YORK®

INSTALL CONFIDENCE.

York® Stack Fan
Installation Operating Manual

Johnson Controls

This Installation Manual is provided as a guide for the installation of fans manufactured by YORK® Stack Fan. It is the responsibility of the purchaser to provide qualified personnel experienced in the installation, operation, and maintenance of air moving equipment. Instructions given in this manual are general in nature and apply to a variety of models manufactured by YORK®. Read this Installation Manual completely before installing the fan. Additional product and engineering information is available at www.York.com. Always follow good safety practices when installing, maintaining and operating air moving equipment.

If fans are located less than 7 feet above the floor, guarding is required in accordance with OSHA (Occupational Safety and Health Act) requirements.

Disconnect power before servicing or installing.
This fan should be assembled and installed by a qualified technician.

Maximum Fan Weight Specifications	
Fan Size	Max. Total Weight (lbs.)
105	240
122	270
135	300
150	340
165	490
182	476
200	528
222	815
245	1263

RECEIVING AND HANDLING

All YORK® products are carefully constructed and inspected before shipment to insure the highest standards of quality and performance. Compare all components with the bill of lading or packing list to verify that the proper unit was received. Check each unit for any damage that may have occurred in transit. Any damage should be reported immediately to the carrier and the necessary damage report filed.

Handling of all air moving equipment should be conducted by trained personnel and be consistent with safe handling practices. Verify the lift capacity and operating condition of handling equipment. Maintain handling equipment to avoid serious personal injury.

Units shipped completely assembled may be lifted with slings and spreader bars. Lift the fan in a fashion that protects the fan and fan coating from damage. Never lift a fan by the inlet or discharge flange, shafting or drives, impeller, motor, motor base, or in any other manner that may bend or distort parts.

LIFTING INSTRUCTIONS

Fans are designed to be lifted and moved as a single module. YORK® does not recommend lifting connected fan modules unless the fan module(s) is supported on a common base.

1. Carefully remove any crate and packing materials.
2. Place the bottom fans onto the mounting structure using the recommended lifting points as shown. Lift each fan individually into position.

Preferred lifting method

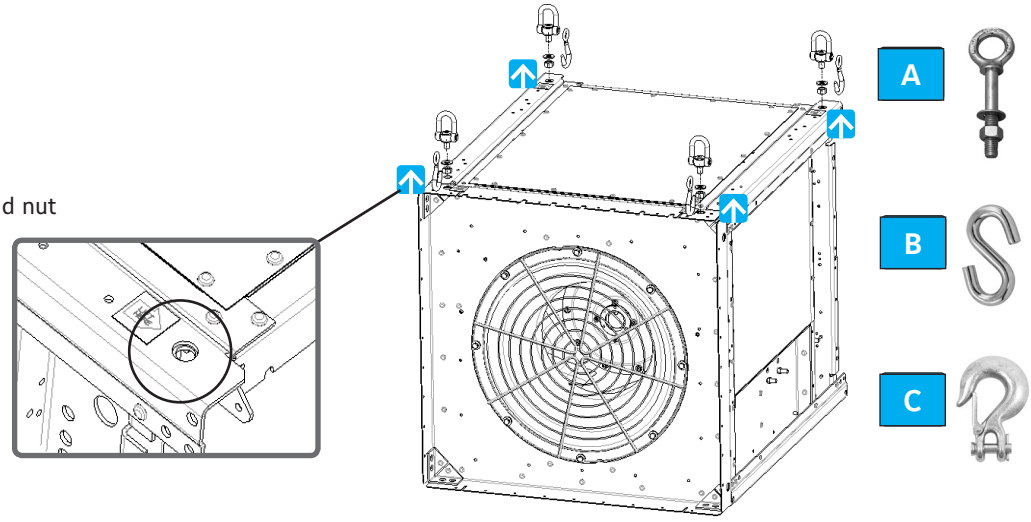
A Eyebolt with washers and nut

Alternate lifting method

B S-Hook

C Clevis Hook

Lifting Points – 5/8" diameter holes



Installation, Operation, & Maintenance

SHORT TERM STORAGE

If fan installation is delayed, store the unit in a protected area. Protect the fan and motor bearings from moisture and vibration (or shock loading).

