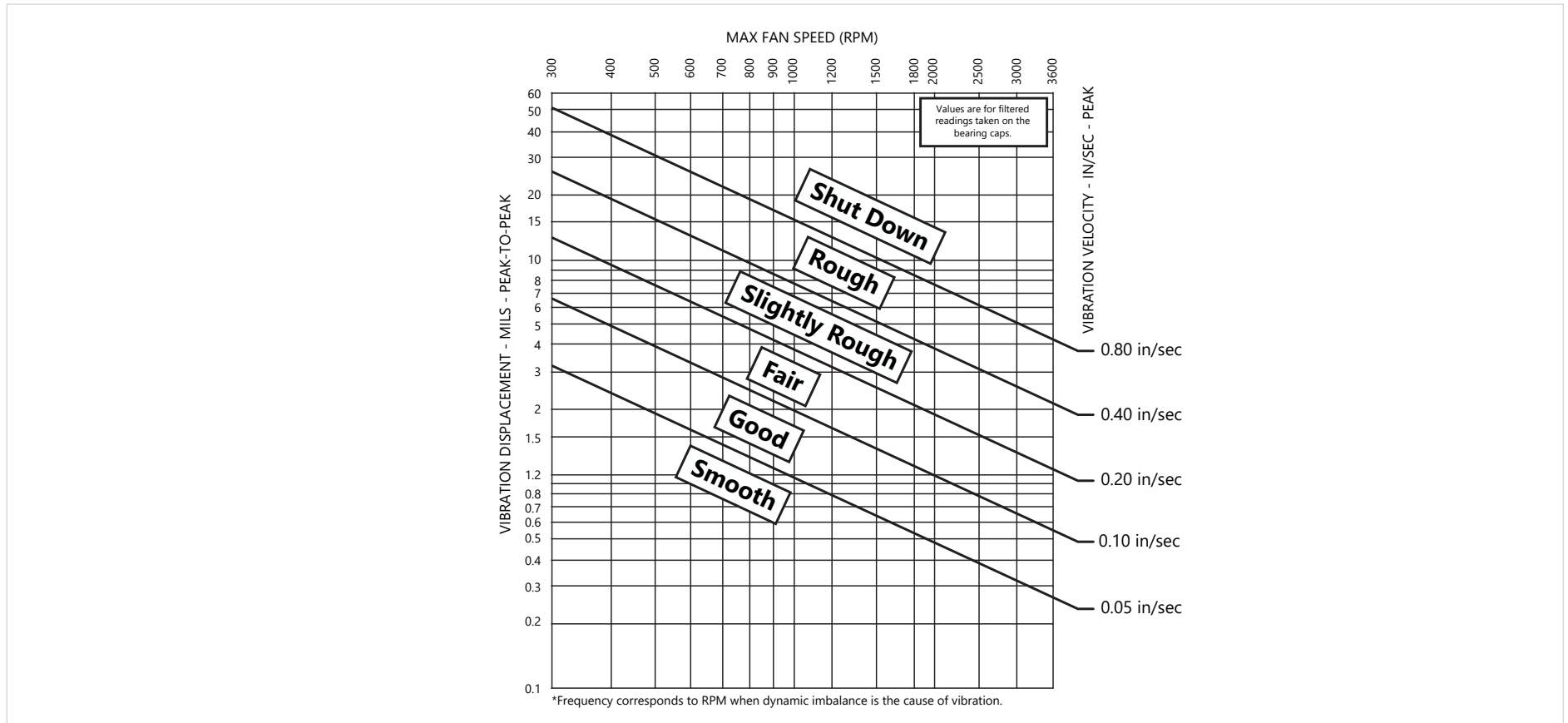
To reassemble fan, reverse the process as listed above. Care should be taken once the fan is reassembled to assure components are firmly fastened and aligned. PennBarry requires that for any rotating assembly replacements, the fan should be rebalanced.

