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## INSTALLATION MAINTENANCE, OPERATING INSTRUCTIONS

**IM-200**

# BELT AND DIRECT DRIVE PROPELLER FANS

## AIR PRESSURE AND SUCTION

In addition to the normal dangers of rotating machinery, fans present another hazard from the suction created at the fan inlet. This suction can draw materials into the fan where they become high velocity projectiles at the outlet. It can also be extremely dangerous to persons in close proximity to the inlet, as the forces involved can overcome the strength of most individuals. Inlets and outlets that are not ducted should be screened to pre-vent entry and discharge of solid objects.

## RECEIVING AND INSPECTION

The fan and accessories should be inspected on receipt for any shipping damage. Turn the propeller by hand to see that it rotates freely and does not bind. If shutters are provided, check these accessories for free operation of all moving parts.

F.O.B. factory shipping terms require that the receiver be responsible for inspecting the equipment upon arrival. Note damage or shortages on the Bill of Lading and file any claims for damage or loss in transit. **nyb** will assist the customer as much as possible; however, claims must be originated at the point of delivery.

## HANDLING AND STORAGE

Fans should be lifted by the panel mounting flanges only. Never lift a fan by the propeller, shaft, motor, motor bracket, panel inlet or any fan part not designed for lifting. A spreader should be used to avoid damage.

Whenever possible, fans and accessories should be stored in a clean, dry location to prevent rust and corrosion of steel components. If outdoor storage is necessary, protection should be provided. The fan should be covered to prevent the accumulation of dirt and moisture. Cover motors with waterproof material. Refer to the bearing section for further storage instructions.

Check shutters for free operation and lubricate moving parts prior to storage. Inspect the stored unit periodically. **Rotate the propeller by hand every two weeks to redistribute grease on internal bearing parts.**

## ELECTRICAL DISCONNECTS

Every motor driven fan should have an independent disconnect switch to isolate the unit from the electrical supply. It should be near the fan and must be capable of being locked by maintenance personnel while servicing the unit, in accordance with OSHA procedures.

## MOVING PARTS

All moving parts must have guards to protect personnel. Safety requirements vary, so the number and type of guards needed to meet company, local and OSHA standards must be determined and specified by the user. Never start a fan without having all safety guards installed. Check regularly for damaged or missing guards and do not operate any fan with guards removed. Fans can also become dangerous because of potential "windmilling", even though all electrical power is disconnected. Always block the rotating assembly before working on any moving parts.

## SOUND

Some fans can generate sound that could be hazardous to exposed personnel. It is the responsibility of the system designer and user to determine sound levels of the system, the degree of personnel exposure, and to comply with applicable safety requirements to protect personnel from excessive noise. Consult **nyb** for fan sound power level ratings.

## FAN INSTALLATION

**nyb** propellers are dynamically balanced when fabricated. Complete fans are test run at operating speeds to check the entire assembly for conformance to **nyb** vibration limits. Nevertheless, all units must be adequately supported for smooth operation.

Rough-in wall opening of sufficient size so that, when framed in, the finished opening will accept the fan. It is preferable to frame in the opening with 2 x 6 material, or other similar suitable material or metal channels adequate to support the fan as shown in Figure 1. Slide the fan into the framed opening in the wall. Securely fasten with bolts or screws around the fan panel. A distance of at least one and one-half times the diameter of the fan should be allowed between the fan inlet or discharge opening and any adjacent wall or large obstruction. Additional framing may be necessary for optional shutters.

If shutters are used, they should be mounted in such a way that the blades are in a horizontal position and overlap like shingles on the side exposed to the weather. The motor on motorized shutters and the tie rods on automatic shutters should face the inside. To install, butt the shutter flange up to the wooden frame on the outside of the wall and secure it with lag screws. Do not bend or twist the shutter frame when tightening the screws. Once the shutter is installed, be certain that the blades open and close freely.