LONG TERM STORAGE

If a fan is to be stored for any length of time and the bearings are re-greasable, the motor bearings should immediately be filled with grease while rotating the fan and then the bearings should be re-greased and rotated monthly. This will prevent moisture, which condenses within the bearing, from corroding the raceways.

STORAGE PROCEDURES

Fans should be stored indoors whenever possible where control over temperature, humidity, shock and dust is reasonably maintained. If units are to be stored outside, they should be covered with a water-resistant material. Stored equipment should be on a clean, dry floor or blocked up off the ground to prevent unit from sitting directly on the ground.

PERIODIC CHECK

On a monthly interval, the equipment should be checked to ensure that it has remained in an acceptable stored condition. The fan and motor should be rotated several times by hand. The fan impeller should be repositioned approximately 180 degrees from the previous month to prevent damaging the motor bearings.

BASES (Foundation and Isolation)

Critical to every fan installation is a strong, level foundation. Structural bases must be sturdy enough to prevent flexing and vibration. YORK® recommends using a spring isolated inertia base for all YORK® StackFan applications. Design, fabrication, and installation of the isolation base are the customers responsibility.

After the fan, isolation base, and isolators are installed, the entire assembly must be leveled. Floor mounted fans should be installed on a flat, level, rigid foundation.

Fans mounted to or within a structure should be placed as close as possible to a rigid member such as a wall or column. The structure must be designed for rotating equipment; static design for strength is not sufficient to ensure proper operation. Structural resonance should be at least 20% above the maximum fan operating speed.

Any ducting should have independent support; do not use the fan to support ducting. Isolating the fan from ductwork with flex connections eliminates transmission of vibration.

Unit Start Up

When the unit is removed from storage, all grease should be purged and replenished with fresh grease.

The following check list is recommended to ensure proper operation:

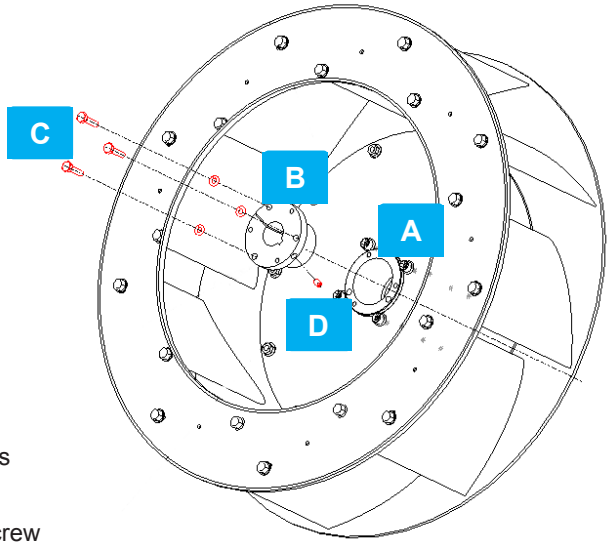
Motor Bolt Torque			
NEMA Frame	Bolt Size (Grade 5)	Washers Size (Top and Bottom)	Recommended Torque (ft-lb)
56-145T	5/16	5/16	18
182-215T	3/8	3/8	31
254U-286TS	1/2	1/2	75
324T-365T	9/16	9/16	107

C

Bushing Fastener Torque		
Bushing Type	Screw Size	Recommended Torque
JA	10-24	60 in-lbs.
SD/SDS	1/4-20	108 in-lbs.
SK	5/16-18	180 in-lbs.
SF	3/8-16	360 in-lbs.

D

Bushing Set Screw		
Bushing Type	Screw Size	Recommended Torque
SD/SDS	1/4-20	60 in-lbs.
SK	5/16-18	110 in-lbs.
SF	3/8-16	110 in-lbs.