Vibration Tolerances

All fans are dynamically balanced at the factory before shipment. The dynamic balance is made at the operating speed if known, or the maximum RPM of the unit. Measurements are taken off both bearings in mil readings of displacement. The readings will meet or exceed the guidelines as established in AMCA Std. 204-96, "Balance Quality and Vibration Levels for Fans." Final measurements are recorded on PennBarry's inspection copies. When motors and drives are not provided by PennBarry it will be necessary for the customer to provide a trim balance in the field.

MAINTENANCE

Vibration Frequency - CPM



Guidelines for Interpreting the Classification

Smooth

Alignment, balance and the integrity of the support structure must be near perfect and the vibration from sources other than the fan equipment must be low.

Good

Requires reasonable care on installation, proper foundation, good balance on the rotating components and good alignment of the running gear.

Fair

Fan equipment can operate in this region, but imperfections are indicated.

Slightly Rough

Requires service. Continued use in this condition will reduce equipment life. Monitor equipment for deterioration.

Rough

Requires service. Dangerous operating conditions for fan equipment. Shut equipment down.

Shut Down

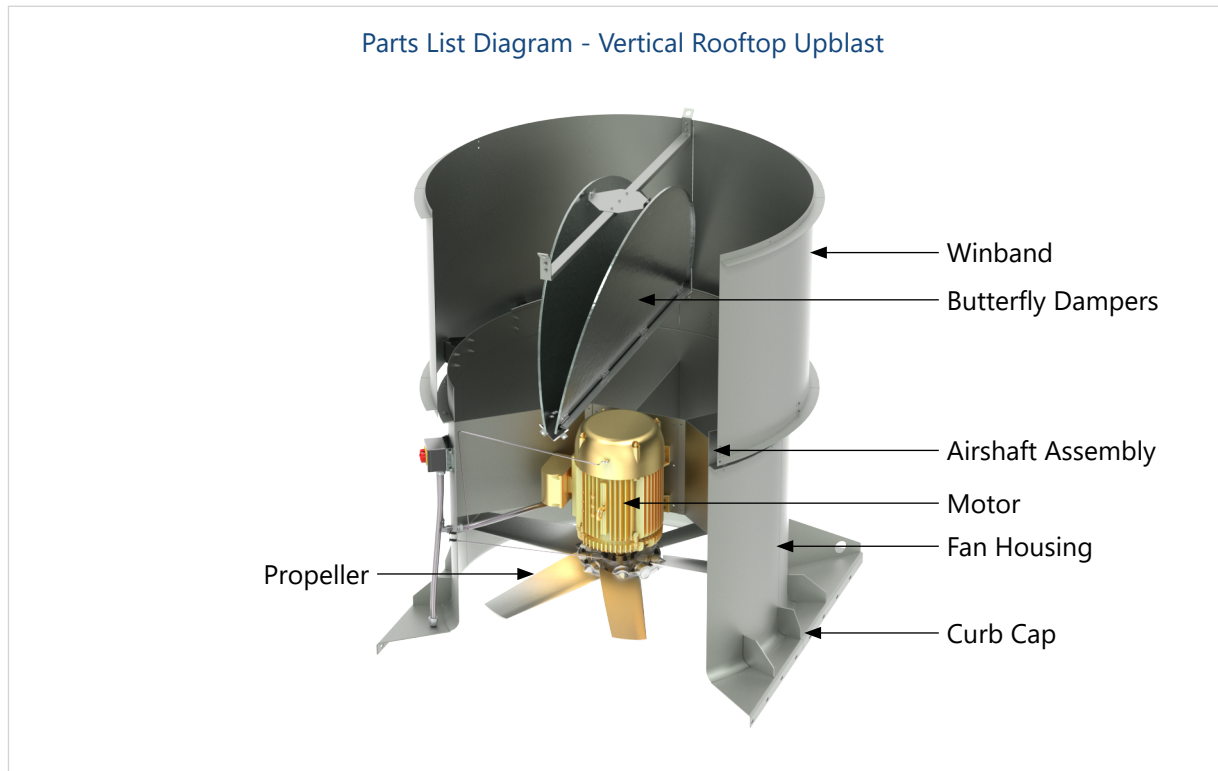
Do not operate fan equipment. Potential for catastrophic failure.