If the shutter is motorized, wire the motor. **When supply type fans are used with motorized shutters, it is necessary that a time delay switch be used between the power source and the fan motor to provide time for the shutter to open fully before the fan is activated.**

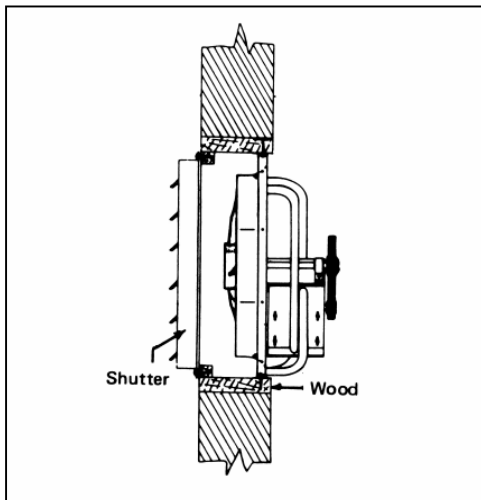


Figure 1

### V-BELT DRIVE Installation (Bare Fans/Replacement)

1. Remove all foreign material from the fan and motor shafts. Coat shafts with machine oil for easier mounting.
2. Mount sheaves on shafts after checking sheave bores and bushings for nicks or burrs. Avoid using force. If resistance is encountered, lightly polish the shaft with emery cloth until the sheave slides on freely.

3. Adjust the motor on its base to a position closest to the fan shaft. Install belts by working each one over the sheave grooves until all are in position. Never pry the belts into place. Sufficient motor adjustment is provided for easy installation of the proper size belts.
4. Adjust sheaves and the motor shaft angle so that the sheave faces are in the same plane. Check this by placing a straightedge across the faces of the sheaves. Any gap between the edge and sheave faces indicates misalignment. Important: This method is only valid when the width of the surface between the belt edge and the sheave face is the same for both sheaves. When they are not equal, or when using adjustable-pitch sheaves, adjust so that all belts have approximately equal tension. Both shafts should be at right angles to the center belt.

### Belt Tensioning

1. Check belt tension with a tensioning gage and adjust using the motor slide base. Insufficient tension shortens belt life, can reduce fan performance and may cause vibration. Excess tension shortens bearing life. The lowest allowable tension is that which prevents slippage under full load. Belts may slip during start-up, but slipping should stop as soon as the fan reaches full speed. For more precise tensioning methods, consult the drive manufacturer's literature.
2. Recheck setscrews, rotate the drive by hand and check for rubbing, then complete the installation of optional guards.
3. Belts tend to stretch somewhat after installation. Recheck tension after several days of operation. Check sheave alignment, as well as setscrew and/or bushing bolt tightness.

### START-UP

Safe operation and maintenance includes the selection and use of appropriate safety accessories for the specific installation. This is the responsibility of the system designer and requires consideration of equipment location and accessibility as well as adjacent components. All safety accessories must be installed properly prior to start-up.

Safe operating speed is a function of system temperature and propeller design. Do not under any circumstances exceed the maximum safe fan speed published in the **nyb** bulletin, which is available from your **nyb** field sales representative.

### Procedure

1. If the drive components are not supplied by **nyb**, verify with the manufacturer that the starting torque is adequate for the speed and inertia of the fan.
2. Inspect the installation prior to starting the fan. Check for any loose items or debris that could be drawn into the fan or dislodged by the fan discharge. Turn the propeller by hand to check for binding.
3. Check drive installation and belt tension.
4. Check the tightness of all setscrews, nuts and bolts. When furnished, tighten hub setscrews with the propeller oriented such that the setscrew is positioned underneath the shaft.

5. Install all remaining safety devices and guards. Verify that the supply voltage is correct and wire the motor. "Bump" the starter to check for proper propeller rotation.
6. Setscrews should be rechecked after a few minutes, eight hours and two weeks of operation (see Table 1 for correct tightening torques).

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

#### WHEEL SETSCREW TORQUES

Setscrew Diameter (in.)	Carbon Steel Setscrew Torque	
	lb. - in.	lb. - ft.
1/4	75	6.2
5/16	144	12
3/8	252	21
7/16	393	33
1/2	600	50

#### FAN MAINTENANCE

**nyb** fans are manufactured to high standards with quality materials and components. Proper maintenance will ensure a long and trouble-free service life.

**Do not attempt any maintenance on a fan unless the electrical supply has been completely disconnected and locked.** In many cases, a fan can windmill despite removal of all electrical power. The rotating assembly should be blocked securely before attempting maintenance of any kind.

The key to good fan maintenance is regular and systematic inspection of all fan parts. Inspection frequency is determined by the severity of the application and local conditions. Strict adherence to an inspection schedule is essential.