- **A** Hub
- **B** Bushing
- **C** Bushing Screws
- **D** Bushing Set Screw

Motor and Structural Maintenance

MOTOR MAINTENANCE

The three basic rules of motor maintenance are: keep the motor clean, dry and properly lubricated. Keeping motors and windings clean is important as trapped dirt and dust may impede air flow and heat convection causing motor windings to overheat possibly leading to premature failure. Blow dust and dirt out of windings and off the motor periodically. Use low pressure (50 psi) airstream to prevent winding damage. Keep the areas surrounding the motor clear so the air can circulate through the motor cooling fan.

Motors should be kept dry to avoid electrical short circuits. Motors kept in storage for long periods of time can have moisture condense on the windings. Be certain the motor is dry before using.

Some smaller motors are permanently lubricated. Motor bearing lubrication, if required, must follow a rigorous schedule. Motors less than 10 hp running eight hours a day in a clean environment should be lubricated once every five years; motors 15 to 50 hp, every 3 years; and motors 50 to 150 hp, yearly. See motor manufacturer specifications for recommended greases. For motors in a dusty or dirty environment or running 24 hours a day, divide the service interval by 2. If the environment is very dirty or high temperatures exist, divide the service interval by 4. Lubrication requirements are normally attached to the motor. Do not over-lubricate.

The major cause of motor bearing failure is contamination of grease, insufficient grease, over lubrication, and incompatibility of grease. If a fan is to be stored for any length of time and the bearings are re-greasable, the motor bearings should immediately be filled with grease while rotating the fan and then the bearings should be re-greased and rotated monthly. This will prevent moisture, which condenses within the bearing, from corroding the raceways.

STRUCTURAL MAINTENANCE

All structural components or devices used to support or attach the fan to the isolation base, or other structure should be checked at regular intervals. Vibration isolators, bolts, foundations, etc, are subject to failure from corrosion, erosion, and other causes. Improper mounting can lead to poor operation characteristics, fan fatigue, and failure. Check components for corrosion, cracks, or other signs of stress.

Troubleshooting Guidelines

Use safety practices when investigating fan or system performance problems. General safe practices and performance troubleshooting guidelines can be found in AMCA Publication 410: Recommended Safety Practices for Users and Installers of Industrial and Commercial Fans, and AMCA Publication 202-98 (R2011): Troubleshooting. Fan application and field measurement procedures can be found in AMCA Publication 201-02 (R2011): Fans and Systems and AMCA Publication 203-90 (R2011): Field Performance Measurement of Fan Systems.

Troubleshooting Performance Problems:

The lists below indicate possible areas to check when air or sound values do not meet expectations. Most fan problems can be pinpointed to one of these common causes.

Air Capacity Problems:

1. **Air resistance of system not at design rating.** If air resistance is lower than expected airflow may be higher and the associated horsepower lower. If air resistance is higher than anticipated, air volume will likely be lower.
2. **Fan speed is not at design speed.**
3. **Air density not at design values.** Also check air performance measurement techniques / procedures.
4. **Mechanical air devices (e.g. dampers or filters), are closed or plugged.**
5. **Impeller mounted improperly or is rotating in reverse.**
6. **Parts of system or fan have been damaged or need cleaning.**

Noise Problems:

1. **Fan is not at design point of operation or fan is operating in an unstable flow region.**
2. **Bearing failure.** Check bearings.
3. **Supply voltage high or inconsistent supply frequency. Variable frequency controllers can generate motor noise.**
4. **Object which are installed in a high velocity airstream can generate noise.** This includes flow sensors, turning vanes, etc.
5. **Non-uniform fan inlet conditions.**
6. **Acoustics or sound measurement procedure incorrect.**

Vibration Problems

1. **Misalignment of drive components.**
2. **Poor foundations (isolation base) or mounting structure (resonances).**
3. **Foreign object trapped in rotating components.**
4. **Damaged rotating components (bearings, shaft, fan, impeller).**
5. **Broken, loose or missing set screws.**
6. **Loose bolts.**
7. **Vibration transmitted by another source.**
8. **Water accumulating in airfoil blades.**
9. **Fan is operating in stall or unstable flow region.**

NOTE: All fans manufactured by York® are factory balanced prior to shipment. Improper handling and movement of the fan during shipment may cause the rotating assembly to shift out of alignment Balance should be checked once the fan is installed. If a final trim balance is required, it is the end user's responsibility to bring the fan back to factory specifications.