MAINTENANCE

Ordering Replacement Parts

When ordering replacement parts it is necessary to provide PennBarry with the serial number of the unit and/or the original shop order number on which the fan was ordered. Typical replacement parts are in below image:

When ordering replacement parts, specify any required accessories, such as special material, flanges and coatings. This will assure that the replacement parts are correct.

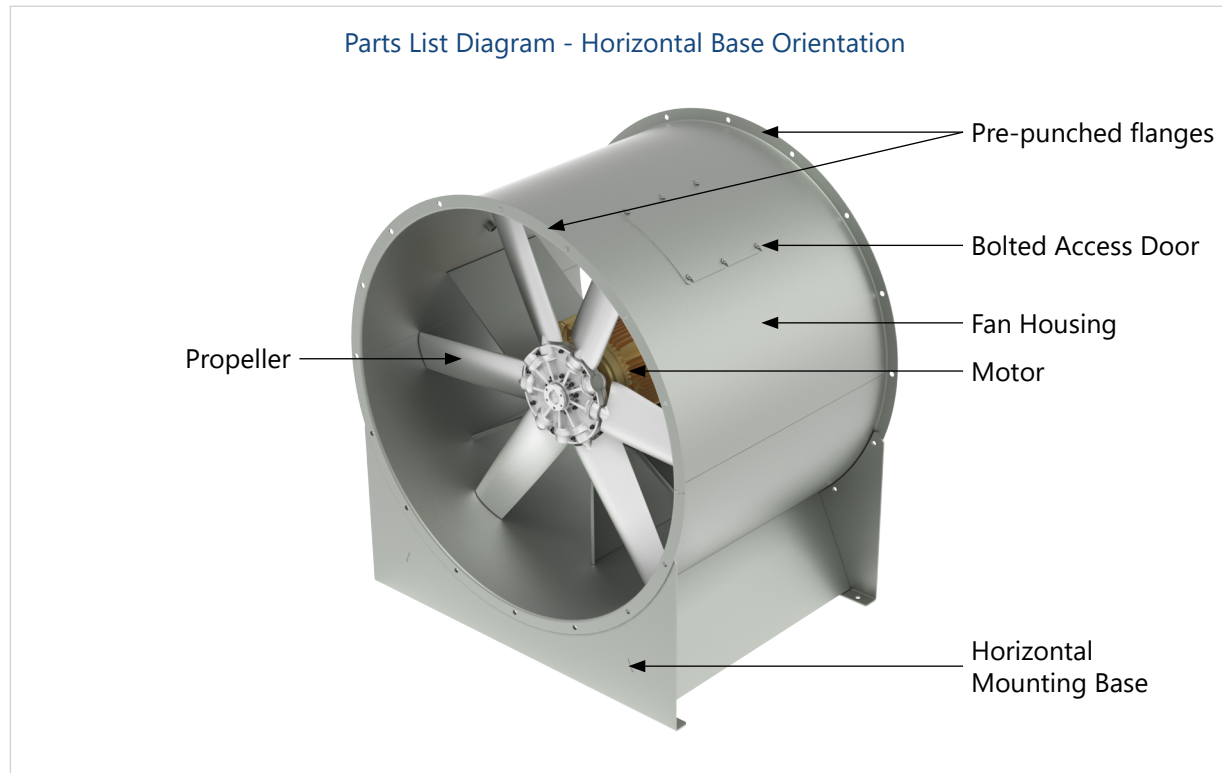


MAINTENANCE

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TROUBLESHOOTING

Troubleshooting Checklist

In the event trouble is experienced in the field, listed below are the most common fan difficulties.