Regular fan maintenance should include the following:

1. Check the fan propeller for any wear or corrosion, as either can cause catastrophic failures. Check also for the build-up of material which can cause imbalance resulting in vibration, bearing wear and serious safety hazards. Clean or replace the propeller as required.
2. Check the V-belt drive for proper alignment and tension (see section on V-belt drives). If belts are worn, replace them as a set, matched to within manufacturer's tolerances.
3. Fans with standard captured bearings in formed housing require no service.
4. During any routine maintenance, all setscrews and bolts should be checked for tightness. See the table for correct torques.

5. When installing a new propeller, the propeller should be positioned in the housing with even spacing between the edge of the orifice and the propeller.

#### PROPELLER BALANCE

Airstreams containing particulate or chemicals can cause abrasion or corrosion of fan parts. This wear is often uneven and can lead to significant propeller imbalance over time. When such wear is discovered, a decision must be made to rebalance or replace the propeller.

The soundness of all parts should be determined if the original thickness of components is reduced. Be sure there is no hidden structural damage. The airstream components should also be cleaned to remove any build-up of foreign material. Specialized equipment can be used to rebalance a cleaned propeller that is considered structurally sound.

Balance weights should be rigidly attached at a point that will not interfere with other fan components nor disrupt airflow. Remember that centrifugal forces can be extremely high at the outer radius of a fan propeller.

#### BEARINGS

##### Storage

Any stored bearing can be damaged by condensation caused by temperature variations. Therefore, **nyb** fan bearings are filled with grease at the factory to exclude air and moisture. Such protection is adequate for shipment and subsequent immediate installation.

For long term or outdoor storage, mounted bearings should be regreased and wrapped with plastic for protection. **Rotate the fan propeller by hand at least every two weeks to redistribute grease on internal bearing parts.**

##### Operation

Check the setscrew torque before start-up (see table for correct values). Since bearings are completely filled with grease at the factory, they may run at an elevated temperature during initial operation. Surface temperatures may reach 180°F. This is normal. Bearing surface temperatures will decrease when the internal grease quantity reaches a normal operating level.

##### Replacement

If captured bearings need replacement, install new bearings into neoprene rings, check correct position of propeller with orifice, position bearings in die-formed recess and tighten setscrews. Replace die-formed bearing cap and tighten four bolts.

## 风机常见问题

### 振动过大

用户针对工业风机的普遍性不满在于风机振动过大问题。nyb十分注意确保每台风机在出厂之前都做过精确的平衡；但是，仍然会有许多其他方面的原因造成振动：

- 1、安装螺栓、固定螺丝、轴承或联轴节松动。
- 2、联轴节或轴承过量磨损或偏心。
- 3、电机偏心或不平衡。
- 4、由于吊装失当或外物的冲击造成传动轴弯曲。
- 5、叶轮上外来物的累积。
- 6、叶轮的过量磨损或腐蚀。
- 7、系统压力过大或由于风门紧闭限制了气流通过。
- 8、支撑结构、安装方法或使用材料不当。
- 9、外部传递而来的振动。

### 性能失当

- 1、不正确的检测方法或计算方法。
- 2、风机转速太慢。
- 3、风机叶轮的转动方向错误或传动轴安装反了。
- 4、风机叶轮与锥形入口未能正确对中。
- 5、入口气流转向板损坏或安装不当。
- 6、系统设计问题、风门紧闭、漏气、过滤器或滤筒阻塞
- 7、风机入口弯头阻塞或转弯角太大。
- 8、风机出口气流转向过大。

### 噪声过大

- 1、由于系统设计或安装有误，风机运行几近停止。
- 2、震动源于系统别处。
- 3、系统谐振或冲击
- 4、风机入口或出口的位置或朝向不当。
- 5、支撑结构设计不当或错误。
- 6、靠近噪声反射面。
- 7、风机附件或部件松动。
- 8、皮带松动。
- 9、轴承磨损。

### 部件过早损坏

- 1、过长时间或过大的振动
- 2、维护不当或错误。
- 3、气流或周围环境使部件磨损或腐蚀。
- 4、旋转部件或轴承出现偏心或物理性损坏。
- 5、由于使用了不正确或污染的润滑油或在采用氩弧焊接时通过轴承接地而造成轴承损坏。
- 6、风机转速过高。
- 7、环境或气流温度过高或过低。
- 8、皮带张力不适当。
- 9、叶轮紧固螺丝的紧固度不当。