Final trim balancing is not the responsibility of York®.

Installation

YORK® STACK FAN **ASSEMBLY**

Intake Side

Supply Side

Bolt bottom YORK® STACK FAN modules to the isolation base, or other structure, and adjacent modules using the inlet and outlet mounting flanges. The first row of modules should be securely installed before installing the second row of modules.

YORK® does not recommend lifting and moving assembled YORK® STACK FAN, as this may cause bending, distortion, and lead to component misalignment.

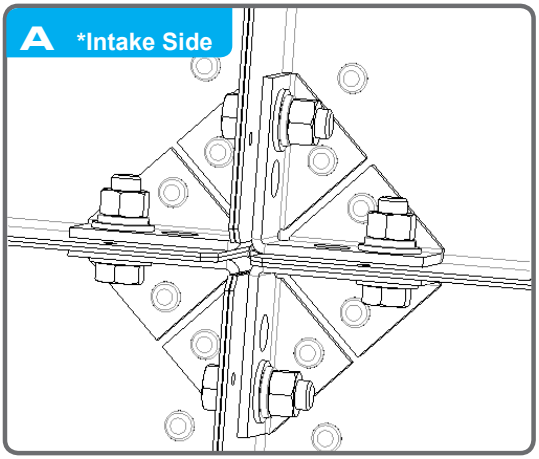
Installation (Continued)

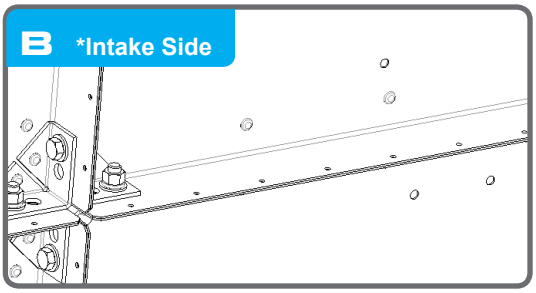
A **Top, Bottom and Side Connections *Intake Side Shown**

- 1/2-13 x 1.00 Grade 5 Hex Head Cap Screw (or equivalent) 4 required (1 in each corner)
- 1/2 Flat Washer, 8 required (2 in each corner)
- 1/2-13 Hex Nut (or equivalent), 4 required (1 in each corner). Recommended torque setting of 18 (ft-lb)
- Split Lock Washer (or equivalent), 4 required (1 in each corner)

B **Middle Connections *Intake Side Shown**

- **Intake Side Panel Connection:** A series of .22" diameter holes, 3" on center are provided to connect the front panel of the fan assembly to the customer's equipment. The holes are sized for 1/4" sheet metal screws.
- All installation hardware supplied by end user.





Installation (Continued)

RADIAL GAP, OVERLAP AND IMPELLER ALIGNMENT

Efficient fan performance can be maintained by having the correct gap and overlap between the impeller and inlet funnel. These items should be checked at installation, after the fan has been in operation for 24 hours, and after the unit has been serviced.

Gap– distance between the OD of the funnel and the ID of the impeller concentricity.
Overlap– distance the funnel and impeller overlap one another.