Symptom	Possible Cause(s)	Corrective Action
Volume of air being delivered is lower than expected.	Total resistance of system higher than anticipated	Check for duct obstructions or other system issues
	Speed too low	Adjust VFD or pulleys
	Dampers or variable inlet vanes improperly adjusted	Open dampers as needed to prevent restriction
	Poor fan inlet or outlet conditions	Correct installation guidelines
	Air leaks in system	Seal joints / correct damper settings
	Damaged impeller or incorrect direction of rotation	Replace impeller or reverse impeller rotation
Vibration and Noise	Misalignment of rotating assembly	Loosen align, tighten
	Unstable foundation	Reinforce/correct foundation issues
	Foreign material in fan causing unbalance	Remove
	Worn bearings	Replace bearings and shaft
	Damaged impeller or motor	Check and repair
	Broken or loose bolts or set screws	Replace
	Bent shaft	Replace
	Worn coupling	Replace
	Impeller or driver unbalanced	Balance
	60/120 Hz magnetic hum due to electrical input	Check for high or unbalanced voltage
	Fan delivering more than rated capacity	Reduce speed
	Loose dampers	Adjust and tighten
	Speed too high or fan rotating in wrong direction	Correct
	Vibration transmitted to fan from some other source	Isolate
Overheated Bearings	Too much grease in ball bearings	Allow run time to purge (24 hours)
	Poor alignment	Correct
	Damaged impeller or drive	Inspect, correct or replace
	Bent shaft	Replace
	Abnormal end thrust	Loosen set screws and adjust
	Dirt in bearings	Replace bearing: use filtered grease
	Excessive belt tension	Adjust

TROUBLESHOOTING

Symptom	Possible Cause(s)	Corrective Action
Overloaded Motor (Pulls too many amps)	Speed too high	Reduce speed or change HP
	Discharge over capacity due to existing system resistance being lower than original rating	Adjust system resistance
	Specific gravity or density of gas above design value	Recalculate and correct
	Incorrect rotation direction	Reverse rotation direction
	Poor alignment	Correct
	Impeller wedging or binding on inlet bell	Loosen and adjust
	Bearings improperly lubricated	See page 4
	Motor improperly wired	Verify and correct
Motor Problems	Check for low or high voltage from power source	Correct voltage
	High temperature; drawing too much current or dirt in windings	Repair motor
	Vibration and noise	Correct armature imbalance
	Armature rubs against stator	Replace worn bearings
	Too much or not enough lubrication in bearings	Correct lubrication
	Commutator brushes on d-c motor worn or not seated under proper tension	Repair motor
	Vibration and noise; loose hold down bolts	Tighten hold down bolts
	Low insulation resistance due to moisture	Check resistance with a megohm meter ("Megger") or similar instrument employing a 500 volt d-c potential. Resistance should read at least 1 megohm
Motor Overheating	Belt Slippage (belt drive units only)	Adjust tension or replace belts
	Over voltage or under voltage	Contact power supply company
	Operation in wrong direction	Reverse direction of motor
	Fan speed too high	Slow down fan by opening variable pitch pulley on motor shaft
	Incorrect motor (service factor 1.0, low ambient temp.)	Replace motor with the correct NEMA service factor (1.15 or higher) and 40°C ambient temperature rating
	Undersized motor	Replace fuses or open circuit breaker

TROUBLESHOOTING

Symptom	Possible Cause(s)	Corrective Action
Fan Inoperative	Blown fuse or open circuit breaker	Shut off power and check wiring for proper connections
	Loose or disconnected wiring	Repair all incorrect wiring connections
	Defective motor	Repair or replace motor
	Broken belts	Replace belts
	No 0-10v signal going into the motor (direct driven model only)	Make sure the included potentiometer is not in the off position
Insufficient Airflow	Open access doors or loose sections of ducts	Check for leakage
	Clogged filters	Clean or replace filters as needed
	Operation in wrong direction	Correct rotation of impeller
	Insufficient make-up air direction	Add make-up fan or louver opening
	Damper (if installed) in the wrong position	Adjust damper opening

Note: Care should be taken to follow all local electrical, safety and building codes. Provisions of the National Electric Code (NEC), as well as the Occupational Safety and Health Act (OSHA) should be followed.