### 备品备件

建议采用原厂提供的备件。利用特殊合金和公差，nyb的风机部件与原来所供的风机的部件完全兼容。这些部件都使用于nyb的标准保证条款。

订购备件时，请注明部件名称、nyb出厂或控制号码、风机规格、类型、旋转方向（从传动侧来看）、配置和轴承的规格或孔径。绝大多数的信息在风机底座所附的金属铭牌上可以找到。选定备品备件时如需要帮助，请与nyb的销售代表联系，<http://www.nyb.com>。

例如：要求部件：叶轮  
出厂/控制号：B-10106-100  
风机说明：ED30

建议的备件包括：  
叶轮 部件：风门  
轴 马达  
联轴节  
轴承组件 三角皮带

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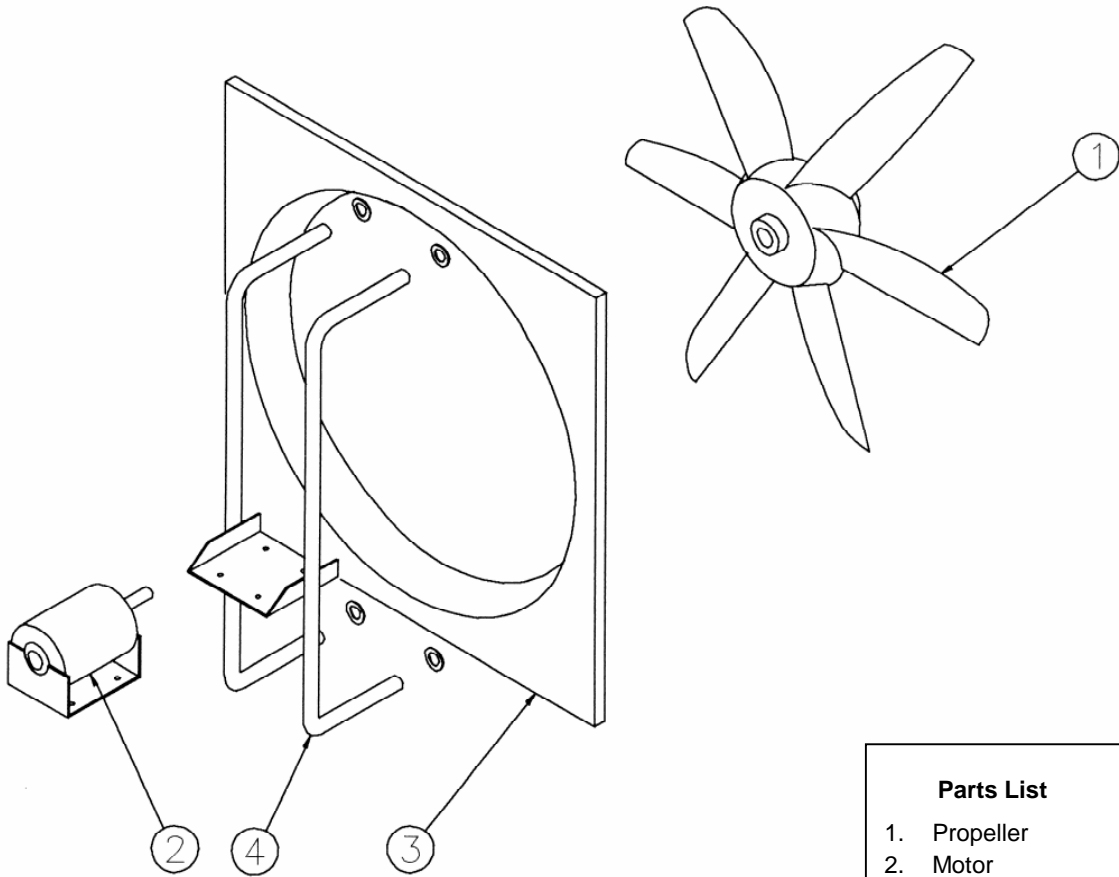
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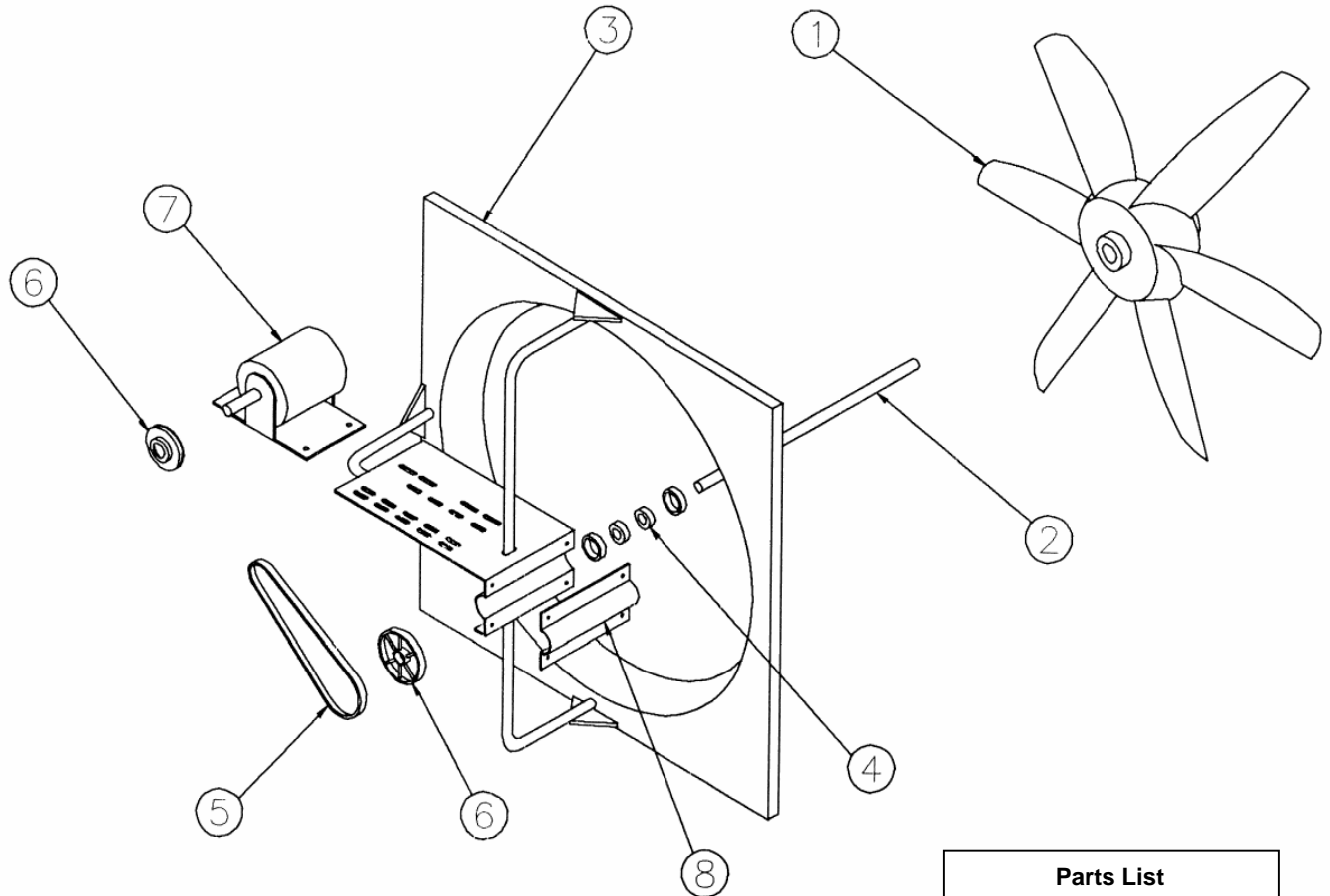
**DIRECT DRIVE  
MODEL F  
PROPELLER FAN**



<b>Parts List</b>	
1.	Propeller
2.	Motor
3.	Fan Panel
4.	Fan Frame

For assistance in selecting replacement parts, contact your local **nyb** representative or visit: <http://www.nyb.com>.

**BELT DRIVE  
MODEL D  
PROPELLER FAN**



**Parts List**

1. Propeller
2. Shaft
3. Fan Frame
4. Bearings
5. Belt
6. Sheaves
7. Motor
8. Bearing Cap

For assistance in selecting replacement parts, contact your local **nyb** representative or visit: <http://www.nyb.com>.