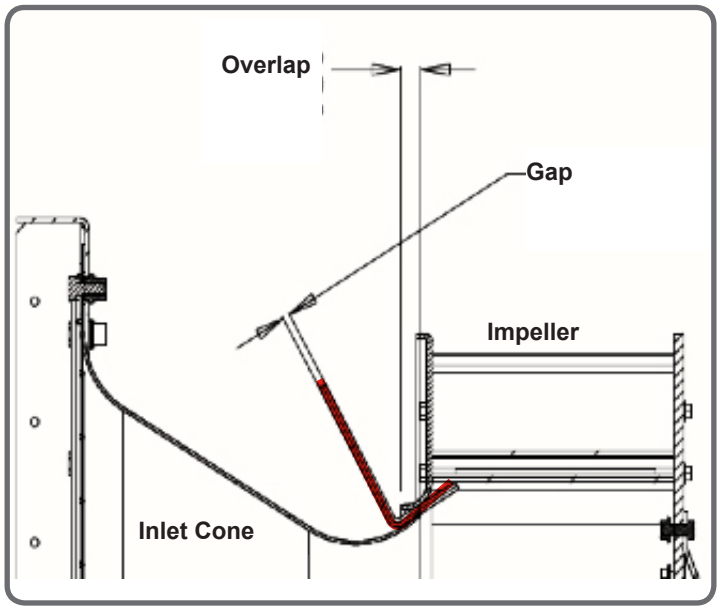
Gap/Overlap Dimensions			
Model	Minimum Overlap (Inches)	Maximum Overlap (Inches)	Minimum Gap (Inches)
105	0.12	0.29	0.06
122	0.12	0.32	0.07
135	0.12	0.35	0.07
150	0.19	0.41	0.09
165	0.25	0.47	0.11
182	0.31	0.5	0.11
200	0.38	0.57	0.12
222	0.44	0.63	0.14
245	0.5	0.69	0.17
165	0.25	0.47	0.11
182	0.31	0.5	0.11
200	0.38	0.57	0.12
222	0.44	0.63	0.14
245	0.5	0.69	0.17

Gap is adjusted by loosening the inlet funnel bolts and centering the funnel on the impeller.

Caution: Never loosen the motor attachment bolts to make adjustments to the impeller-to-funnel gap.

Overlap is adjusted by loosening the impeller hub from the shaft and moving the impeller to the desired position along the shaft. The transition between the inlet funnel and impeller should be as shown; there is a smooth feel to the profile when moving from one component to the other.

This sketch shows both the gap and overlap dimensions for all sizes.



Installation (Continued)

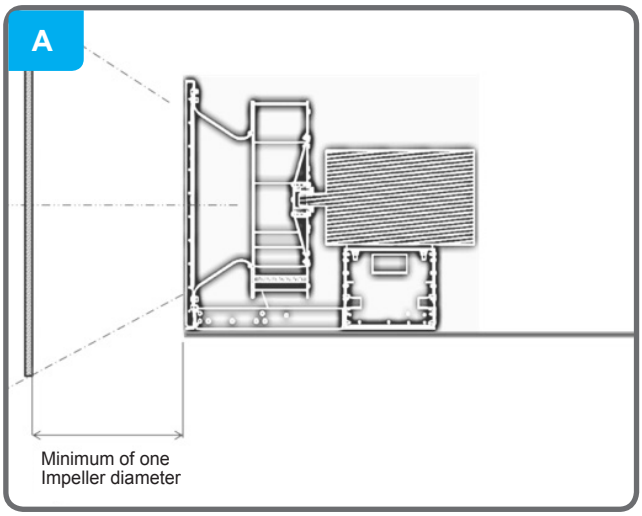
FAN SPACING

Location and Placement of Plenum Fans in Air Handlers

Center the fan inlets in both the horizontal and vertical planes.

- For inlet clearance, see **A** .
  A minimum of one fan impeller diameter clearance is recommended.

Recommended Inlet Spacing



Piezometer Ring Data

HOW IT WORKS

The Piezo Ring system is based on the principle of a flow nozzle. The inlet funnel of the fan is used as the flow nozzle, and the flow can be calculated by measuring the static pressure drop through the inlet funnel. The pressure drop is measured from the tap located on the face of the inlet funnel to the piezometer ring in the throat. The inlet tap is connected to the high-pressure side of the transducer and the piezometer ring is connected to the low-pressure side (see diagram below).