All motors are checked prior to shipment. If motor defects should develop, prompt service can be obtained from the nearest authorized service station of the motor manufacturer while under warranty. Exchange, repair or replacement will be provided on a no charge basis, if the motor is defective within the warranty period. The PennBarry representative in your area will provide a name and address of an authorized service station, if requested.



WARNING

Warning: Motor guarantee is void unless overload protection is provided in motor wiring circuit.

LIMITED WARRANTY

What Products Are Covered

PennBarry Commercial and Industrial Fans (each, a “PennBarry Product”)

One Year Limited Warranty For PennBarry Products

PennBarry warrants to the original commercial purchaser that the PennBarry Products will be free from defects in material and workmanship for a period of one (1) year from the date of shipment.

Exclusive Remedy

PennBarry will, at its option, repair or replace (without removal or installation) the affected components of any defective PennBarry Product; repair or replace (without removal or installation) the entire defective PennBarry Product; or refund the invoice price of the PennBarry Product. In all cases, a reasonable time period must be allowed for warranty repairs to be completed.

What You Must Do

In order to make a claim under these warranties:

1. You must be the original commercial purchaser of the PennBarry Product.
2. You must promptly notify us, within the warranty period, of any defect and provide us with any substantiation that we may reasonably request.
3. The PennBarry Product must have been installed and maintained in accordance with good industry practice and any specific PennBarry recommendations.

Exclusions

These warranties do not cover defects caused by:

1. Improper design or operation of the system into which the PennBarry Product is incorporated.
2. Improper installation.
3. Accident, abuse or misuse.
4. Unreasonable use (including any use for non-commercial purposes, failure to provide reasonable and necessary maintenance as specified by PennBarry, misapplication and operation in excess of stated performance characteristics).
5. Components not manufactured by PennBarry.

Limitations

1. In all cases, PennBarry reserves the right to fully satisfy its obligations under the Limited Warranties by refunding the invoice price of the defective PennBarry Product (or, if the PennBarry Product has been discontinued, of the most nearly comparable current product).
2. PennBarry reserves the right to furnish a substitute or replacement component or product in the event a PennBarry Product or any component of the product is discontinued or otherwise unavailable.
3. PennBarry’s only obligation with respect to components not manufactured by PennBarry shall be to pass through the warranty made by the manufacturer of the defective component.

General

The foregoing warranties are exclusive and in lieu of all other warranties except that of title, whether written, oral or implied, in fact or in law (including any warranty of merchantability or fitness for a particular purpose).

PennBarry hereby disclaims any liability for special, punitive, indirect, incidental or consequential damages, including without limitation lost profits or revenues, loss of use of equipment, cost of capital, cost of substitute products, facilities or services, downtime, shutdown or slowdown costs.

The remedies of the original commercial purchaser set forth herein are exclusive and the liability of PennBarry with respect to the PennBarry Products, whether in contract, tort, warranty, strict liability or other legal theory shall not exceed the invoice price charged by PennBarry to its customer for the affected PennBarry Product at the time the claim is made.



PENNBARRY™

PennBarry is proud to be your preferred manufacturer of commercial and industrial fans and blowers. Learn how PennBarry can assist you in your next application by contacting your PennBarry Representative or visiting us on the web at www.pennbarry.com

PennBarry | www.pennbarry.com | pbtsr@pennbarry.com | tel: 765.483.5800

PennBarry reserves the right to make changes at any time, without notice, to models, construction, specifications, options & availability. This manual illustrates the appearance of PennBarry products at the time of publication.

View the latest updates on the PennBarry website.

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