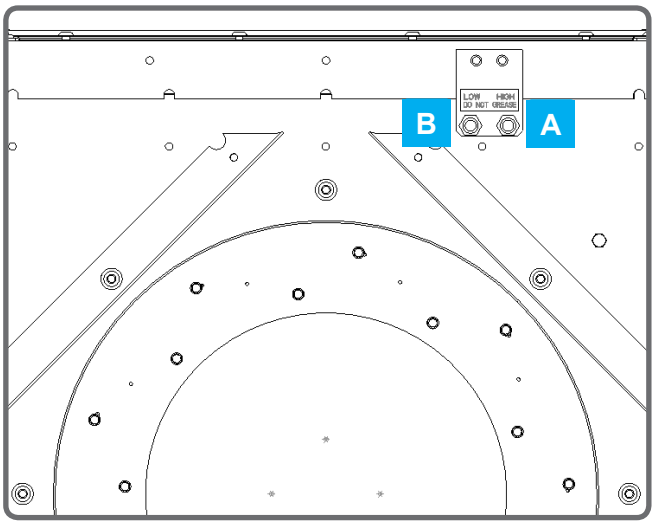
MEASUREMENT OF AIRFLOW

Several factors affect the accuracy of this method of determining flow. The equations below assume the following:

- There are no vanes or other obstructions in or near the inlet
- Impeller to inlet funnel overlap
- Flow entering the funnel (no pre-swirl) contains no pressure.
- Accurate determination of air density at the inlet

A Front Pressure Tap
HIGH PRESSURE

B Piezometer Ring
LOW PRESSURE



K Factor		
Fan Size	iCorus & Corus DDP	Efficient Silent Array
105	592	592
122	842	842
135	963	963
150	1147	1147
165	1450	1450
182	1671	1671
200	2087	2087
222	2458	2458
245	2941	2941

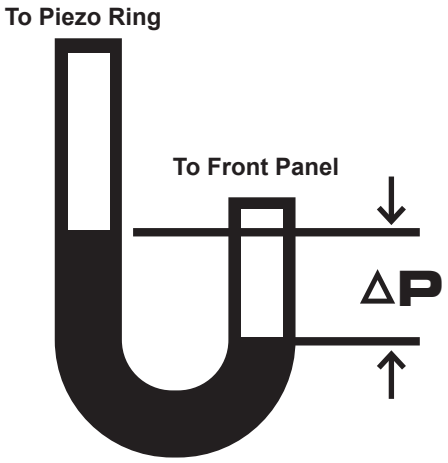
Piezometer Ring Data (Continued)

Calculation when using the Piezo Ring

For standard air (ρ = 0.075 lb/ft3):

(CFM) = K Factor * √(delta pressure)

- K Factor = value from chart
- Delta Pressure (ΔP) = The differential in static pressure from the piezometer ring and the front pressure tap (inches w.g.)



Operation Checklist

When the unit is removed from storage, all grease should be purged and replenished with fresh grease.

The following check list is recommended to ensure proper operation:

Verify proper safety precautions have been followed:

- ☐ Electrical power must be locked off.

Check fan mechanism components:

- ☐ System connections are properly made and tightened.
- ☐ Impeller and fan surfaces are clean and free of debris.
- ☐ Rotate the impeller by hand to verify it spins freely and has not shifted in transit.

Check fan electrical components:

- ☐ Motor is wired for proper supply voltage.
- ☐ Motor was properly sized for power.
- ☐ Motor is properly grounded.
- ☐ All leads are properly insulated.

Trial "bump":

- ☐ Turn on power just long enough to start assembly rotating.
- ☐ Check rotation for agreement with rotation arrow.

Perform checklist again until unit is operating properly. Verify fastener tightness. These may have become loose during shipment or installation.

- ☐ Bushing set screw torque.
- ☐ Bolts on inlet funnel.
- ☐ Motor bolt torque.
- ☐ Nuts holding housing frame to base and base to ground (customer specifications).
- ☐ Bushing fastener torque.
- ☐ Ensure piezo ring tubing will not contact the impeller.

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FOR MORE INFORMATION CONTACT
YOUR LOCAL JOHNSON CONTROLS BRANCH

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